III. INTERNATIONAL CONFERENCE ON GLOBAL PRACTISE OF MULTIDISCIPLINARY SCIENTIFIC STUDIES

November 15-17, 2022

Cyprus



PROCEEDINGS BOOK

EDITORS

Assoc. Prof. Dr. M. Fırat BARAN

Assoc. Prof. Dr. Seyithan SEYDOSOGLU

Assoc. Prof. Dr. Ayse Ozge ARTEKIN

International Conference on Global Practice of Multidisciplinary Scientific Studies-III

DATE – PLACE
November 15-17, 2022
Turkish Republic of Northern Cyprus

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ISSUED: 05/12/2022

ISBN: 978-625-6380-10-3

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III. INTERNATIONAL CONFERENCE ON GLOBAL PRACTICE OF MULTIDISCIPLINARY SCIENTIFIC STUDIES

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- The participant must be connected to the session 5 minutes before the presentation time.
- All congress participants can connect live and listen to all sessions.
- Moderator is responsible for the presentation and scientific discussion (question-answer) section of the session.

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CONGRESS LANGUAGES: English and All Turkish Dialects

15.11.2022 | SESSION-1

Kyrenia Time: 09:00–11:00

Ankara Time: 10:00–12:00

In Person Participation - The Olive Tree Hotel, Kyrenia

HEAD OF SESSION: Prof.Dr. İsmet BAŞER

Authors	Affiliation	Presentation title
Durmuş Çetin Ertuğrul Filiz M. Aydın Akbudak	Akdeniz University	Expression Profiles Of Tomato Nitrate Transporter 2 (Nrt2) Genes Under Abiotic Stress Conditions
Damla Balaban Göçmen Oğuz Bilgin Alpay Balkan Ismet Başer	Tekirdağ Namık Kemal University	Evaluation of Durum Wheat (*Triticum durum* L. Desf.) M4 Mutant Lines in Terms of Yield and Some Phenological Characteristics
Alpay Balkan Levent Özdüven Oğuz Bilgin Canan Şen Ismet Başer Damla Balaban Göçmen Berrin Okuyucu	Tekirdağ Namık Kemal University	Comparison of Green Grass Qualıty Characters of Cool Clımate Cereals In Different Cutting Periods
Ismet Baser Feyza Çay Damla Balaban Göçmen	Tekirdağ Namık Kemal University	Evaluation Of Synthetic Haxaploid Bread Wheat Genotypes For Some Abiotic Stress Characters
Yasemin Erdoğdu	Tekirdağ Namık Kemal University	Effect Of Salt (Nacl) Stress On Germınatıon And Early Seedıng Growth Of Chıve (*Allium schoenoprasum* L.)
Ayşe Özge Artekin	Selçuk University	The Development Process Of Foreıgn Trade In Türkiye From Regıonal And Sectoral Perspectıves
Negar Ebrahim Pour Mokhtari Zeynep Dumanoğlu	Gaziantep University	Some Features Of Lentils Varieties
Ayşenur Şakalak Savaş Çevik	Selçuk University	International Migration From An Economic Perspective And Economic Effects
Zeynep Karaçor Emel Mirza Burcu Güvenek	Selçuk University	Determinants Of Provincial Differences In Average Life Satisfaction: Case Of Turkey
Ceren Yaren Sakim Dilek Tekdal Ayşe Nuran Çil Abdullah Çil	Mersin University	Effects of Herbicide Resistance Genes in Peanut Cultivation
Ceren Yaren Sakim Dilek Tekdal Ayşe Nuran Çil Abdullah Çil	Mersin University	Comparison of Genes Affecting Morphological Characteristics in Oil and Confectionary Sunflower

(All speakers required to be connected to the session 10 min before the session starts)
Moderator is responsible for ensuring the smooth running of the presentation, managing the group discussion and dynamics.

15.11.2022 | SESSION-2

Kyrenia Time: 11:00–13:00

Ankara Time: 12:00–14:00

In Person Participation - The Olive Tree Hotel, Kyrenia

HEAD OF SESSION: Assoc.Prof.Dr. Gülay OĞUZ

Authors	Affiliation	Presentation title
Elvan Şahin Zeteroğlu Meral Taner Derman	Osmaniye Korkut Ata University	Opinions Of Pre-School Education Institution Administrators On Inclusive Education
Fatih Çağatay Baz	Osmaniye Korkut Ata University	A Study On The Socıal Medıa Use And Addıctıons Of Adolescents
Handan Asûde Başal Ayşegül Çikrikçi	Bursa Uludağ University	The Relatıonshıp Between The Separatıon Anxıety Of Chıldren Who Have A New Begınnıng Of Preschool Educatıon And The Concerns Of Theır Mothers
A. Hakan Aktaş	Süleyman Demirel University	Determination of Metamızol and Caffeine Active Ingredients In Medicine Samples By Classıc and Inverse Least Square Methods Wıth The Aıd Of Uv-Spectrophotometric Method
Efkan Çatiker Mesut Yilmaz Temel Öztürk	Ordu University	Investıgatıon Of The Swellıng Behavıor Of Polyepıchlorhydrıne Cross-Lınked Wıth Polyethylene Glycol Brıdges In Solvents Of Dıfferent Polarıty
Güher Ceylan Kuşoğlu	Akdeniz University	Changing Mothers of A Changing Turkey
Nur Kaluç Damla Koyun Pınar Buket Thomas	Maltepe University	Effect Of Acıdıty On The Mode Of Cell Death In Response To Oxıdatıve Stress
Gamze Kirilmazkaya	Harran University	Investigation of the Effects of Inquiry-Based Science Teaching on Pre-service Teachers' Science Process Skills and Motivation
Gülay Oğuz	Harran University	An Intruduction to Soft Dimonoids
Meryem Evecen	Amasya University	Spectroscopıc Properties Of The Schıff Base Ni Metal Complex Compound Wıth Theoretıcal Methods
Nedime Karasel Eylem Menteşoğullari Şevket Şafakoğullari	Cyprus International University	Developments In The Fıeld Of Technology Qualıfıcatıon In School Managers
Çiğdem Yorulmaz	Kırıkkale University	Regulatıons That Protect Women Workers In Internatıonal Treatıes And In Our Legıslatıon
Bahar Burtan Doğan Zerin Türk	Dicle University	The Importance Of Education And Qualified Labor Force In Digital Economy

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15.11.2022 | SESSION-3

Kyrenia Time: 13:00–15:00

Ankara Time: 14:00–16:00

In Person Participation - The Olive Tree Hotel, Kyrenia

HEAD OF SESSION: Dr. Ayşe Nuran ÇİL

Authors	Affiliation	Presentation title
Ahmet Salih Ikiz	Muğla Sıtkı Koçman University	An Assessment on Turkey-Eu Relatıons After 11 September Within The Framework of Dynamic Game Model
Pınar Sevginer	Marmara University	Addiction In Adolescense And Evaluatıon Accordıng To The Biopsycosocıal Model
Hasan Osmanoğlu Meliha Uzun Gamze Güney	Şırnak University	Emotional Status Of Physical Education Teachers By Analysis Of Twits With The #Bedeneğitimineadalet Hashtag
Meliha Uzun Sekvan Yimez Gamze Güney Hasan Osmanoğlu	Şırnak University	Sports And Bullying Tendencies: A Research On Sports Individuals
Ayfer Sönmez	Bursa Uludağ University	Effectiveness Of The Method Of Teaching Primary Reading And Writing With Visual Story Syllables (Ghhoyö) (Students With Foreign National Parents)
Emine Aldirmaz Meryem Evecen	Amasya University	Effect Of The Doped Centre On The Electronic Properties Of Icosahedron Cu6zn6al, Cu6al6zn And Zn6al6cu Cluster
Murat Korunur Sibel Korunur	Munzur University	Tsallıs Holographıc Dark Energy And Scalar Fıelds In Bıanchı Type-V Space-Tıme Model
Nazan Avcioğlu Kalebek Seher Turgut	Gaziantep University	Production of Accessorıes (Buttons) From Bio-Based Wastes and Investigation of Washıng Fastness Values
A. Hakan Aktaş	Süleyman Demirel University	Determınatıon of Active Substances in High Tension Drug Contaınıng Valsartan and Hydrochlorothıazıde By Uv-Spectrophotometrıc Method and Chemometric Methods
Çiğdem Esendağli Serdar Selim	Akdeniz University	Automated Change Detectıon Of Water Surface In The Geçitköy Reservoır Usıng Multı-Temporal Landsat Imagery
Mustafa Gurhan Yalcin Sezer Unal Ozge Ozer Atakoglu Fusun Yalcin	Akdeniz University	Factor Analysis Of Beach Sediment At Damlatas Beach (Alanya, Turkey)
Emre Yavuz Niyazi Ugur Kockal	Akdeniz University	Effect of aerogel on manufactured insulation plates
Seyithan Seydosoglu Kagan Kokten	Siirt University	Metal Accumulation in Forages: A Review

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15.11.2022 | SESSION-4

Kyrenia Time: 15:00–17:00

Ankara Time: 16:00–18:00



In Person Participation - The Olive Tree Hotel, Kyrenia

HEAD OF SESSION: Prof. Dr. Murat DEVECİ

Authors	Affiliation	Presentation title
Özlem Üstündağ Selçuk Göçmez	Aydın Adnan Menderes Üniversitesi	Effects Of Biochars Aplications Which Were Saturated With Biogas Plant Wastewater On Plant Nutrient Of Maize (Zea mays L.)
Harun Korunur	Munzur University	The Position And Importance Of Women In The Empire Of Great Seljuk And Anatolıan Seljuk State
Oktay Yildiz	Düzce University	Effects of Fire on Mediterranean Ecosystems
Oktay Yildiz	Düzce University	Aridity, Desertification And Central Anatolia
Mertkan F. Tekinalp	Düzce University	Use Of Rain Gardens In Urban Design
Zehra Meliha Tengiz Bekir Ayyildiz	Yozgat Bozok University	Evaluatıon Of Agrıculture And Energy Consumptıon Wıth Agro-Ecologıcal Economıc Crıterıa In Turkey
Merve Ayyildiz Zehra Meliha Tengiz	Yozgat Bozok University	The Causalıty Relatıonshıp Between Forage Supports And Culture Area In Turkey
Erdem Yilmaz Seda Yavuz	Akdeniz University	Determination of Change in Humic and Fulvic Acid Amount in Lignite Accumulating Soils
Sevilay Konya Zeynep Karaçor	Selçuk University	Investıgatıon on Unemployment Hysterıa in The Türkiye Economy: Female, Men, And Youth Unemployment
Murat Deveci Zeliha Elif Savci	Tekirdağ Namık Kemal University	The effect of different organomineral and mineral fertilizer Applications on some physiological properties in spinach Growing
Murat Deveci Zeliha Elif Savci	Tekirdağ Namık Kemal University	Alternatif Yeşilliklerde (Mibuna, Mizuna ve Komatsuna) Tuz Stresinin Meydana Getirdiği Bazı Kimyasal Değişikliklerin Belirlenmesi.
Murat Deveci Gülhan Akyürek	Tekirdağ Namık Kemal University	Bazı Egzotik Sebze Türlerinde Farklı Kuraklık Uygulamalarının Fizyolojik Değişiklikler Üzerine Etkisi
Murat Deveci Şükrü Öztürk	Tekirdağ Namık Kemal University	Farkli Tuz Konsantrasyonlarina Sahip Sulama Sularinin Pazinin Bazi Makro-Mikro Besin Elementi Miktarlari Üzerine Etkileri

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15.11.2022 | SESSION-5

Kyrenia Time: 17:00–19:00

Ankara Time: 18:00–20:00

In Person Participation - The Olive Tree Hotel, Kyrenia

HEAD OF SESSION: Assoc.Prof. Dr. Mehmet Fırat BARAN

Authors	Affiliation	Presentation title
Şahin Ay	Siirt University	An Assessment On Accommodation Tax
Şahin Ay	Siirt University	The Status Of The Border Cıtıes In Tax Collectıon: Examples Of Kilis, Şırnak, Van And Artvin
Şahin Ay	Siirt University	Elections And Tax-Based Promises In Turkey
Nihayet Koçyiğit	Batman University	Effect Of Nanographıte On Nonflammabılıty Proporties Of Expandable Polystyrene
Nihayet Koçyiğit	Batman University	Increasıng The Synergıc Effect Between Halloysıte Nanotubes And The Surfaces Of The Polystyrene Matrıx
Sipan Soysal Hilal Yilmaz Abdurrahim Yilmaz	Siirt University	Biochar Treatments in Field Crops
Abdurrahim Yilmaz Hilal Yilmaz Sipan Soysal Vahdettin Çiftçi	Bolu Abant İzzet Baysal University	Use of Nano-Fertilizer in Agricultural Fields
Korkmaz Bellitürk Ahmet Çelik Fatih Büyükfiliz	Tekirdağ Namık Kemal University	Status Of Agricultural Inputs After The Covid-19 Pandemic Crisis: The Case Of Mineral And Organic Fertilizers. A Review
Korkmaz Bellitürk Ahmet Çelik	Adıyaman University	The Importance Of Using Vermicompost In Field Crops Cultivation
Fatih Büyükfiliz Kıvanç Sezer Korkmaz Bellitürk Ahmet Çelik	Tekirdağ Directorate of Provincial Agriculture and Forestry	Evaluation Of Agricultural Activities In Süleymanpaşa District
Cihan Demir Osman Gökdoğan Mehmet Fırat Baran	Kırklareli University	Determination of Energy Usage and Greenhouse Gas Emissions in Lavender Production
Emine Budakli Çarpici Sebiha Erol Barış Bülent Aşik	Bursa Uludağ University	The Effects of Sowing Time And Harvest Stages on Silage Quality In Buckwheat (Fagopyrum esculentum Moench.)

(All speakers required to be connected to the session 10 min before the session starts)
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15.11.2022 | SESSION-1 | HALL-1

Kyrenia Time: 09:00–11:00

Ankara Time: 10:00–12:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assoc. Prof. Dr. Omer SOZEN

	Affiliation	Presentation title
M. Zeki Karipçin	Siirt University	Hardness Of Seed Coat In Some Vegetables
Aynur Bilmez Özçinar	Siirt University	Expressing Genes of Peanut (Arachis hypogaea L.): A Review
Sait Aykanat Mehmet Emin Bilgili Hatun Barut	Eastern Mediterranean Agricultural Research Institute Directorate	The Effects Of Different Sowing Methods On Some Soil Parameters On Wheat-Second Crop Soybean Rotation In Çukurova Conditions
Yusuf Solmaz	Tekirdağ Namık Kemal University	Algae As A Bio-Fertilizer In The Soil-Plant System
Serhat Akyüz Serap Kızıl Aydemir	Bilecik Şeyh Edebali University	Determination Of Vitality Performances Of Feed Pea Seeds Before And After Storage Under Laboratory Conditions
Ömer Sözen	Sivas Science and Technology University	Comparison Of Some Dried Bean Genotypes In Terms Of Quality Characteristics
Ömer Sözen	Sivas Science and Technology University	A Research On The Determination Of The Relationships Between Some Quality Characteristics In Dried Bean Genotypes By Correlation And Path Analysis
Pınar Bozbeyoğlu Ali Gündoğdu	Gümüşhane University	Investigation Of The Performance Of A New Activated Carbon Produced By The Activation Of Potassium Carbonate From Corncob To Remove Dyestuffs From Industrial Wastewater
Bilge Alpin Gümüş Ayşe Sirel	İstanbul Aydın University	Iconıc Buıldıngs As A Spartıal Representatıon Of Power

(All speakers required to be connected to the session 10 min before the session starts)
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15.11.2022 | SESSION-1 | HALL-2

Kyrenia Time: 09:00–11:00

Ankara Time: 10:00–12:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assist. Prof. Dr. Görkem ÖRÜK

Authors	Affiliation	Presentation title
Başak Ocak M. Şahin Gök Tuğkan Arici	Gebze Teknik University	Competitive Intensity Factor In The Industry 4.0 Process
Makbule Evrim Gülsünler Imran Aslan	Selçuk University	Sustainabilty And Public Relations Practices
Bahadır Cahit Tosun Mehmet Akif Balkaya	Selcuk University	Academic Writing Course When Online: Is It Really Fun?
Umoette Linda Edo Ekong Emem Archibong	Akwa Ibom State University	Nutrient level in sediments and water of Iko river
Erkan Fidan	Bilecik Şeyh Edebali University	A Multidisciplinary Approach To Archaeological Surveys
Erkan Fidan	Bilecik Şeyh Edebali University	The Importance Of Interdisciplinary Studies In Archaeological Excavations
Gamze Mercan	Necmettin Erbakan University	Share Of Wealth Tax In Gdp: A Comparative Analysis Of Turkey And Eu Member Countries
Semih Muşabak Zeynep Nur Sandikci Elçin Yilmaz Ediz Şaykol	Beykent University	Systematic Evaluations And A Scoring Approach On Buy Now Pay Later Credit System
Ufuk Şahin	Atatürk University	Devastating Effects Of War On Women And Society In "Cennet Kizin Cinneti": A Critical Discourse Stylistic Analysis
Hülya Küçükoğlu	Bozok University	Teaching Language Skills Through Short Stories

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15.11.2022 | SESSION-1 | HALL-3

Kyrenia Time: 09:00–11:00

Ankara Time: 10:00–12:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assoc. Prof. Dr. Deniz ŞİRELİ

Authors	Affiliation	Presentation title
Dürdane Mart Meltem Türkeri	Eastern Mediterranean Agricultural Research Institute Directorate	Investigation Of Chickpea (Cicer aritinum L.) Lines And Varieties İn Winter Sowing İn Çukurova Region
Levend Coşkuntuna	Tekirdağ Namık Kemal University	Critical Control Points In Silage Making
Rahşan Taner Kirca Arzu Coşkuntuna	Tekirdağ Namık Kemal University	Investigation Of Control Possibilities Of Seed Borne Alternaria Alternata With Essential Oils In Sainfoin Feed Plant
H. Deniz Şireli Ali Murat Tatar Murat Turan	Dicle University	The Effect Of The Weight Of Invisible Sheep At Breaking And Birth On The Weight Of Lamb Birth And Weaning
Ali Murat Tatar H. Deniz Şireli Murat Turan	Dicle University	Determination Of The Relationship Between Various Body Size And Milk Production Of Karakaş Sheep Breeds Under Breeders Conditions
Murat Turan Ali Murat Tatar H. Deniz Şireli	Dicle University	Current Situation And Future Of Buffalo Breeding In Turkey
Ferhat Kizilgeçi Mehmet Yildirim Ferhat Öztürk	Mardin Artuklu University	Dendrogram Of Cimmyt Bread Wheat Germplasm Based On Seed Characteristics
Mehmet Yildirim Ferhat Kizilgeçi Seval Eliş	Mardin Artuklu University	Evaluation Of Yield And Quality Traits Of Bread Wheat Advanced Lines During Drought Season
M. Said Bayraklilar	Siirt University	A Research On The Application Of Finite Element Analysis In Additive Manufacturing Method
Pervin Erdoğan Fatih Ölmez Zemran Mustafa Tolga Karaköy	Sivas Bilim ve Teknoloji University	Determination Of Methods Of Control With Vectors Caused By Stolbur Disease (Candidatus Phytoplasma Solani) In Potato Culture Areas In Sivas Province

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15.11.2022 | SESSION-1 | HALL-4

Kyrenia Time: 09:00–11:00

Ankara Time: 10:00–12:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assoc. Prof. Dr. Ferhat ÖZTÜRK

Authors	Affiliation	Presentation title
Ferhat Öztürk	Sırnak University	The Determination Of Agronomic And Quality Characteristics Of Different Sesame (Sesamum Indicum L.) Genotypes: I. Agronomic Characteristics
Ferhat Öztürk	Sırnak University	The Determination Of Agronomic And Quality Characteristics Of Different Sesame (Sesamum Indicum L.) Genotypes: Ii. Quality Characteristics
A. Konuralp Eliçin Abdullah Sessiz	Dicle University	Comparison Of Shear Methods Of Vineyard Pruning Residues
Gülten Süer Ahmet Konuralp Eliçin	Dicle University	Determining The Cooling Efficiency Of A Milk Tank Modeling Using Peltier Cooler
Sevilay Gül Levent Coşkuntuna	Tekirdağ Namık Kemal University	Factors Affecting Silage Quality And Dry Material Losses
Soumya Sukumaran Renju. R. Krishnan	Mar Ivanios College	Modified Combustion Method Synthesis Of Cuo-Nio Nanocomposites For Photocatalytic Degradation Of Methylene Blue Under Solar Light Irradiation
Seerwan Saeed Mohammed Ali Volkan Bilgili	Harran University	Estimation Of Soil Properties In Harir Region In Erbil Governorate Of Iraq By Using Geostatistical And Spectro Radiometer Techniques
Gökçe Çiçek Ceyhun	Bursa Technical University	Potentıal Effects Of Aegean Sea Dısputes On Marıtıme Transportatıon
Serkan Perçin Yener Aksoy Yılmaz Aksoy	On Dokuz Mayıs University	Individuals According To The Departments Educed Examination Of Confidence Conditions
Yener Aksoy Serkan Perçin	On Dokuz Mayıs University	Aggression Status of Individuals According To Body Mass Index

(All speakers required to be connected to the session 10 min before the session starts)
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15.11.2022 | SESSION-1 | HALL-5

Kyrenia Time: 09:00–11:00

Ankara Time: 10:00–12:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assoc. Prof. Dr. Sevim AKÇAĞLAR

Authors	Affiliation	Presentation title
Mohammad Zakir Pardis Ebru Mavioglu Ayan Suleyman Kocak Ahmet Cay Fatima Nil Ertaş	Ege University	Use of Electrospun Cellulose Acetate Nanofiber Coating in Corrosion Protection of ST37 Stainless Steel
Sezen Gamze Göker Bilgin Zengin	Munzur University	Investigation Of Turkey's Solid Waste Energy Potential: Example Of Eskişehir Province
Sevim Akçağlar	Bursa Uludağ University	Green Synthesis, Characterization and Antibacterial Activity of Silver Nanoparticles of Aspergillus terreus
Sevim Akçağlar	Bursa Uludağ University	Biological Synthesis of Silver@Graphene Oxide Nanocomposite and Antimicrobial Determination of Activity
Şeyda Taşar Ahmet Özer	Fırat University	Effect Of Natural Antimicrobial Agents On Water Vapor Permeability, Moisture Holding Capacity And Water Solubility Of Hemicellulose-Based Food Packaging Material
Erhan Kahya Fatma Funda Özdüven	Tekirdağ Namık Kemal University	Determining The Position Of Cucumber On The Seedle And Finding The Harvest Size Using Image Processing Technique
Vaibhav Kant Singh	Central University	Fuzzy Associative Memory For Truck Backer System
Vaibhav Kant Singh	Central University	Backpropagation Algorithm Of Ann
Vaibhav Kant Singh	Central University	A Report On Principal Component Analysis
Oualid Rholam Barmaki Mohammed	University Ibn Tofail	Fractional integrals of Hermite-Hadamard inequalities type for MT-convex stochastic

(All speakers required to be connected to the session 10 min before the session starts)
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15.11.2022 | SESSION-1 | HALL-6

Kyrenia Time: 09:00–11:00

Ankara Time: 10:00–12:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assist. Prof. Dr. Zekiye ŞENGÜL

Authors	Affiliation	Presentation title
Rıstına Sıtı Sundari Andrı Kusmayadi Aı Kusmıyatı Asyiah	University of Perjuangan Tasikmalaya	Producing Antioxidant And Odorless Duck Salted Egg Extention With (Plectranthus Amboinicus Spreng) Enrichment
Zekiye Şengül Gamze Saner	Siirt University	Socio-Economic Analysis Of Beekeeping Farms In Aydin, İzmir, And Muğla Provinces
Ivan Pavlovic	Institute of Veterinary Medicine of Serbia	Biodiversity Of Ticks On Green Areas And Parks Of Belgrade During 2020
Oktay Kaplan	Dicle University	Nutritional Diseases Of Cat And Dogs
Özlem Durna Aydin	Kafkas University	Meadows, Pastures And Their Roles In Disease Contagion
Füsun Gülser Coşkun Gülser	Van Yüzüncü Yıl University	Stress Types and Antioxidant Enzyme in Plants
Coşkun Gülser Füsun Gülser	Van Yüzüncü Yıl University	Chemical and Organic Fertilization in Ornamental Plants
Naim Derebaşi Ilhan Kahraman	Bursa Uludağ University	Novel Controlled Pulse Drive Method For Cooling Performance

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15.11.2022 | SESSION-1 | HALL-7

Kyrenia Time: 09:00–11:00

Ankara Time: 10:00–12:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assoc. Prof. Nazire MİKAİL

Authors	Affiliation	Presentation title
Amjed Mohammed Ismael Miraç Kılıç Hikmet Günal	Harran University	Performance Of Multilayer Perceptron Artificial Neural Network Model In Spatial Estimation Of Particle Size Distribution
Amjed Mohammed Ismael Miraç Kılıç Hikmet Günal	Harran University	Comparison Of Conventional Geostatistics And Machine Learning Techniques For Modeling Spatial Distribution Of Lime Content In A Semi-Arid Region
Muhammed Zeki Kaplan Nazire Mikail	Siirt University	Loess Regression Method And It's Application
Muhammed Zeki Kaplan Nazire Mikail	Siirt University	Thin-Plate Smoothing Spline Method And It's Application
Samarjit Roy Debashis De	D Y Patil International University	Sustainable Internet Of Music Things Towards The Ubiquitous Musicological Smart City
Wahid Ullah Muhammad Asif Jan Emel Khan	Kohat University	Improved Firefly Algorithm With Different Distance Formulae
Zeynep Noyan Tuğcan Yilmaz Alper Çanakçi	BİSAN Motosiklet ve Bisiklet San. ve Tic. A.Ş.	Crank Design With Topology Optimization
Şerife Gökçe Çalişkan Onur Genç Nursabah Sarikavakli	Aydın Adnan Menderes University	Investıgatıon Of The In Vıtro Antı-Prolıferatıve Actıvıty And In Sılıco Molecular Dockıng Properties Of Nıckel(Iı) Complexes Of Hydrazonoxyme Lıgands Bearıng The Pyrazolone Group

(All speakers required to be connected to the session 10 min before the session starts)
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15.11.2022 | SESSION-2 | HALL-1

Kyrenia Time: 11:30–13:30

Ankara Time: 12:30–14:30

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assoc.Prof. Dr. Emine KÜÇÜKER

Authors	Affiliation	Presentation title
Ismayilov Nadir	Baku State University	Contemporary Trends Of Document Flow in The Field Of Librarianship And Bibliography in Azerbaijan
Yahşihanım Nesirova	Azerbaijan National Academy of Sciences	The Reflection Of The Socio-Political Events Of The Early 20th Century In Urmia And Surrounding Areas In The Ottoman Archival Documents
A.I.Ismayilkhanova	Department of general pedagogy	Orqanization of educational work in general educational institutions
Ekin Su Kuzu	Giresun University	Transforming Graphic Design Concept On The Axis Of Post-Capitalism As A New Paradigm
Ruslan Valieiev	Dnipropetrovsk State University of Internal Affairs	Implementation An Interactive Multimedia Textbook To Organize Flipped Classroom For Part-Time Education Students
Adamzhan Moldir	Al-Farabi Kazakh National University	The influence of fake information on urban culture
Nazlı Çağıl Küçükgöksel Teoman Akpinar	Tekirdağ Namık Kemal University	The Effect Of Social Media On Conspicuous Consumption
Mahnoor Fatima Aiman Shahzad Sara Majid	University of Management and Technology	Family Cohesion, Bully victimization and Emotional Behavioral Problems in School Children: A correlation study
Cherrycharry Agwa Tabi Joel Agwetang Ajuh	Chukwuemeka Odumegwu Ojukwu University	Car Refugees And Cameroonian Host Community Women At Crossroad With Resilient Livelihoods

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15.11.2022 | SESSION-2 | HALL-2

Kyrenia Time: 11:30–13:30

Ankara Time: 12:30–14:30

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assist. Prof. Dr. Abdurrahim YILMAZ

Authors	Affiliation	Presentation title
Hannene Hafsi Naoual Handel	University of Mouhamed	Influence of the material grain size on the physical-mechanical behavior of sand concrete
Naoual Handel Sarah Djouimaa	University of Mouhamed	Physical-mechanical behavior of concrete based on blast furnace slag sand
Uzma Ashiq Sara Subhan Sayyeda Taskeen Zahra	University of Mouhamed	Role of Self-Esteem in Punitive Parenting and Psychological Reactions of Abuse and Neglect in Adolescents
Raphael I. Ndukwu Nkeiru H. Ezeadichie Joy U. Ogbazi	University of Nigeria	Spatial Analysis Of Home-Based Enterprises And Implications For Urban Management
Raja Muhammad Liaquat Malik Naeem Akhtar Mansoor Alam Ansari	Federal Urdu University of Arts	Server cloning in AAA for ad hoc networks
Mutlu Türkmen Mert Durukan M. Fatih Akay H. Şebnem Arli F. Ceren Ulus Z. Sude Sari Sevtap Erdem	Cukurova University	Demand Forecast Models For Personal Protective Equipment Using Supervised Learning
Reşitcan Yiğittop	Maysan Mando A.Ş,	Investigation and Optımızatıon of The Parameters Affecting The Damping Force In Telescopic Shock Absorber

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15.11.2022 | SESSION-2 | HALL-3

Kyrenia Time: 11:30–13:30

Ankara Time: 12:30–14:30

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assist. Prof. Dr. Leila IMANPARAST

Authors	Affiliation	Presentation title
Adebiyi Oladipupo Adeboye Oluwabusayo Matey Olabode Adetoun Adedotun Amubode	Federal University of Agriculture	Acceptance Of Pointillism Wall Hanging As A Means Of Communication Among Staff Of Corporate Organizations In Abeokuta Metropolis
Nwafili Sylvanus	University of Port Harcourt	Sills gap in undergraduates Fisheries Training Programmes in Nigeria: Case study of University of Port Harcourt
Monica Toma	Bucharest University of Economic Studies	Oppression and revolution in in Kurt Wimmer's film, „Equilibrium"
Chandrasekharan Praveen	Christ Nagar College of Education	English Language Learning and Culture Clash: Can the hurdles to empowerment be overcome?
Agubata Nonye Stella Ekwueme, Chika Maurren	Chukwuemeka Odumegwu Ojukwu University	Audit Attributes On Earnings Smoothing Of Quoted Industrial Goods Companies In Nigeria
Maikudi Muhammad Inuwa Mukhtar Ahmad Ahmad Tijjani Abdullahi Abubakar Isah Jibrin	Kano State College of Education and Preliminary Studies	Coupling Effect Of Control Of Corruption And Economic Growth On Environmental Quality In African Countries: Gmm-Based Quantile Regression
Ayesha Batool Farkhanda Anjum	University of Agriculture	Impact of socio- cultural factors on nutritional status of mother and children in Punjab, Pakistan
Leila Imanparast Murat Bakan	Agri Ciel Institute Company	Weeds Inhibitor Mathematical Modeling Microwave Agricultural Device Design and Development

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15.11.2022 | SESSION-2 | HALL-4

Kyrenia Time: 11:30–13:30

Ankara Time: 12:30–14:30

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assoc. Prof. Dr. Yasemin DUMRUL

Authors	Affiliation	Presentation title
Selin Başer	Independent Researcher	An Evaluation Of The Srebrenica Genocide And The Attitudes Of International Actors During And After The Genocide In The Context Of International Law
Yasemin Dumrul Zerrin Kiliçarslan	Kayseri University	Empirical Analysis Of The Effects Of Trade Openness On Economic Growth: An Evidence For Turkiye
Elif Betül Kiliç Dilek Dülger Altiner	Kocaeli University	Functional Product Development: Investigation Of Sensory Analysis Studies In Different Bread Varieties
Seda Topgül	Akdeniz University	The Effect Of Artificial Intelligence On Working Life
Vildan Kistik Tuncay Can	Marmara University	Marmaray Timetable And Energy Consumption Optimization With Fuzzy Passenger Arrival-Alighting Rates
Halime Güdül Dilek Dülger Altiner	Kocaeli University	Investigation Of Sensory Analysis And New Product Development Studies In Dessert Varieties
Charity Ebelechukwu Okorie Emeka Emmanuel Otti Blessing Maina John Bamigbala Olateju Alao Ibrahim Abdulmudallib Jonathan Timothy Auta	Federal University	Statistical Analysis Of Crime Rate And Prison Population In Nigeria
Erol Esen	Akdeniz University	The future of European Integration: Ukraine turn of the European Union
Ahmad Siar Akbari Liaqat Ali Akhlaqi	Lecturers of Taj University	Challenges and Opportunities of Applying Decent Work in Afghanistan
Durmuş Ünver Tevfik Şahin	Amasya University	3-Boyutlu Öklid Uzayinda Singülerlikler Üzerine

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15.11.2022 | SESSION-2 | HALL-5

Kyrenia Time: 11:30–13:30

Ankara Time: 12:30–14:30

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Dr. Rıstına Sıtı SUNDARI

Authors	Affiliation	Presentation title
Vaibhav Kant Singh	Central University	Learning Vector Quantization Algorithm Of Ann
Abdulgaffar Muhammad Ibrahim Salisu Masoud Abdulkadir Salisu Musa Usman	Central University	Modeling the connection between electrical energy security instruments and GDP growth in Nigeria: A Linear Autoregressive Distributed Lags Approach
Mina Pirzadeh Mansour Hashemi	University of Guilan	On the commutativity degree of finite group G Hm m for g G
Aitolkyn Ashimova Almagul Kurmanbayeva	Turan University	Problems Of Legal Regulation Of Artificial Intelligence In Kazakhstan
Ali Irfan Sadia Faiz Azhar Rasul Rehman Zafar Ameer Fawad Zahoor Katarzyna Kotwica-Mojzych Mariusz Mojzych	Government College University Faisalabad	Facile Synthesis, Hemolytic, Thrombolytic and Anti-Cancer Potential of Benzofuran-Oxadiazole and Triazole Scaffolds
Nidhi Lathigara Tushar Jain	Marwadi University	Adultery Laws – An Assessment Under International Domain
Krupansh Patel Bhargav Tewar	CEPT University	Developing Lightweight Geopolymer Concrete Using Leca
Nurəliyeva Sevda Əlimət Qızı	Azerbaycan University	The Issue Of Self-Education Of High School Students

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15.11.2022 | SESSION-3 | HALL-6

Kyrenia Time: 15:00–17:30

Ankara Time: 16:00–18:30

Meeting ID: 889 2167 5245 | Passcode: 555444

HEAD OF SESSION: Assoc. Prof. Dr. Mine PAKYÜREK

Authors	Affiliation	Presentation title
Bilal Albenni Mine Pakyürek	Siirt University	An Organic Soil Improver : Compost
Nihayet Yağmur Mine Pakyürek Erdal Ağlar	Siirt University	Effects of drought stress on plants.
Kajal Shaw	Central University of Punjab	Preventive Education on drug abuse: Need of the day for human rights
Kajal Shaw	Central University of Punjab	Mobile phone: A Boon to Health Communication in India
Hafiz Qadeer Ahmed Adil Shahzad	University of Agriculture	Methane Emission from animals and its Environmental Consequences
Imran Nawaz Nazeer Anjum Ghulam Murtaza	University of Engineering and Technology	Study Of Stress Corrosion Cracking Of Tig Welded Aluminum Alloy
Emmamoge Orewere Dogun Ojochogu Ruth Ajibola Ogenyi	Federal College of Forestry	Implications Of Street Trading On The Visual Streetscapes Of An Urban City Centre In Nigeria
Dogun Ojochogu Ruth Ajibola Ogenyi Emmamoge Orewere Longchi Satkat Zacheaus	Federal College of Forestry	Anti Fungal Activity Of Azadirachta Indica Essential Oil On Several Selected Aspergillus Species

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15.11.2022 | SESSION-3 | HALL-1

Kyrenia Time: 14:00–16:00

Ankara Time: 15:00–17:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assist. Prof. Dr. Görkem ÖRÜK

Authors	Affiliation	Presentation title
Mohammed Waheeb Firas Alawneh	The Hashemite University	Discoveries At Livias Near Site Of Jesus Baptism-Jordan Southern Levant (A Station for Incense Route in Jordan Valley)
Berfin Kardaş Görkem Örük	Siirt University	Food safety knowledge of consumers in Diyarbakır Province
Şilan Laçin Görkem Örük	Siirt University	Determination of socio-economic structure of wheat farms: A case study of Diyarbakır Province
Ogbeche, Mary Mark Asuquo, Michael Ekpenyong Owan Mercy Valentine	University of Calabar	Stress Management Strategies and Administrative Job Performance of Secondary School Principals in Cross River State, Nigeria.
Ali Usman Fatima Bello Iklimatu Adamu Umar Aliyu M. Maibeti Jamilu M. B Ahmed	School of Business Studies	Modelling Corporate Governance and Local Content Disclosure in the Nigerian Oil and Gas Sector: A Conceptual Review
Ms.Vadde Leelasri Ms.Ashmikaa S Mr.Jayashankar.J	Hindustan Institute of Technology and Science	China Pakistan Economic Corridor(Cpec) And Its Impact On India: A Study
Nabanita Sen	Bankura University	Tech-Enabled Investigative Techniques In Human Trafficking: The Phased Approach
Baiju Thomas	Ramakrishna Mission Vivekananda Educational and Research Institute	Supporting Cooperative Learning Skills in Pre-service Teacher Education Enhances Professional Development in the Inclusive Classroom Settings
Priya Chaudhary Richa Gupta Neelam Kumari Shabila Wani	Lovely Professional University	Psychological Distress and Suicidal ideation among Adolescents: The Moderating Role of Social Support

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15.11.2022 | SESSION-3 | HALL-2

Kyrenia Time: 14:00–16:00

Ankara Time: 15:00–17:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Dr. Ayman El Sabagh

Authors	Affiliation	Presentation title
Yusuf Naimat	Lovely Professional University	For Sustainable Healthy Life To Be Guaranteed, Individual's Contributions Towards Health Care Delivery Needs To Be Addressed
Samira Hasanova Ulviyya Nasirova Vafa Hajiyeva	Odlar Yurdu University	Intercultural Communication And Translation
Samira Hasanova Ulviyya Nasirova Batura Guliyeva	Odlar Yurdu University	Globalization And Features Of The English-Language Scientific Discourse
Ayesha Haider Ayesha Jabeen	University of Management and Technology	Temperament, Quality of Parent-Child Relationship and Adjustment Difficulties in Preschoolers.
Ukam, Joy Anthony	Department Of Social Science Education University Of Calabar	Historical Perspectives Of Traditional Methods Of Conflict Resolution In Enoghi Community Of Epkache Nkome In Cross River State Nigeria From 1850-1976.
Haadiyah Chishti	Baba Ghulam Shah Badshah University	Linguistic Paralysis in Ciaran Carson's" Belfast Confetti"
Mohammed Waheeb Firas Alawneh	The Hashemite University	Discoveries At Livias Near Site Of Jesus Baptism-Jordan Southern Levant (A Station for Incense Route in Jordan Valley)
Clara Amaka N. Akpan	Can Tho University	Enhancing Efficacy of Cotrimoxazole by Stabilizing It with Medicinal Synthetic Aluminium Magnesium Silicate for Treatment of Trypanosomosis
Tien Dung Khong Yen Dan Tong Thi Phuong Dong Khuu	Can Tho University	Differences Between Urban And Rural Citizens' Shopping Habits During Covid-19 In The Mekong River Delta Vietnam
Mankour Mohamed Miloudi Mohamed	University of Ahmed Zabana of Relizane	Simulation Of A Mono-Polar Hvdc Link In Presence Of Dc Link Faults

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15.11.2022 | SESSION-3 | HALL-3

Kyrenia Time: 14:00–16:00

Ankara Time: 15:00–17:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assoc. Prof. Dr. Ali Beyhan UÇAK

Authors	Affiliation	Presentation title
Mbuotidem David Dick Aniekan Essienubong Ikpe Emem Okon Ikpe	Department of Science Laboratory Technology	Determination Of Thermal And Biofluid Properties Of Different Wood Samples Used For Building And Heavy Construction Works In Nigeria
Saida Assouik Fouad Mourabit M'hamed Ahari	Abdelmalek Essaadi University	Physico-Chemical Groundwater Quality Of The Ghiss-Nekor Aquifer (Central Rif, Morocco)
Aabdousse Jamal Wahid Nadya Faida Rahima Boulli Abdelali Hasib Aziz Oussif Ilis Salim Nora Elhabty Mohamed Benhssain Khalid	Sulatn Moulay Slimane University Beni Mellal	Effect Of Domestication On The Yield, Chemical Composition And Biological Activity Of Essential Oils Of Thymus In Morocco
Qassim Shamkhi Al Khafaji Shaymaa Awad Kadhim Shatha F.Alhous	University of Kufa	Estimation Of The Orbital Correction Function And Energy Of The Two Electron Systems
Anastasiya Pavkova Varvara Getmantseva	Student of Kosygin Russian State University	Development Of Design Documentation For A Model Of Women's Outerwear
Suganya. J Kishonancy. A Thejaswny. K	Department of Bioinformatics	Identification Of Bioactive Compounds As Potent Inhibitors In The Treatment Of Polycystic Ovary Syndrome Through Computational Assessment
Omas Bulan Samosir	Universitas Indonesia	Urbanization And Fertility In The Industrial Revolution 4.0 Era
Shanmugavani. S Surya. G	Vels Institute of Science	A Study On Antigenotoxicity Against Mitomycin C In Swiss Albino Mice Using Cardiospermum Species (Crude Ethanolic Leaf Extract)

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15.11.2022 | SESSION-3 | HALL-4

Kyrenia Time: 14:00–16:00

Ankara Time: 15:00–17:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Dr. Rıstına Sıtı SUNDARI

Authors	Affiliation	Presentation title
Anam, Ekpenyonganwan Godwin	University of Calabar	Principals' Administrative Strategies And Special Needs Students' Academic Self-Concept In Inclusive Public Secondary Schools In Calabar Municipality, Cross River State, Nigeria
Jasintha Nirojan	University of Jaffna	HRM Practices and Task Performance: A Special reference to employees in MAS Apparel Industry in Sri Lanka
Jasintha Nirojan	University of Jaffna	Factors Determining Individual Entrepreneurial Orientation: A Special Reference to Management graduates from Sri Lankan State Universities
Pooja J L.R.K. Krishnan	VIT University	AI Driving New Generation Competencies, productivity and engagement: Leadership Perspective
Neelofar Shafi Prachi Priyanka	Sharda University	A detailed examination of Christina Rossetti's poem "Remember" in order to get insight into Remembering / Forgetting.
Adewale Adeseun A. Bureaucratic Fasasi Wakeel A.	The Federal Polytechnic	Bureaucratic Corruption in Nigeria: A study of the successes and challenges of EFCC from 2010-2020
Barat Ali Sahebi	lecturer at Taj University	The effects of the crisis of fall of the government on non-governmental educational institutions in Balkh province, Afghanistan
Vinod Ekka Pratima Bais	Dr. C.V. Raman University	Sericulture among the tribe to alleviate poverty a socioeconomic study of the Dharamjaigarh block, Raigarh, Chhattisgarh

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15.11.2022 | SESSION-3 | HALL-5

Kyrenia Time: 14:00–16:00

Ankara Time: 15:00–17:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assoc. Prof. Dr. Ali BOLAT

Authors	Affiliation	Presentation title
Raja Mohammad Latif	Prince Mohammad Bin Fahd University	Beta*G*-Mappings in Topological Spaces
Ali K. Kurmanzhan Shvaibovich Alya Guseva Marina	The Kosygin State University of Russia	Redesign Of Clothes With Fur Trim - A New Fashion Trend
Jasintha Nirojan	University of Jaffna	Moderating effect of gender on the impact of Employee Happiness and Employee Engagement: A special reference to Apparel Industry workers in Sri Lanka
Maharramova Elmira	Applied Studies of ETM of ADPU	Active in research-based education organization using learning methods
Mahmud Yagub	Brody School of Medicine	"Fake News" As A Phenomenon Of Modern Media Space
Nabila Sher Mohammad Rubina Nazli Hafsa Zafar Sadia Fatima	Khyber Medical University KMU	Effects of lipid based Multiple Micronutrients Supplement on the birth outcome of underweight pre-eclamptic women: A randomized clinical trial
M. Fathrezza Imani Nur Kholidah	Halal Center of IAIN Pekalongan	The Origin Of Pekalongan City With The Nickname : 'World City Of Batik'
M. Fathrezza Imani Nur Kholidah	Halal Center of IAIN Pekalongan	Pekalongan City Unique That Other Cities Do Not Have

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15.11.2022 | SESSION-3 | HALL-6

Kyrenia Time: 14:00–16:00

Ankara Time: 15:00–17:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assist. Prof. Meltem AVAM

Authors	Affiliation	Presentation title
Ounis Hadj Mohamed Zatar Nassima	University Mostefa Ben Boulaid	The Introduction Of A Combined Type Passive System (Fps-Lrb) And Its Effectiveness In Reducing The Dynamic Response Of A Low-Rise Building
Kanika Cial Mohammad Mobin Ruby Aslam	Aligarh Muslim University	Investigating The Effect Of Cationic Cleavable Surfactant For The Corrosion Inhibition Behavior Of Mild Steel In 5% Hcl Solution
Abdelouahed Essaied Mohamed Rouai Karim Bouhali	Moulay Ismail University	Geotechnical Characterization Of Miocene Marls, Sais Basin, Morocco
Nohaila Rharmili Ayoub El_Mrabet Youssef Kandri Rodi Fouad Ouazzani Chahdi Amal Haoudi Ahmed Mazzah	Sidi Mohamed Ben Abdellah University	Spectroscopic Characterization Of Novel N-Alkylated Isatin Hydrrazone And Phenyl Hydrazone Derivatives
Gbaguidi, Célestin Quenum, Géraud	Université d'Abomey-Calavi/Benin Republic	Resistance to Violence against Women in Amma Darko's Beyond the Horizon and Chimamanda Ngozi Adichie's Purple Hibiscus
Kamaluddeen, A Bawa D. Y Elisha D Abdurrahman, U. D	Kebbi University of Science and Technology	Survival And Growth Performance Of Heterobranchus bidorsalis Fingerlings Fed With Varying Level Of Composite Fish Offal
Sanghavi Radhika Patil Sanjay	College of Pharmacy	Gastro Retentive Drug Delivery System : A review
Chems Eddine Boukhedimi	University of Tizi Ouzou	Impact of Gender on the awareness of electricity consumption in Algeria
Desi Sianipar Irene Rompies-Hakh Mark Rompies Sozanolo Telaumbanua	Universitas Kristen Indonesia,	Revitalization Of Religious Moderation Education In Resilient And Sustainable Urban Development

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16.11.2022 | SESSION-1 | HALL-1

Kyrenia Time: 09:00–11:00

Ankara Time: 10:00–12:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assist. Prof. Dr. Zekiye ŞENGÜL

Authors	Affiliation	Presentation title
Huma Ali Saba Zubair	Jinnah Sindh Medical University	Challenges Encountered By Developing Country's During Covid-19 Pandemic: Measures And Estimates
Supriya S	R.M.K. Engineering College	Islamic Banking
Shahid Shehzad	Kohat University Of Science And Technology Kohat	An extended COPRAS method for multiattribute decision making based on complex dual hesitant fuzzy Maclaurin symmetric mean
Wan Aezwani Bt Wan Abu Bakar Nur Laila Najwa Bt Josdi Mustafa B Man Muhammad Amierusyahmi B Zuhairi	Universiti Sultan Zainal Abidin	A Review: Disease Prediction Using Machine Learning
Chandrakant Naikodi Tousif Salt Venuprasad M Vidyashree R	Davangere University	Additional Namenode's Extended Caching For Improving Availability For Read-Only Transactions in CAP Theaoram
Kauthar Kabir Abubakar Aminu Mu'azu	Umaru Musa Yaradua University	Application Of Hybrid Lsb-Msb Algorithm Using Jpg And Png Digital Images
Aishah H.O. Al Shehhi Gul Ahmed Jokhio Abid Abu-Tair	The British University in Dubai	Preventive Maintenance Using Recycled Asphalt
Ibrahim Zailani Abdullahi Dahiru	Ahmadu Bello University	The Knowledge And Practice Of Personal Hygiene Among Primary School Pupils In Paki Community Ikara Local Government Area Of Kaduna States
Derviş Boztosun Tuğba Gül Baynal Doğan	Kayseri University	A Bibliometric Analysis Of Humble Leadership Style

16.11.2022 | SESSION-1 | HALL-2

Kyrenia Time: 09:00–11:00

Ankara Time: 10:00–12:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assist. Prof. Dr. Fatih TAS

Authors	Affiliation	Presentation title
Emral Gülçek	Siirt University	Çocuk Bakım Hemşireliği: Bir Derleme
Hülya Gözde Önal Hülya Nalçacioğlu Demet Tekcan Karali	Ondokuz Mayıs University	Different Clinical Symptoms And Findings Of Family Members With The Same Genotype Diagnosed With Type 1 Primary Hyperoxaluria
Ebru Yüksel Kaya Çiğdem Şeker Gediz Geduk	Zonguldak Bülent Ecevit University	Retrospective Evaluation Of Nasopalatine Canal Morphology By Cone-Beam Computed Tomography
Muzaffer Berna Doğan Gözde Aksucu Zübeyde Ezgi Erçelik Canseli Akşahin Büşra Sinir Ünzüle Yildirim	İstanbul Arel University	The Effect Of Nutritional Habits On Obesity In Secondary School 5th And 6th Grade Students
Zübeyde Ezgi Erçelik Nurdan Akçay Didişen Hatice Bal Yilmaz	Bandırma Onyedi Eylül University	Therapies Used In Pediatric Palliative Care: Music And Animal Assisted Therapy
Ibrahim Burak Yüksel Ali Altindağ	Necmettin Erbakan University	Evaluation Of Tonsilolith Prevalence On Panoramic Radiographs
Ibrahim Burak Yüksel Güldane Mağat	Necmettin Erbakan University	Detection Of Dental Maturation In Adolescents: A Retrospective Study
Oktay Yanik	Van Yüzüncü Yıl University	Use Of Smart Service Equipment From Healthcare Management Perspective
Mehmet Akyüz Ibrahim Burak Yüksel Güldane Mağat	Necmettin Erbakan University	Evaluation Of Pulp Stones In Permanent First Molars Of Adolescents In A Turkish Population
Mehmet Akyüz Ibrahim Burak Yüksel Güldane Mağat Ali Altindağ	Necmettin Erbakan University	Investigation Of The Incidence Of Residual Root Observed On Panoramic Radiography In Totally Eentless Patients

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16.11.2022 | SESSION-1 | HALL-3

Kyrenia Time: 09:00–11:00

Ankara Time: 10:00–12:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assoc. Prof. Dr. Ali Beyhan UÇAK

Authors	Affiliation	Presentation title
Muhsin Kiliç Candaş Yurdakul	Bursa Uludağ University	Numerical And Experimental Investigation Of Ambulance Cabin Air Heating
Boukerma Rima Maghmouli Hanane Mansouri Lamia Debache Benzagouta Samira	University of Algiers 1 Benyoucef-Benkhedda	For A Reintegration Of The Forgotten Ancient Heritage In The Urban Landscape Of Present-Day Cities: The Case Of The Roman Theatre Of Skikda, Algeria
Sabina Lachowicz-Wiśniewska Ireneusz Kapusta Anna Bieniek Agata Kotowska	Calisia University	Freeze drying technique for microencapsulation of Goumi berry extract
Rohit Kumar Subham Saptadeepa Kalita	Sharda University	Gsm Smart Tank Management System
Ekong Emem Archibong Mary Ekanim	Akwa Ibom State University	International Urban Research Conference Production of biogas using waste products(water hyacinth and cow dung)
Ekong Emem Archibong Mary Ekanim	Akwa Ibom State University	Transdisciplinary approaches of data science in marine sciences
Luisa-Maria Trifas Lidia Favier Gabriela Ciobanu Maria Harja	Technical University of Iasi-Romania	Magnesium Hydroxide Adsorbent For Organic Dye Sorption From Polluted Waters
Mihai Vrabie Mihaela Caftanachi Alexandru Ioan Cotofan Mihaela Fanache Maria Harja	Gheorghe Asachi Technical University of Iasi	Waste Modification By Lkali Activated Methods For Obtaining Sustainable Building Materials
B. Bahja A. Elouafi A. Tizliouinea	Hassan II University of Casablanca	Structural and mechanical characterization of Metakaolin's based geopolymer reinforced with treated natural fibers

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16.11.2022 | SESSION-1 | HALL-4

Kyrenia Time: 09:00–11:00

Ankara Time: 10:00–12:00

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Dr. Ayman El SABAGH

Authors	Affiliation	Presentation title
Jasintha Nirojan	University of Jaffna	The nexus of Employee Happiness and Employee Engagement: A special reference to Apparel Industry workers in Sri Lanka
H. Soumadrass Z. Beidouri Kh. Zarbane	Hassan II University	Structural expertise of the mosque EL ABBASSI EL KABIR in the old Medina of Marrakech, Morocco, in the context of historical building evaluation and rehabilitation.
A. Elouafi S. Ezairi F. Lmai A. Tizliouine H. Lassria	Université Hassan II de Casablanca	Magnetic properties and magnetocaloric effect in amorphous (Fe35Er65)100-xBx (x=0 and 10)
Nour El Houda Belazreg Mahmoud Hasbaia Zekai Sen Ahmed Ferhati	University of M'sila	Evaluation and assessment of flow discharge for different return periods: case study of Hodna basin (Algeria)
S. Sivasakthi Mca, M.Phil	Department of Computer Applications	Study On Detection And Classification Of Cervical Cancer In Pap Smear Images Using Feature Extraction Techniques
Muhammed Abdu Rahman Kp Musadhique Kottaparamban	King Khalid University	Education, Reformation, and Women Empowerment: Reading Periyar's views on the Emancipation of Women
A. Rajeswari M.Phil	G. Venkataswamy Naidu College	Detection and classification of Skin Lesion Images using deep learning: A Review
Adhava Maha Ganapathy, A S	Architecture Department	Tangible Failures Of Urbanism In 500 Metres Infrastructure Accessible Futuristic City Model
Kazem Gholizadeh	Technical and Vocational University	The period of transition in traditional to modern urban planning in the context of historical cities of Iran- Case Study Of Ardabil City

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16.11.2022 | SESSION-2 | HALL-1

Kyrenia Time: 11:30–13:30

Ankara Time: 12:30–14:30

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assoc. Prof. Dr. Ahmet ÇELİK

Authors	Affiliation	Presentation title
Owoyemi, S.I Ojo, M.O Akinwande , D.D	Adeyermi federal University of Education Ondo	Investigations of Subsoil Surface Conditions in the Southern Region of Ilaje-Eseodo Using Geophysical Methods
Uday S. Kothari Geetanjali N. Jadhav Kalpesh N. Niphade	Adeyermi federal University of Education Ondo	Determination Of Alcohol Content Present In Palm Wine (Tadi) Using Conventional Technique Of Specific Gravity
Desi Sianipar Irene Rompies-Hakh Mark Rompies Sozanolo Telaumbanua	Universitas Kristen Indonesia	Revitalization Of Religious Moderation Education In Resilient And Sustainable Urban Development
Gyanendra Pratap Singh Kajal Shaw	Central University of Punjab	Preventive Education on drug abuse: Need of the day for human rights
Elhabty Mohamed Ait Yacine Zehor Aabdousse Jamal Benhssain Khalid Hasib Aziz Boundi abdelhaq	Sulatn Moulay Slimane University Beni Mellal	Characterization Of Olive Oil From Olive Groves (Olea Europaea Var. Euroupaea L.) In Semi-Arid Continental Regions: Case Of The Beni Mellal-Khenifra Region In Central Morocco
Sobia Maqsood Saira Akhtar	University of Agriculture Faisalabad	Causes and Consequences of Brain Drain in Pakistan: A case Study
Lina Khalfallah Haraoubia Imane	University of Algiers 1	Analysis Of Urban Experiments Replicability And Knowledge Transfer In Transportation
Adamu Hauni Ganya Hauwa Dauda Monica Ango	-	Trend and Challenges of Information and Communication Technology in Education (ICTE) In a Changing World
Khelaf Naceur Abdelmadjid Timaoui Fatma Belkhir Marouane Samir Guedouh	University of Ghardaia	The promotion of archaeological and historical sites using the digital marketing. Bitam region in Algeria as a model

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16.11.2022 | SESSION-2 | HALL-2

Kyrenia Time: 11:30–13:30

Ankara Time: 12:30–14:30

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assist. Prof. Dr. Ali İhsanKAYA

Authors	Affiliation	Presentation title
Priya J	Deemed to be University	The Relation between Air Pollution and Mental Well-being
Stephen Oyedeji Sefiyat A. Moshood	University of Ilorin	Influence of scrap metals recycling on heavy metals load and flora diversity
Joseph Chineduofobuike	Nnamdi Azikiwe University	A Critical Appraisal Of Issues Surrounding Gender Relation In African Urban Centers
Bhumika Sharma Sanskriti Mishra Muskan Agnihotri	Sharda University	Need for Menstrual Leaves in an Urbanised World
Khelaf Naceur Racha Mokrane Ouiem Guergueb Abdelmadjid Timaoui Belkhir Fatma	University of Ghardaia	The role of micro-enterprises for traditional industries in rural development, the city of Kantara (Algeria) as a model
Adegbe, J.Y Ilojiakor, A. F Oraekem, N. R Umehadota, F. N.	Federal Polytechnic	Chemical Composition Of Some Tropical Kitchen Waste Materials As Potential Feedstuff For Animal Diet
Liubov Althaim	Ternopol National Pedagogical University	Destruction Of Historical, Architectural, Cultural, Religious Monuments And Objects In Ukraine By Russian Occupants
Olena Myroniuk	National University of Kyiv	The current situation with the cultural heritage of Ukraine as a result of the full-scale invasion of Russia into Ukraine
Ayushi Singh Sparsh Yadav	Galgotias University	Legal study of the world
Tamara Lukić Milka Bubalo Živković Ivana Penjišević Milica Solarević Bojan Đerčan	University of Novi Sad	They And We – Testimonies Significant For Historical Geography Of Serbia

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16.11.2022 | SESSION-2 | HALL-3

Kyrenia Time: 11:30–13:30

Ankara Time: 12:30–14:30

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assist. Prof. Dr. Abdurrahim YILMAZ

Authors	Affiliation	Presentation title
Nabeel Riaz	Bahria University	Embedded Artificial Intelligence And Machine Learning: A Comparative Study
Kelechi Uchemadu Lazarus	University of Ibadan	Vocabulary Knowledge as Correlate of Reading Comprehension Achievement among Students with Learning Disabilities in Ibadan, Nigeria
Sabrina Carvalho Sobia Maqsood	Brazil and University of Kassel	Management of Educational Policies for Internationalization in College Education Institutions: Theoretical Approaches
Isha Jain Imran Mansuri	Howard Hughes Medical Institute	Issues, challenges & effectiveness for Economically Weaker Section (EWS) housing - How do spatial configurations affect economic security in EWS housing projects in Surat?
Sara Attaran Abolfazl Mosaedi Hamdollah Sojasi Qeidari Javad Farrokhi Derakhshandeh	Ferdowsi University of Mashhad	The Effect Of Inappropriate Urbanization On The Possibility Of Flooding (Case Study: Kalat City)
Adamu, Auwal Muhammad Salako, Oluwaseun Adewale	General Studies Department	The Girl Child Education And Sustainable Development Prospects And Challenges A Case Study Of Katsina State, Nigeria
Maxim O. Kvitko Vasyl M. Savosko Yuriy V. Lykholat Olena A. Lykholat Tetyana Y. Lykholat	Kryvyi Rih State Pedagogical University	Analysis Of The Woody Plantations State With The Participation Of The Main Forest-Forming Species In The Kryvyi Rih Mining And Metallurgical District, Ukraine
Ummama Munir Asma Seemi Malik Rabia Amir	Lahore College for Women University	Sibling Rivalry In Family System. A Comparative Study Among The Childen Of Working And Non-Working Women
Amnah Ejaz	University of Management and Technology	Kiddie-SADS-PL Screen Interview: Urdu Translation and Cross-cultural Adaptation

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16.11.2022 | SESSION-2 | HALL-4

Kyrenia Time: 11:30–13:30

Ankara Time: 12:30–14:30

Meeting ID: 878 7744 9108 / Passcode: 123123

HEAD OF SESSION: Assoc. Prof. Dr. Harun BEKTAŞ

Authors	Affiliation	Presentation title
Muskan Mishra Kritika Dwivedi Mahendra Kumar Savita	Naraina Vidyapeeth Engineering and Management Institute	Evaluation of the Antimicrobic efficacy of Tulsi (Ocimum sanctum), Neem (Azadirachta indica) extracts against Staphylococcus Aureus & E. coli
Gaurav Goyal Bhargav Tewar	CEPT University	Studying Effect Of Leca On Structural Lightweight Concrete
Zineb Moujoud Omar Tanane Abdeslam El Bouari	Hassan II University of Casablanca	Mechanical Properties Of Fired Clay Bricks Made By Using Organic Waste As Pore-Forming
Muhammad Asim Humaira Kanwal Muhammad Ahsan Adil Sultan Tayyaba Latif Mughal Muhammad Tahir Amna Mahmood Sadia Mughal	The university of Lahore	Effect On Compressive Strength Of Concrete As A Partial Replacement Of Cement With Sugar Cane Ash At Different Curing Conditions
Yusuf, Yakubu Yusuf Kayode, Yusuf Afolabi Ahmed, Suleiman Muhammed Muhammad, Alhassan Hassan Ahmad, Jaafar Umar, Muhammad	Ahmadu Bello University	Smart Cities: The Cities Of The Future
Dede Yoga Paramartha Setia Pramana	Directorate of Statistical Analysis and Development	Potential Development Of Biofuels In Indonesia In Response To Energy And Pollution Issues
Olena Budiakova	Kyiv National University of Technologies and Design	Regional Economic System Resources
El Bouami Halima	University of IBN ZOHR	Synthesis of a new composition of bioactive glass with improved properties
M. Mobin M. Parveen	Aligarh Muslim University	L-tryptophanium picrate as novel and green corrosion inhibitors of carbon steel in 5%HCl

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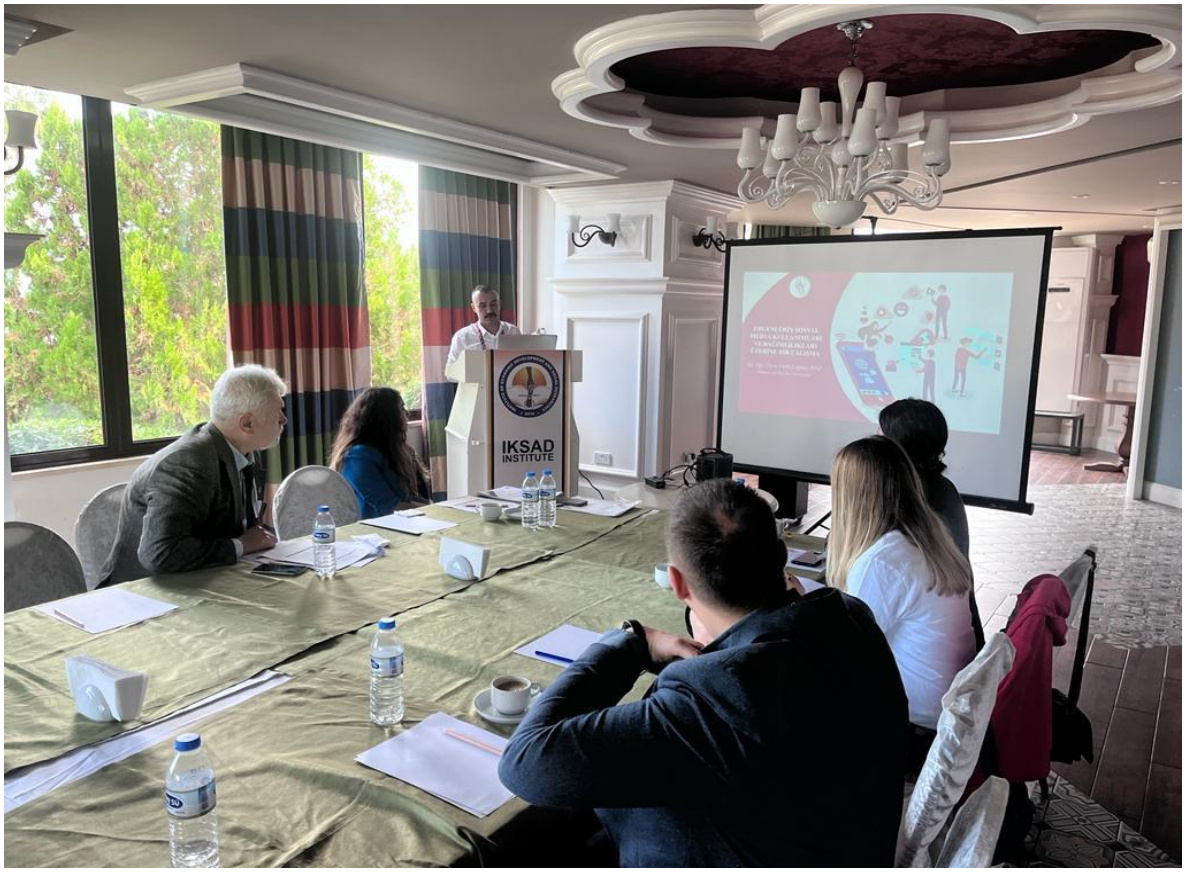
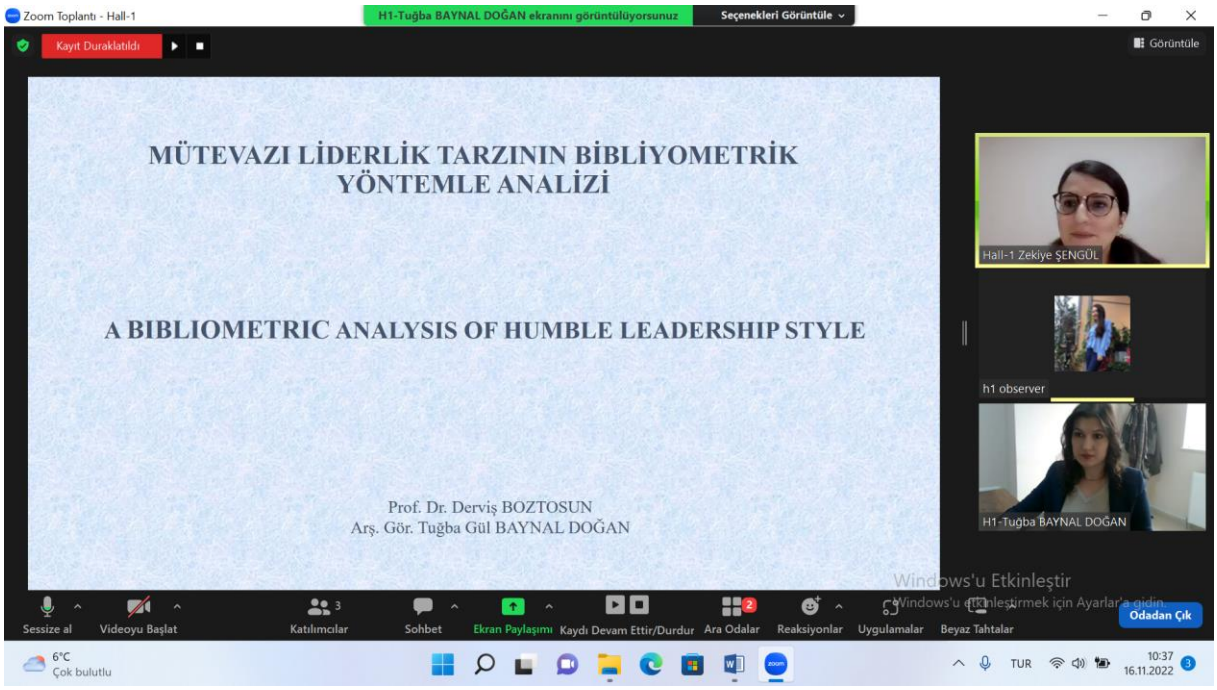


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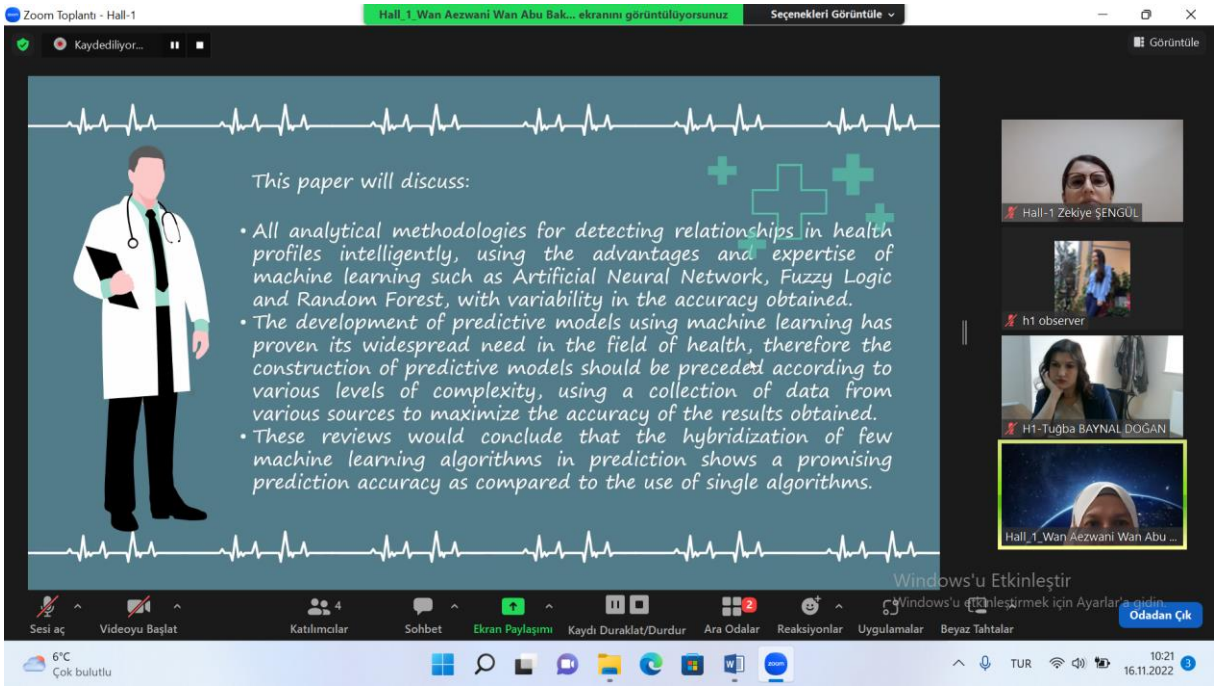
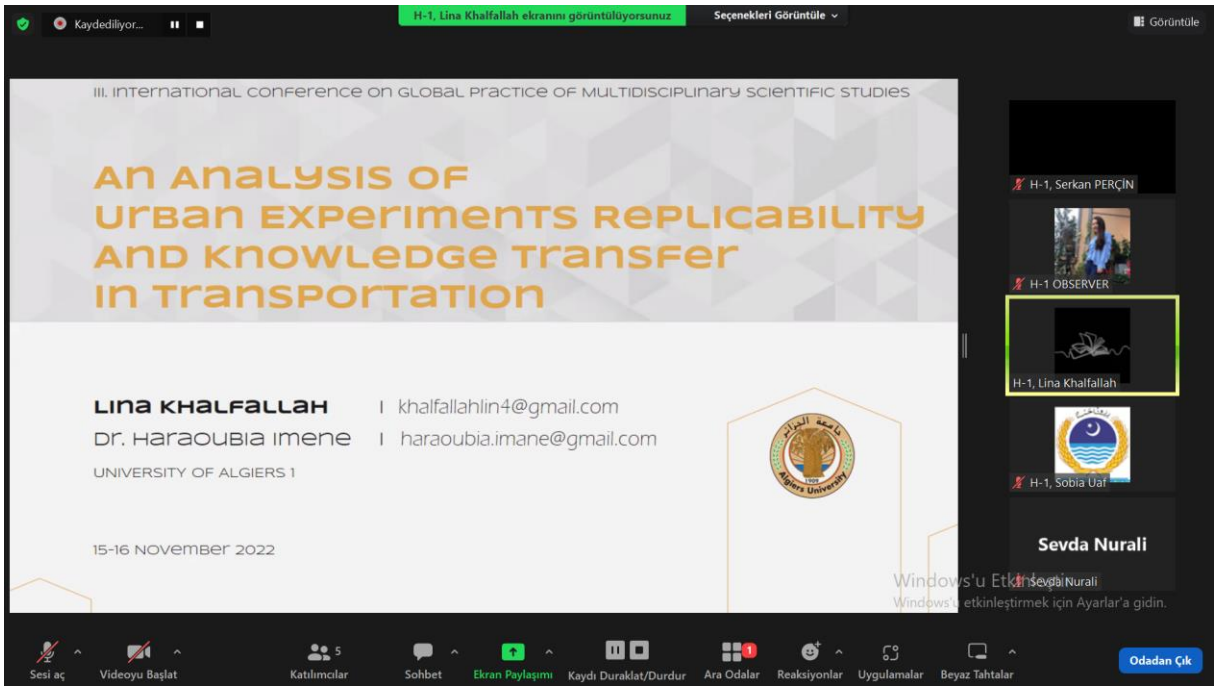
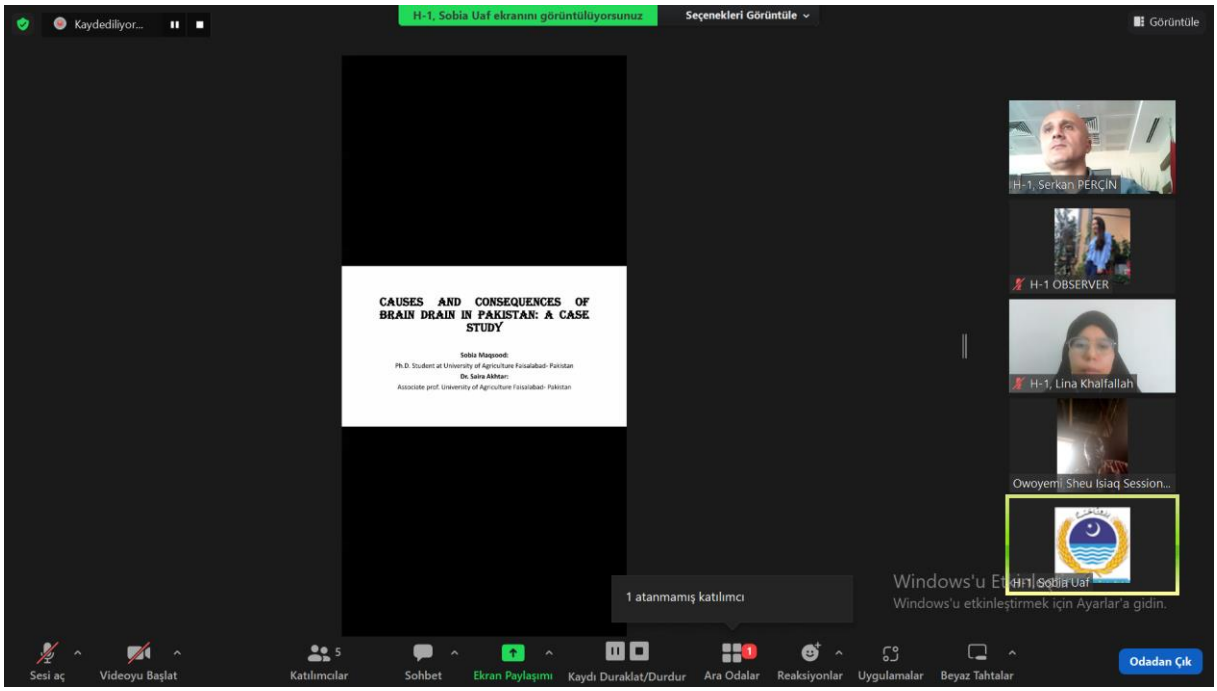


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CONTENTS

CONGRESS ID		I
PROGRAM		II
PHOTO GALLERY		III
CONTENTS		IV
Authors	**TITLE**	**Page Number**
ABSTRACTS		
Durmuş Çetin Ertuğrul Filiz M. Aydın Akbudak	Expression Profiles Of Tomato Nitrate Transporter 2 (Nrt2) Genes Under Abiotic Stress Conditions	2
Yasemin Erdoğdu	Effect Of Salt (Nacl) Stress On Germınatıon And Early Seedıng Growth Of Chıve (*Allium schoenoprasum* L.)	4
Güher Ceylan Kuşoğlu	Changing Mothers of A Changing Turkey	6
Nur Kaluç Damla Koyun Pınar Buket Thomas	Effect Of Acıdıty On The Mode Of Cell Death In Response To Oxıdatıve Stress	8
Gülay Oğuz	An Intruduction to Soft Dimonoids	10
Nedime Karasel Eylem Menteşoğullari Şevket Şafakoğullari	Developments In The Fıeld Of Technology Qualıfıcatıon In School Managers	12
Çiğdem Yorulmaz	Regulatıons That Protect Women Workers In Internatıonal Treatıes And In Our Legıslatıon	14
Ahmet Salih Ikiz	An Assessment on Turkey-Eu Relatıons After 11 September Within The Framework of Dynamic Game Model	16
Pınar Sevginer	Addiction In Adolescense And Evaluatıon Accordıng To The Biopsycosocıal Model	18
Ayfer Sönmez	Effectiveness Of The Method Of Teaching Primary Reading And Writing With Visual Story Syllables (Ghhoyö) (Students With Foreign National Parents)	20
Emine Aldirmaz Meryem Evecen	Effect Of The Doped Centre On The Electronic Properties Of Icosahedron Cu6zn6al, Cu6al6zn And Zn6al6cu Cluster	22
Murat Korunur Sibel Korunur	Tsallıs Holographıc Dark Energy And Scalar Fıelds In Bıanchı Type-V Space-Tıme Model	24
Özlem Üstündağ Selçuk Göçmez	Effects Of Biochars Aplications Which Were Saturated With Biogas Plant Wastewater On Plant Nutrient Of Maize (Zea mays L.)	26
Harun Korunur	The Position And Importance Of Women In The Empire Of Great Seljuk And Anatolıan Seljuk State	28
Mertkan F. Tekinalp	Use Of Rain Gardens In Urban Design	30
Erdem Yilmaz Seda Yavuz	Determination of Change in Humic and Fulvic Acid Amount in Lignite Accumulating Soils	32
Fatih Büyükfiliz Kıvanç Sezer Korkmaz Bellitürk Ahmet Çelik	Evaluation Of Agricultural Activities In Süleymanpaşa District	33
Cihan Demir Osman Gökdoğan Mehmet Fırat Baran	Determination of Energy Usage and Greenhouse Gas Emissions in Lavender Production	36
Sait Aykanat Mehmet Emin Bilgili Hatun Barut	The Effects Of Different Sowing Methods On Some Soil Parameters On Wheat-Second Crop Soybean Rotation In Çukurova Conditions	38
Ömer Sözen	Comparison Of Some Dried Bean Genotypes In Terms Of Quality Characteristics	41
Ömer Sözen	A Research On The Determination Of The Relationships Between Some Quality Characteristics In Dried Bean Genotypes By Correlation And Path Analysis	43

Umoette Linda Edo Ekong Emem Archibong	Nutrient level in sediments and water of Iko river	45
Semih Muşabak Zeynep Nur Sandikci Elçin Yilmaz Ediz Şaykol	Systematic Evaluations And A Scoring Approach On Buy Now Pay Later Credit System	46
Ufuk Şahin	Devastating Effects Of War On Women And Society In “Cennet Kizin Cinneti”: A Critical Discourse Stylistic Analysis	48
Hülya Küçükoğlu	Teaching Language Skills Through Short Stories	50
Dürdane Mart Meltem Türkeri	Investigation Of Chickpea (Cicer aritinum L.) Lines And Varieties İn Winter Sowing İn Çukurova Region	52
Levend Coşkuntuna	Critical Control Points In Silage Making	54
Rahşan Taner Kirca Arzu Coşkuntuna	Investigation Of Control Possibilities Of Seed Borne Alternaria Alternata With Essential Oils In Sainfoin Feed Plant	56
M. Said Bayraklilar	A Research On The Application Of Finite Element Analysis In Additive Manufacturing Method	58
Sevilay Gül Levent Coşkuntuna	Factors Affecting Silage Quality And Dry Material Losses	60
Soumya Sukumaran Renju. R. Krishnan	Modified Combustion Method Synthesis Of Cuo-Nio Nanocomposites For Photocatalytic Degradation Of Methylene Blue Under Solar Light Irradiation	62
Gökçe Çiçek Ceyhun	Potentıal Effects Of Aegean Sea Dısputes On Marıtıme Transportatıon	63
Mohammad Zakir Pardis Ebru Mavioglu Ayan Suleyman Kocak Ahmet Cay Fatima Nil Ertaş	Use of Electrospun Cellulose Acetate Nanofiber Coating in Corrosion Protection of ST37 Stainless Steel	65
Sezen Gamze Göker Bilgin Zengin	Investigation Of Turkey's Solid Waste Energy Potential: Example Of Eskişehir Province	67
Oualid Rholam Barmaki Mohammed	Fractional integrals of Hermite-Hadamard inequalities type for MT-convex stochastic	69
Naim Derebaşi Ilhan Kahraman	Novel Controlled Pulse Drive Method For Cooling Performance	73
Samarjit Roy Debashis De	Sustainable Internet Of Music Things Towards The Ubiquitous Musicological Smart City	74
Wahid Ullah Muhammad Asif Jan Emel Khan	Improved Firefly Algorithm With Different Distance Formulae	75
Zeynep Noyan Tuğcan Yilmaz Alper Çanakçi	Crank Design With Topology Optimization	76
Şerife Gökçe Çalişkan Onur Genç Nursabah Sarikavakli	Investıgatıon Of The In Vıtro Antı-Prolıferatıve Actıvıty And In Sılıco Molecular Dockıng Properties Of Nıckel(Iı) Complexes Of Hydrazonoxyme Lıgands Bearıng The Pyrazolone Group	78
Yahşihanım Nesirova	The Reflection Of The Socio-Political Events Of The Early 20th Century In Urmia And Surrounding Areas In The Ottoman Archival Documents	79
Ruslan Valieiev	Implementation An Interactive Multimedia Textbook To Organize Flipped Classroom For Part-Time Education Students	81
Adamzhan Moldir	The influence of fake information on urban culture	82
Mahnoor Fatima Aiman Shahzad Sara Majid	Family Cohesion, Bully victimization and Emotional Behavioral Problems in School Children: A correlation study	83

Cherrycharry Agwa Tabi Joel Agwetang Ajuh	Car Refugees And Cameroonian Host Community Women At Crossroad With Resilient Livelihoods	84
Hannene Hafsi Naoual Handel	Influence of the material grain size on the physical-mechanical behavior of sand concrete	85
Naoual Handel Sarah Djouimaa	Physical-mechanical behavior of concrete based on blast furnace slag sand	86
Uzma Ashiq Sara Subhan Sayyeda Taskeen Zahra	Role of Self-Esteem in Punitive Parenting and Psychological Reactions of Abuse and Neglect in Adolescents	87
Raphael I. Ndukwu Nkeiru H. Ezeadichie Joy U. Ogbazi	Spatial Analysis Of Home-Based Enterprises And Implications For Urban Management	88
Raja Muhammad Liaquat Malik Naeem Akhtar Mansoor Alam Ansari	Server cloning in AAA for ad hoc networks	89
Mutlu Türkmen Mert Durukan M. Fatih Akay H. Şebnem Arli F. Ceren Ulus Z. Sude Sari Sevtap Erdem	Demand Forecast Models For Personal Protective Equipment Using Supervised Learning	91
Reşitcan Yiğittop	Investigation and Optımızatıon of The Parameters Affecting The Damping Force In Telescopic Shock Absorber	93
Adebiyi Oladipupo Adeboye Oluwabusayo Matey Olabode Adetoun Adedotun Amubode	Acceptance Of Pointillism Wall Hanging As A Means Of Communication Among Staff Of Corporate Organizations In Abeokuta Metropolis	95
Nwafili Sylvanus	Sills gap in undergraduates Fisheries Training Programmes in Nigeria: Case study of University of Port Harcourt	97
Monica Toma	Oppression and revolution in in Kurt Wimmer's film, „Equilibrium"	98
Chandrasekharan Praveen	English Language Learning and Culture Clash: Can the hurdles to empowerment be overcome?	99
Agubata Nonye Stella Ekwueme, Chika Maurren	Audit Attributes On Earnings Smoothing Of Quoted Industrial Goods Companies In Nigeria	100
Ayesha Batool Farkhanda Anjum	Impact of socio- cultural factors on nutritional status of mother and children in Punjab, Pakistan	101
Selin Başer	An Evaluation Of The Srebrenica Genocide And The Attitudes Of International Actors During And After The Genocide In The Context Of International Law	102
Vildan Kistik Tuncay Can	Marmaray Timetable And Energy Consumption Optimization With Fuzzy Passenger Arrival-Alighting Rates	104
Charity Ebelechukwu Okorie Emeka Emmanuel Otti Blessing Maina John Bamigbala Olateju Alao Ibrahim Abdulmudallib Jonathan Timothy Auta	Statistical Analysis Of Crime Rate And Prison Population In Nigeria	106
Erol Esen	The future of European Integration: Ukraine turn of the European Union	107
Ahmad Siar Akbari Liaqat Ali Akhlaqi	Challenges and Opportunities of Applying Decent Work in Afghanistan	108
Mina Pirzadeh Mansour Hashemi	On The Commutativity Degree Of Finite Group For	109
Nidhi Lathigara Tushar Jain	Adultery Laws – An Assessment Under International Domain	110
Krupansh Patel Bhargav Tewar	Developing Lightweight Geopolymer Concrete Using Leca	111
Gyanendra Pratap Singh Kajal Shaw	Preventive Education on drug abuse: Need of the day for human	112

	rights	
Kajal Shaw Gyanendra Pratap Singh	Mobile phone: A Boon to Health Communication in India	113
Hafiz Qadeer Ahmed Adil Shahzad	Methane Emission from animals and its Environmental Consequences	114
Emmamoge Orewere Dogun Ojochogu Ruth Ajibola Ogenyi	Implications Of Street Trading On The Visual Streetscapes Of An Urban City Centre In Nigeria	115
Dogun Ojochogu Ruth Ajibola Ogenyi Emmamoge Orewere Longchi Satkat Zacheaus	Anti Fungal Activity Of Azadirachta Indica Essential Oil On Several Selected Aspergillus Species	116
Mohammed Waheeb Firas Alawneh	Discoveries At Livias Near Site Of Jesus Baptism-Jordan Southern Levant (A Station for Incense Route in Jordan Valley)	117
Nabanita Sen	Tech-Enabled Investigative Techniques In Human Trafficking: The Phased Approach	118
Yusuf Naimat	For Sustainable Healthy Life To Be Guaranteed, Individual's Contributions Towards Health Care Delivery Needs To Be Addressed	119
Samira Hasanova Ulviyya Nasirova Batura Guliyeva	Globalization And Features Of The English-Language Scientific Discourse	120
Samira Hasanova Ulviyya Nasirova Vafa Hajiyeva	Intercultural Communication And Translation	121
Ayesha Haider Ayesha Jabeen	Temperament, Quality of Parent-Child Relationship and Adjustment Difficulties in Preschoolers.	122
Ukam, Joy Anthony	Historical Perspectives Of Traditional Methods Of Conflict Resolution In Enoghi Community Of Epkache Nkome In Cross River State Nigeria From 1850-1976.	123
Haadiyah Chishti	Linguistic Paralysis in Ciaran Carson's" Belfast Confetti"	124
Clara Amaka N. Akpan	Enhancing Efficacy of Cotrimoxazole by Stabilizing It with Medicinal Synthetic Aluminium Magnesium Silicate for Treatment of Trypanosomosis	125
Mankour Mohamed Miloudi Mohamed	Simulation Of A Mono-Polar Hvdc Link In Presence Of Dc Link Faults	126
Mbuotidem David Dick Aniekan Essienubong Ikpe Emem Okon Ikpe	Determination Of Thermal And Biofluid Properties Of Different Wood Samples Used For Building And Heavy Construction Works In Nigeria	127
Saida Assouik Fouad Mourabit M'hamed Ahari	Physico-Chemical Groundwater Quality Of The Ghiss-Nekor Aquifer (Central Rif, Morocco)	128
Aabdousse Jamal Wahid Nadya Faida Rahima Boulli Abdelali Hasib Aziz Oussif Ilis Salim Nora Elhabty Mohamed Benhssain Khalid	Effect Of Domestication On The Yield, Chemical Composition And Biological Activity Of Essential Oils Of Thymus In Morocco	129
Qassim Shamkhi Al Khafaji Shaymaa Awad Kadhim Shatha F.Alhous	Estimation Of The Orbital Correction Function And Energy Of The Two Electron Systems	131
Omas Bulan Samosir	Urbanization And Fertility In The Industrial Revolution 4.0 Era	132

Anam, Ekpenyonganwan Godwin	Principals' Administrative Strategies And Special Needs Students' Academic Self-Concept In Inclusive Public Secondary Schools In Calabar Municipality, Cross River State, Nigeria	133
Jasintha Nirojan	Factors Determining Individual Entrepreneurial Orientation: A Special Reference to Management graduates from Sri Lankan State Universities	134
Jasintha Nirojan	HRM Practices and Task Performance: A Special reference to employees in MAS Apparel Industry in Sri Lanka	135
Pooja J L.R.K. Krishnan	AI Driving New Generation Competencies, productivity and engagement: Leadership Perspective	136
Neelofar Shafi Prachi Priyanka	A detailed examination of Christina Rossetti's poem "Remember" in order to get insight into Remembering / Forgetting.	137
Adewale Adeseun A. Bureaucratic Fasasi Wakeel A.	Bureaucratic Corruption in Nigeria: A study of the successes and challenges of EFCC from 2010-2020	138
Barat Ali Sahebi	The effects of the crisis of fall of the government on non-governmental educational institutions in Balkh province, Afghanistan	139
Vinod Ekka Pratima Bais	Sericulture among the tribe to alleviate poverty a socioeconomic study of the Dharamjaigarh block, Raigarh, Chhattisgarh	140
Raja Mohammad Latif	Beta*G*-Mappings in Topological Spaces	141
Jasintha Nirojan	Moderating effect of gender on the impact of Employee Happiness and Employee Engagement: A special reference to Apparel Industry workers in Sri Lanka	142
Mahmud Yagub	"Fake News" As A Phenomenon Of Modern Media Space	143
M. Fathrezza Imani Nur Kholidah	The Origin Of Pekalongan City With The Nickname : 'World City Of Batik'	145
M. Fathrezza Imani Nur Kholidah	Pekalongan City Unique That Other Cities Do Not Have	146
Ounis Hadj Mohamed Zatar Nassima	The Introduction Of A Combined Type Passive System (Fps-Lrb) And Its Effectiveness In Reducing The Dynamic Response Of A Low-Rise Building	147
Kanika Cial Mohammad Mobin Ruby Aslam	Investigating The Effect Of Cationic Cleavable Surfactant For The Corrosion Inhibition Behavior Of Mild Steel In 5% Hcl Solution	148
Abdelouahed Essaied Mohamed Rouai Karim Bouhali	Geotechnical Characterization Of Miocene Marls, Sais Basin, Morocco	149
Nohaila Rharmili Ayoub El_Mrabet Youssef Kandri Rodi Fouad Ouazzani Chahdi Amal Haoudi Ahmed Mazzah	Spectroscopic Characterization Of Novel N-Alkylated Isatin Hydrrazone And Phenyl Hydrazone Derivatives	150
Sanghavi Radhika Patil Sanjay	Gastro Retentive Drug Delivery System : A review	152
Chems Eddine Boukhedimi	Impact of Gender on the awareness of electricity consumption in Algeria	153
Supriya S	Islamic Banking	154
Kauthar Kabir Abubakar Aminu Mu'azu	Application Of Hybrid Lsb-Msb Algorithm Using Jpg And Png Digital Images	155
Aishah H.O. Al Shehhi Gul Ahmed Jokhio Abid Abu-Tair	Preventive Maintenance Using Recycled Asphalt	156
Ibrahim Zailani Abdullahi Dahiru	The Knowledge And Practice Of Personal Hygiene Among Primary School Pupils In Paki Community Ikara Local Government Area Of Kaduna States	157
Hülya Gözde Önal	Different Clinical Symptoms And Findings Of Family Members	158

Hülya Nalçacioğlu Demet Tekcan Karali	With The Same Genotype Diagnosed With Type 1 Primary Hyperoxaluria	
Ebru Yüksel Kaya Çiğdem Şeker Gediz Geduk	Retrospective Evaluation Of Nasopalatine Canal Morphology By Cone-Beam Computed Tomography	160
Boukerma Rima Maghmouli Hanane Mansouri Lamia Debache Benzagouta Samira	For A Reintegration Of The Forgotten Ancient Heritage In The Urban Landscape Of Present-Day Cities: The Case Of The Roman Theatre Of Skikda, Algeria	162
Sabina Lachowicz-Wiśniewska Ireneusz Kapusta Anna Bieniek Agata Kotowska	Freeze drying technique for microencapsulation of Goumi berry extract	163
Rohit Kumar Subham Saptadeepa Kalita	Gsm Smart Tank Management System	164
Ekong Emem Archibong Mary Ekanim	International Urban Research Conference Production of biogas using waste products(water hyacinth and cow dung)	165
Ekong Emem Archibong Mary Ekanim	Transdisciplinary approaches of data science in marine sciences	166
Mihai Vrabie Mihaela Caftanachi Alexandru Ioan Cotofan Mihaela Fanache Maria Harja	Waste Modification By Lkali Activated Methods For Obtaining Sustainable Building Materials	167
Luisa-Maria Trifas Lidia Favier Gabriela Ciobanu Maria Harja	Magnesium Hydroxide Adsorbent For Organic Dye Sorption From Polluted Waters	169
A. Elouafi S. Ezairi F. Lmai A. Tizliouine H. Lassria	Magnetic properties and magnetocaloric effect in amorphous (Fe35Er65)100-xBx (x=0 and 10)	170
B. Bahja A. Elouafi A. Tizliouinea	Structural and mechanical characterization of Metakaolin's based geopolymer reinforced with treated natural fibers	171
Jasintha Nirojan	The nexus of Employee Happiness and Employee Engagement: A special reference to Apparel Industry workers in Sri Lanka	172
H. Soumadrass Z. Beidouri Kh. Zarbane	Structural expertise of the mosque EL ABBASSI EL KABIR in the old Medina of Marrakech, Morocco, in the context of historical building evaluation and rehabilitation.	173
Nour El Houda Belazreg Mahmoud Hasbaia Zekai Sen Ahmed Ferhati	Evaluation and assessment of flow discharge for different return periods: case study of Hodna basin (Algeria)	174
S. Sivasakthi Mca, M.Phil	Study On Detection And Classification Of Cervical Cancer In Pap Smear Images Using Feature Extraction Techniques	175
Muhammed Abdu Rahman Kp Musadhique Kottaparamban	Education, Reformation, and Women Empowerment: Reading Periyar's views on the Emancipation of Women	176
Adhava Maha Ganapathy, A S	Tangible Failures Of Urbanism In 500 Metres Infrastructure Accessible Futuristic City Model	177

Kazem Gholizadeh	The period of transition in traditional to modern urban planning in the context of historical cities of Iran- Case Study Of Ardabil City	178
Owoyemi, S.I Ojo, M.O Akinwande , D.D	Investigations of Subsoil Surface Conditions in the Southern Region of Ilaje-Eseodo Using Geophysical Methods	179
Uday S. Kothari Geetanjali N. Jadhav Kalpesh N. Niphade	Determination Of Alcohol Content Present In Palm Wine (Tadi) Using Conventional Technique Of Specific Gravity	180
Elhabty Mohamed Ait Yacine Zehor Aabdousse Jamal Benhssain Khalid Hasib Aziz Boundi abdelhaq	Characterization Of Olive Oil From Olive Groves (Olea Europaea Var. Euroupaea L.) In Semi-Arid Continental Regions: Case Of The Beni Mellal-Khenifra Region In Central Morocco	181
Sobia Maqsood Saira Akhtar	Causes and Consequences of Brain Drain in Pakistan: A case Study	183
Lina Khalfallah Haraoubia Imane	Analysis Of Urban Experiments Replicability And Knowledge Transfer In Transportation	184
Khelaf Naceur Abdelmadjid Timaoui Fatma Belkhir Marouane Samir Guedouh	The promotion of archaeological and historical sites using the digital marketing. Bitam region in Algeria as a model	185
Priya J	The Relation between Air Pollution and Mental Well-being	186
Stephen Oyedeji Sefiyat A. Moshood	Influence of scrap metals recycling on heavy metals load and flora diversity	187
Joseph Chineduofobuike	A Critical Appraisal Of Issues Surrounding Gender Relation In African Urban Centers	188
Khelaf Naceur Racha Mokrane Ouiem Guergueb Abdelmadjid Timaoui Belkhir Fatma	The role of micro-enterprises for traditional industries in rural development, the city of Kantara (Algeria) as a model	189
Muskan Mishra Kritika Dwivedi Mahendra Kumar Savita	Evaluation of the Antimicrobic efficacy of Tulsi (Ocimum sanctum), Neem (Azadirachta indica) extracts against Staphylococcus Aureus & E. coli	190
Gaurav Goyal Bhargav Tewar	Studying Effect Of Leca On Structural Lightweight Concrete	191
Zineb Moujoud Omar Tanane Abdeslam El Bouari	Mechanical Properties Of Fired Clay Bricks Made By Using Organic Waste As Pore-Forming	192
Muhammad Asim Humaira Kanwal Muhammad Ahsan Adil Sultan Tayyaba Latif Mughal Muhammad Tahir Amna Mahmood Sadia Mughal	Effect On Compressive Strength Of Concrete As A Partial Replacement Of Cement With Sugar Cane Ash At Different Curing Conditions	193
Dede Yoga Paramartha Setia Pramana	Potential Development Of Biofuels In Indonesia In Response To Energy And Pollution Issues	195
El Bouami Halima	Synthesis of a new composition of bioactive glass with improved properties	196
Nabeel Riaz	Embedded Artificial Intelligence And Machine Learning: A Comparative Study	197
Sabrina Carvalho Sobia Maqsood	Management of Educational Policies for Internationalization in College Education Institutions: Theoretical Approaches	198
Isha Jain Imran Mansuri	Issues, challenges & effectiveness for Economically Weaker Section (EWS) housing - How do spatial configurations affect economic security in EWS housing projects in Surat?	199

Sara Attaran Abolfazl Mosaedi Hamdollah Sojasi Qeidari Javad Farrokhi Derakhshandeh	The Effect Of Inappropriate Urbanization On The Possibility Of Flooding (Case Study: Kalat City)	201
Adamu, Auwal Muhammad Salako, Oluwaseun Adewale	The Girl Child Education And Sustainable Development Prospects And Challenges A Case Study Of Katsina State, Nigeria	202
Ummama Munir Asma Seemi Malik Rabia Amir	Sibling Rivalry In Family System. A Comparative Study Among The Childen Of Working And Non-Working Women	203
Amnah Ejaz	Kiddie-SADS-PL Screen Interview: Urdu Translation and Cross-cultural Adaptation	205
Liubov Althaim	Destruction Of Historical, Architectural, Cultural, Religious Monuments And Objects In Ukraine By Russian Occupants	206
Olena Myroniuk	The current situation with the cultural heritage of Ukraine as a result of the full-scale invasion of Russia into Ukraine	208
Ayushi Singh Sparsh Yadav	Legal study of the world	209
Efkan Çatiker Mesut Yilmaz Temel Öztürk	Investıgatıon Of The Swellıng Behavıor Of Polyepıchlorhydrıne Cross-Lınked Wıth Polyethylene Glycol Brıdges In Solvents Of Dıfferent Polarıty	210
Bahadır Cahit Tosun Mehmet Akif Balkaya	Academic Writing Course When Online: Is It Really Fun?	212
Vaibhav Kant Singh	A Report On Principal Component Analysis	214
Vaibhav Kant Singh	Backpropagation Algorithm Of Ann	215
Vaibhav Kant Singh	Fuzzy Associative Memory For Truck Backer System	216
Ekin Su Kuzu	Transforming Graphic Design Concept On The Axis Of Post-Capitalism As A New Paradigm	217
Maikudi Muhammad Inuwa Mukhtar Ahmad Ahmad Tijjani Abdullahi Abubakar Isah Jibrin	Coupling Effect Of Control Of Corruption And Economic Growth On Environmental Quality In African Countries: Gmm-Based Quantile Regression	219
Leila Imanparast Murat Bakan	Weeds Inhibitor Mathematical Modeling Microwave Agricultural Device Design and Development	220
Durmuş Ünver Tevfik Şahin	On Singularition In Three-Dimensional Eclidean Space	222
Vaibhav Kant Singh	Learning Vector Quantization Algorithm Of Ann	223
Abdulgaffar Muhammad Ibrahim Salisu Masoud Abdulkadir Salisu Musa Usman	Modeling the connection between electrical energy security instruments and GDP growth in Nigeria: A Linear Autoregressive Distributed Lags Approach	224
Aitolkyn Ashimova Almagul Kurmanbayeva	Problems Of Legal Regulation Of Artificial Intelligence In Kazakhstan	225
Ali Irfan Sadia Faiz Azhar Rasul Rehman Zafar Ameer Fawad Zahoor Katarzyna Kotwica-Mojzych Mariusz Mojzych	Facile Synthesis, Hemolytic, Thrombolytic and Anti-Cancer Potential of Benzofuran-Oxadiazole and Triazole Scaffolds	226
Ms.Vadde Leelasri Ms.Ashmikaa S Mr.Jayashankar.J	China Pakistan Economic Corridor(Cpec) And Its Impact On India: A Study	228
Priya Chaudhary Richa Gupta Neelam Kumari Shabila Wani	Psychological Distress and Suicidal ideation among Adolescents: The Moderating Role of Social Support	229

Ogbeche, Mary Mark Asuquo, Michael Ekpenyong Owan Mercy Valentine	Stress Management Strategies and Administrative Job Performance of Secondary School Principals in Cross River State, Nigeria.	230
Ali Usman Fatima Bello Iklimatu Adamu Umar Aliyu M. Maibeti Jamilu M. B Ahmed	Modelling Corporate Governance and Local Content Disclosure in the Nigerian Oil and Gas Sector: A Conceptual Review	231
Huma Ali Saba Zubair	Challenges Encountered By Developing Country's During Covid-19 Pandemic: Measures And Estimates	233
Oktay Yanik	Use Of Smart Service Equipment From Healthcare Management Perspective	234
Bhumika Sharma Sanskriti Mishra Muskan Agnihotri	Need for Menstrual Leaves in an Urbanised World	238
Adegbe, J.Y Ilojiakor, A. F Oraekem, N. R Umehadota, F. N.	Chemical Composition Of Some Tropical Kitchen Waste Materials As Potential Feedstuff For Animal Diet	239
Yusuf, Yakubu Yusuf Kayode, Yusuf Afolabi Ahmed, Suleiman Muhammed Muhammad, Alhassan Hassan Ahmad, Jaafar Umar, Muhammad	Smart Cities: The Cities Of The Future	241
Nabila Sher Mohammad Rubina Nazli Hafsa Zafar Sadia Fatima	Effects of lipid based Multiple Micronutrients Supplement on the birth outcome of underweight pre-eclamptic women: A randomized clinical trial	242
Shahid Shehzad	An extended COPRAS method for multiattribute decision making based on complex dual hesitant fuzzy Maclaurin symmetric mean	244
M. Mobin M. Parveen	L-tryptophanium picrate as novel and green corrosion inhibitors of carbon steel in 5%HCl	245
Ibrahim Burak Yüksel Güldane Mağat	Detection Of Dental Maturation In Adolescents: A Retrospective Study	246
Mehmet Akyüz Ibrahim Burak Yüksel Güldane Mağat	Evaluation Of Pulp Stones In Permanent First Molars Of Adolescents In A Turkish Population	248
Kajal Shaw	Preventive Education on drug abuse: Need of the day for human rights	250
Mina Pirzadeh Mansour Hashemi	On the commutativity degree of finite group $g=h_m$ for $g \in G$	251
A. Rajeswari M.Phil	Detection and classification of Skin Lesion Images using deep learning: A Review	252
Mohammed Waheeb Firas Alawneh	Discoveries At Livias Near Site Of Jesus Baptism-Jordan Southern Levant (A Station for Incense Route in Jordan Valley)	253
Kelechi Uchemadu Lazarus	Vocabulary Knowledge as Correlate of Reading Comprehension Achievement among Students with Learning Disabilities in Ibadan, Nigeria	254
FULL TEXT		
Desi Sianipar Irene Rompies-Hakh Mark Rompies Sozanolo Telaumbanua	Revitalization Of Religious Moderation Education In Resilient And Sustainable Urban Development	256

Ismet Baser Feyza Çay Damla Balaban Göçmen	Evaluation Of Synthetic Haxaploid Bread Wheat Genotypes For Some Abiotic Stress Characters	264
Damla Balaban Göçmen Oğuz Bilgin Alpay Balkan Ismet Başer	Evaluation Of Durum Wheat M4 Mutant Lines (*Triticum durum* L. Desf.) In Terms Of Grain Yield And Some Agronomic Traits	273
Abdurrahim Yilmaz Hilal Yilmaz Sipan Soysal Vahdettin Çiftçi	Use of Nano-Fertilizer in Agricultural Fields	284
Alpay Balkan Levent Özdüven Oğuz Bilgin Canan Şen Ismet Başer Damla Balaban Göçmen Berrin Okuyucu	Comparison of Green Grass Qualıty Characters of Cool Clımate Cereals In Different Cutting Periods	295
Nihayet Yağmur Mine Pakyürek Erdal Ağlar	Effects of drought stress on plants.	308
Sevilay Konya Zeynep Karaçor	Investıgatıon on Unemployment Hysterıa in The Türkiye Economy: Female, Men, And Youth Unemployment	314
Sipan Soysal Hilal Yilmaz Abdurrahim Yilmaz	Biochar Treatments in Field Crops	334
Ceren Yaren Sakim Dilek Tekdal Ayşe Nuran Çil Abdullah Çil	Effects of Herbicide Resistance Genes in Peanut Cultivation	343
Shanmugavani. S Surya. G	A Study On Antigenotoxicity Against Mitomycin C In Swiss Albino Mice Using Cardiospermum Species (Crude Ethanolic Leaf Extract)	349
Olena Budiakova	Regional Economic System Resources	359
Imran Nawaz Nazeer Anjum Ghulam Murtaza	Study Of Stress Corrosion Cracking Of Tig Welded Aluminum Alloy	369
Seda Topgül	The Effect Of Artificial Intelligence On Working Life	381
Rıstına Sıtı Sundari Andrı Kusmayadi Aı Kusmıyatı Asyiah	Producing Antioxidant And Odorless Duck Salted Egg Extention With (Plectranthus Amboinicus Spreng) Enrichment	396
Ivan Pavlovic	Biodiversity Of Ticks On Green Areas And Parks Of Belgrade During 2020	406
Oktay Kaplan	Nutritional Diseases Of Cat And Dogs	413
Özlem Durna Aydin	Meadows, Pastures And Their Roles In Disease Contagion	423
Füsun Gülser Coşkun Gülser	Stress Types and Antioxidant Enzyme in Plants	429
Coşkun Gülser Füsun Gülser	Chemical and Organic Fertilization in Ornamental Plants	439
Amjed Mohammed Ismael Miraç Kılıç Hikmet Günal	Performance Of Multilayer Perceptron Artificial Neural Network Model In Spatial Estimation Of Particle Size Distribution	444
Amjed Mohammed Ismael Miraç Kılıç Hikmet Günal	Comparison Of Conventional Geostatistics And Machine Learning Techniques For Modeling Spatial Distribution Of Lime Content In A Semi-Arid Region	457
Muhammed Zeki Kaplan Nazire Mikail	Loess Regression Method And It's Application	471
Muhammed Zeki Kaplan Nazire Mikail	Thin-Plate Smoothing Spline Method And It's Application	487
Ismayilov Nadir	Contemporary Trends Of Document Flow in The Field Of	501

	Librarianship And Bibliography in Azerbaijan	
A.I.Ismayilkhanova	Orqanization of educational work in general educational institutions	508
Nazlı Çağıl Küçükgöksel Teoman Akpinar	The Effect Of Social Media On Conspicuous Consumption	519
Yasemin Dumrul Zerrin Kiliçarslan	Empirical Analysis Of The Effects Of Trade Openness On Economic Growth: An Evidence For Turkiye	538
Elif Betül Kiliç Dilek Dülger Altiner	Functional Product Development: Investigation Of Sensory Analysis Studies In Different Bread Varieties	548
Halime Güdül Dilek Dülger Altiner	Investigation Of Sensory Analysis And New Product Development Studies In Dessert Varieties	560
Nurəliyeva Sevda Əlimət Qızı	The Issue Of Self-Education Of High School Students	573
Şilan Laçin Görkem Örük	Determination of socio-economic structure of wheat farms: A case study of Siirt Province	584
Berfin Kardaş Görkem Örük	Food safety knowledge of consumers in Siirt Province	592
Baiju Thomas	Supporting Cooperative Learning Skills in Pre-service Teacher Education Enhances Professional Development in the Inclusive Classroom Settings	601
Tien Dung Khong Yen Dan Tong Thi Phuong Dong Khuu	Differences Between Urban And Rural Citizens' Shopping Habits During Covid-19 In The Mekong River Delta Vietnam	613
Suganya. J Kishonancy. A Thejaswny. K	Identification Of Bioactive Compounds As Potent Inhibitors In The Treatment Of Polycystic Ovary Syndrome Through Computational Assessment	627
Ali K. Kurmanzhan Shvaibovich Alya Guseva Marina	Redesign Of Clothes With Fur Trim - A New Fashion Trend	638
Maharramova Elmira	Active in research-based education organization using learning methods	643
Gbaguidi, Célestin Quenum, Géraud	Resistance to Violence against Women in Amma Darko's Beyond the Horizon and Chimamanda Ngozi Adichie's Purple Hibiscus	652
Kamaluddeen, A Bawa D. Y Elisha D Abdurrahman, U. D	Survival And Growth Performance Of Heterobranchus bidorsalis Fingerlings Fed With Varying Level Of Composite Fish Offal	665
Wan Aezwani Bt Wan Abu Bakar Nur Laila Najwa Bt Josdi Mustafa B Man Muhammad Amierusyahmi B Zuhairi	A Review: Disease Prediction Using Machine Learning	681
Derviş Boztosun Tuğba Gül Baynal Doğan	A Bibliometric Analysis Of Humble Leadership Style	699
Emral Gülçek	Çocuk Bakım Hemşireliği: Bir Derleme	710
Muzaffer Berna Doğan Gözde Aksucu Zübeyde Ezgi Erçelik Canseli Akşahin Büşra Sinir Ünzüle Yildirim	The Effect Of Nutritional Habits On Obesity In Secondary School 5th And 6th Grade Students	720
Zübeyde Ezgi Erçelik Nurdan Akçay Didişen Hatice Bal Yilmaz	Therapies Used In Pediatric Palliative Care: Music And Animal Assisted Therapy	736
Ibrahim Burak Yüksel Ali Altindağ	Evaluation Of Tonsilolith Prevalence On Panoramic Radiographs	748
Mehmet Akyüz Ibrahim Burak Yüksel Güldane Mağat Ali Altindağ	Investigation Of The Incidence Of Residual Root Observed On Panoramic Radiography In Totally Eentless Patients	755

Muhsin Kiliç Candaş Yurdakul	Numerical And Experimental Investigation Of Ambulance Cabin Air Heating	766
Adamu Hauni Ganya Hauwa Dauda Monica Ango	Trend and Challenges of Information and Communication Technology in Education (ICTE) In a Changing World	778
Tamara Lukić Milka Bubalo Živković Ivana Penjišević Milica Solarević Bojan Đerčan	They And We – Testimonies Significant For Historical Geography Of Serbia	793
Ayşe Özge Artekin	The Development Process Of Foreıgn Trade In Türkiye From Regıonal And Sectoral Perspectıves	820
Şahin Ay	Elections And Tax-Based Promises In Turkey	839
Şahin Ay	An Assessment On Accommodation Tax	847
Şahin Ay	The Status Of The Border Cıtıes In Tax Collectıon: Examples Of Kilis, Şırnak, Van And Artvin	855
Erkan Fidan	The Importance Of Interdisciplinary Studies In Archaeological Excavations	864
Erkan Fidan	A Multidisciplinary Approach To Archaeological Surveys	873
Chandrakant Naikodi Tousif Salt Venuprasad M Vidyashree R	Additional Namenode's Extended Caching For Improving Availability For Read-Only Transactions in CAP Theaoram	882
M. Zeki Karipçin	Hardness Of Seed Coat In Some Vegetables	891
Elvan Şahin Zeteroğlu Meral Taner Derman	Opinions Of Pre-School Education Institution Administrators On Inclusive Education	901
Maxim O. Kvitko Vasyl M. Savosko Yuriy V. Lykholat Olena A. Lykholat Tetyana Y. Lykholat	Analysis Of The Woody Plantations State With The Participation Of The Main Forest-Forming Species In The Kryvyi Rih Mining And Metallurgical District, Ukraine	925
Sevil Akçağlar Sevim Akçağlar	Green Synthesis, Characterization and Antibacterial Activity of Silver Nanoparticles of Aspergillus terreus	935
Sevil Akçağlar Sevim Akçağlar	Biological Synthesis of Silver@Graphene Oxide Nanocomposite and Antimicrobial Determination of Activity	945
Murat Deveci Zeliha Elif Savci	Determination Of Some Chemical Changes Caused By Salt Stress In Alternative Greens (Mibuna, Mizuna And Komatsuna)	954
Murat Deveci Gülhan Akyürek	The Effect Of Different Drought Applications On Physiological Changes In Some Exotic Vegetable Species	973
Murat Deveci Şükrü Öztürk	Farkli Tuz Konsantrasyonlarina Sahip Sulama Sularinin Pazinin Bazi Makro-Mikro Besin Elementi Miktarlari Üzerine Etkileri	995
Bilal Albenni Mine Pakyürek	An Organic Soil Improver : Compost	1009
Murat Deveci Zeliha Elif Savci	The effect of different organomineral and mineral fertilizer Applications on some physiological properties in spinach Growing	1021
Zekiye Şengül Gamze Saner	Socio-Economic Analysis Of Beekeeping Farms In Aydin, İzmir, And Muğla Provinces	1038
Seyithan Seydosoglu Kagan Kokten	Metal Accumulation in Forages: A Review	1062
Anastasiya Pavkova Varvara Getmantseva	Development Of Design Documentation For A Model Of Women's Outerwear	1072
Seerwan Saeed Mohammed Ali Volkan Bilgili	Estimation Of Soil Properties In Harir Region In Erbil Governorate Of Iraq By Using Geostatistical And Spectro Radiometer Techniques	1079
Negar Ebrahim Pour Mokhtari Zeynep Dumanoğlu	Some Features Of Lentils Varieties	1098
Ayşenur Şakalak Savaş Çevik	International Migration From An Economic Perspective And Economic Effects	1107

Zeynep Karaçor Emel Mirza Burcu Güvenek	Determinants Of Provincial Differences In Average Life Satisfaction: Case Of Turkey	1118
Ceren Yaren Sakim Dilek Tekdal Ayşe Nuran Çil Abdullah Çil	Comparison of Genes Affecting Morphological Characteristics in Oil and Confectionary Sunflower	1130
Fatih Çağatay Baz	A Study On The Socıal Medıa Use And Addıctıons Of Adolescents	1136
Handan Asûde Başal Ayşegül Çikrikçi	The Relatıonshıp Between The Separatıon Anxıety Of Chıldren Who Have A New Begınnıng Of Preschool Educatıon And The Concerns Of Theır Mothers	1144
A. Hakan Aktaş	Determination of Metamızol and Caffeine Active Ingredients In Medicine Samples By Classıc and Inverse Least Square Methods Wıth The Aıd Of Uv-Spectrophotometric Method	1168
A. Hakan Aktaş	Determınatıon of Active Substances in High Tension Drug Contaınıng Valsartan and Hydrochlorothıazıde By Uv-Spectrophotometrıc Method and Chemometric Methods	1176
Gamze Kirilmazkaya	Investigation of the Effects of Inquiry-Based Science Teaching on Pre-service Teachers' Science Process Skills and Motivation	1186
Meryem Evecen	Spectroscopıc Properties Of The Schıff Base Ni Metal Complex Compound Wıth Theoretıcal Methods	1199
Emine Aldirmaz Meryem Evecen	Effect Of The Doped Centre On The Electronic Properties Of Icosahedron Cu6zn6al, Cu6al6zn And Zn6al6cu Cluster	1210
Bahar Burtan Doğan Zerin Türk	The Importance Of Education And Qualified Labor Force In Digital Economy	1219
Hasan Osmanoğlu Meliha Uzun Gamze Güney	Emotional Status Of Physical Education Teachers By Analysis Of Twits With The #Bedeneğitimineadalet Hashtag	1236
Meliha Uzun Sekvan Yimez Gamze Güney Hasan Osmanoğlu	Sports And Bullying Tendencies: A Research On Sports Individuals	1246
Nazan Avcioğlu Kalebek Seher Turgut	Production of Accessorıes (Buttons) From Bio-Based Wastes and Investigation of Washıng Fastness Values	1261
Mustafa Gurhan Yalcin Sezer Unal Ozge Ozer Atakoglu Fusun Yalcin	Factor Analysis Of Beach Sediment At Damlatas Beach (Alanya, Turkey)	1269
Emre Yavuz Niyazi Ugur Kockal	Effect of aerogel on manufactured insulation plates	1275
Oktay Yildiz	Aridity, Desertification And Central Anatolia	1280
Oktay Yildiz	Effects of Fire on Mediterranean Ecosystems	1294
Zehra Meliha Tengiz Bekir Ayyildiz	Evaluatıon Of Agrıculture And Energy Consumptıon Wıth Agro-Ecologıcal Economıc Crıterıa In Turkey	1307
Merve Ayyildiz Zehra Meliha Tengiz	The Causalıty Relatıonshıp Between Forage Supports And Culture Area In Turkey	1323
Nihayet Koçyiğit	Effect Of Nanographıte On Nonflammabılıty Proporties Of Expandable Polystyrene	1335
Nihayet Koçyiğit	Increasıng The Synergıc Effect Between Halloysıte Nanotubes And The Surfaces Of The Polystyrene Matrıx	1342
Korkmaz Bellitürk Ahmet Çelik Fatih Büyükfiliz	Status Of Agricultural Inputs After The Covid-19 Pandemic Crisis: The Case Of Mineral And Organic Fertilizers. A Review	1349
Korkmaz Bellitürk Ahmet Çelik	The Importance Of Using Vermicompost In Field Crops Cultivation	1364
Emine Budakli Çarpici Sebiha Erol Barış Bülent Aşik	The Effects of Sowing Time And Harvest Stages on Silage Quality In Buckwheat (Fagopyrum esculentum Moench.)	1379
Aynur Bilmez Özçinar	Expressing Genes of Peanut (Arachis hypogaea L.): A Review	1390

Yusuf Solmaz	Algae As A Bio-Fertilizer In The Soil-Plant System	1398
Serhat Akyüz Serap Kızıl Aydemir	Determination Of Vitality Performances Of Feed Pea Seeds Before And After Storage Under Laboratory Conditions	1414
Pınar Bozbeyoğlu Ali Gündoğdu	Investigation Of The Performance Of A New Activated Carbon Produced By The Activation Of Potassium Carbonate From Corncob To Remove Dyestuffs From Industrial Wastewater	1430
Bilge Alpin Gümüş Ayşe Sirel	Iconıc Buıldıngs As A Spartıal Representatıon Of Power	1454
Başak Ocak M. Şahin Gök Tuğkan Arici	Competitive Intensity Factor In The Industry 4.0 Process	1485
Makbule Evrim Gülsünler Imran Aslan	Sustainabilty And Public Relations Practices	1507
Gamze Mercan	Share Of Wealth Tax In Gdp: A Comparative Analysis Of Turkey And Eu Member Countries	1515
Murat Turan Ali Murat Tatar H. Deniz Şireli	Current Situation And Future Of Buffalo Breeding In Turkey	1528
Ali Murat Tatar H. Deniz Şireli Murat Turan	Determination Of The Relationship Between Various Body Size And Milk Production Of Karakaş Sheep Breeds Under Breeders Conditions	1537
H. Deniz Şireli Ali Murat Tatar Murat Turan	The Effect Of The Weight Of Invisible Sheep At Breaking And Birth On The Weight Of Lamb Birth And Weaning	1547
Ferhat Öztürk	The Determination Of Agronomic And Quality Characteristics Of Different Sesame (Sesamum Indicum L.) Genotypes: II. Quality Characteristics	1554
Ferhat Öztürk	The Determination Of Agronomic And Quality Characteristics Of Different Sesame (Sesamum Indicum L.) Genotypes: I. Agronomic Characteristics	1569
Ferhat Kizilgeçi Mehmet Yildirim Ferhat Öztürk	Dendrogram Of Cimmyt Bread Wheat Germplasm Based On Seed Characteristics	1581
Mehmet Yildirim Ferhat Kizilgeçi Seval Eliş	Evaluation Of Yield And Quality Traits Of Bread Wheat Advanced Lines During Drought Season	1588
Pervin Erdoğan Fatih Ölmez Zemran Mustafa Tolga Karaköy	Determination Of Methods Of Control With Vectors Caused By Stolbur Disease (Candidatus Phytoplasma Solani) In Potato Culture Areas In Sivas Province	1595
Gülten Süer Ahmet Konuralp Eliçin	Determining The Cooling Efficiency Of A Milk Tank Modeling Using Peltier Cooler	1606
A. Konuralp Eliçin Abdullah Sessiz	Comparison Of Shear Methods Of Vineyard Pruning Residues	1619
Serkan Perçin Yener Aksoy Yılmaz Aksoy	Individuals According To The Departments Educed Examination Of Confidence Conditions	1629
Yener Aksoy Serkan Perçin	Aggression Status of Individuals According To Body Mass Index	1637
Şeyda Taşar Ahmet Özer	Effect Of Natural Antimicrobial Agents On Water Vapor Permeability, Moisture Holding Capacity And Water Solubility Of Hemicellulose-Based Food Packaging Material	1645
Erhan Kahya Fatma Funda Özdüven	Determining The Position Of Cucumber On The Seedle And Finding The Harvest Size Using Image Processing Technique	1655
Çiğdem Esendağli Serdar Selim	Automated Change Detectıon Of Water Surface In The Geçitköy Reservoır Usıng Multı-Temporal Landsat Imagery	1667
Ömer Sözen	Comparison Of Some Dried Bean Genotypes In Terms Of Quality Characteristics	1679

Ömer Sözen	A Research On The Determination Of The Relationships Between Some Quality Characteristics In Dried Bean Genotypes By Correlation And Path Analysis	1693

ABSTRACTS

EXPRESSION PROFILES OF TOMATO NITRATE TRANSPORTER 2 (NRT2) GENES UNDER ABIOTIC STRESS CONDITIONS

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ABSTRACT
Nitrate (NO3-) is the most abundant form of inorganic nitrogen found in the soil. It is actively taken up through the roots and leaves, and then transported within the plant by various nitrate transporters, each of which has different features. The Nitrate Transporter 1 (NRT1)/Peptide Transporter (PTR) family (NPF), NRT2 family, Chloride Channel (CLC) family and Slow Anion Channel (SLAC) protein family are the four protein families that fulfil key functions in relation to nitrate transport. Our study revealed the presence of four novel NRT2 genes in the tomato genome. They interact with many other genes that perform various functions in many crucial pathways including the transport, photosynthesis, fatty acid metabolism and amino acid catabolism pathways. The responses of the SlNRT2 genes to drought and salinity stresses are diverse, and they are neither stress- nor tissue-specific. The findings of this study should provide a useful scientific basis for future studies concerning the roles of the NRT2 gene family in plants.

Key words: NRT2, gene family, tomato, drought, salt stress

ACKNOWLEDGMENTS
The study was funded by Akdeniz University Scientific Research Projects Coordination Unit. Grant number: FBA-2021-5572.

ABİYOTİK STRES ŞARTLARI ALTINDA DOMATES NİTRAT TAŞIYICI 2 (NRT2) GENLERİNİN İFADE PROFİLLERİ

ÖZET

Nitrat (NO^{3-}), toprakta en bol bulunan inorganik azot formudur. Kök ve yapraklardan aktif olarak alındıktan sonra her biri farklı özelliklere sahip çeşitli nitrat taşıyıcıları ile bitki içinde taşınır. Nitrat Taşıyıcı 1 (NRT1)/Peptit Taşıyıcı (PTR) ailesi (NPF), NRT2 ailesi, Klorür Kanalı (CLC) ailesi ve Yavaş Anyon Kanalı (SLAC) protein ailesi, nitrat taşınmasıyla ilgili temel işlevleri yerine getiren dört protein ailesidir. Çalışmamız domates genomunda dört yeni NRT2 geninin varlığını ortaya koymuştur. Bu genler, taşıma, fotosentez, yağ asidi metabolizması ve amino asit katabolizması yolları dahil olmak üzere birçok önemli yolakta çeşitli işlevleri yerine getiren birçok başka genle etkileşime girmektedirler. SlNRT2 genlerinin kuraklık ve tuzluluk streslerine tepkileri çeşitli olup, bunlar ne strese ne de dokuya özgüdür. Elde edilen bulguların, bitkilerde NRT2 gen ailesinin rolleriyle ilgili gelecekteki çalışmalar için faydalı bir bilimsel temel sağlayacağı düşünülmektedir.

Anahtar kelimeler: NRT2, gen ailesi, domates, kuraklık, tuz stresi

FRENK SOĞANININ (*Allium schoenoprasum* L.) ÇİMLENME VE ERKEN FİDE GELİŞİMİ ÜZERİNE TUZ STRESİNİN (NaCl) ETKİSİ

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ÖZET

Tuz stresi, bitki tarımı için artan bir tehdit oluşturan önemli bir abiyotik stres faktörüdür. Bu çalışmada farklı tuz konsantrasyonlarının (0, 2, 4, 8, 12, 16 ve 20 dS m^{-1}) frenk soğanının çimlenme ve erken fide aşamaları üzerine etkileri araştırılmıştır. Araştırma her bir tuzluluk seviyesinde Tesadüf Blokları Deneme Deseninde dört tekrarlamalı olarak kurulmuştur. Yüzey sterilizasyonu yapılan tohumlar 25 ±1 °C'de 14 gün süreyle karanlık ortamda çimlendirilmiştir. Sonuçlar, çimlenme oranı dışında incelenen tüm karakterler arasındaki farklılıkların istatistiksel olarak önemli olduğunu göstermiştir. Tüm tuz konsantrasyonlarında yüksek çimlenme oranı (%94-98) elde edilmiştir. Ortalama çimlenme süresi (3.05-4.51 gün), artan tuz konsantrasyonları ile önemli ölçüde artmıştır. Uygulanan tuzluluk seviyeleri erken fide gelişimini etkilerken, artan tuzluluk ile kök sayısı (1.02-1.45 adet/bitki) kök uzunluğu (0.51-2.35 cm), kök yaş ağırlığı (0.527-0.897 mg), kök kuru ağırlığı (0.0116- 0.0229 mg), sürgün uzunluğu (1.52-5.37 cm), sürgün yaş ağırlığı (2.665-9.465 mg), sürgün kuru ağırlığı (0.123-0.527 mg) önemli ölçüde azalmıştır. Sürgün gelişimi 4 dS m^{-1} tuz konsantrasyonundan, kök gelişimi ise 8 dS m^{-1} tuz konsantrasyonundan olumlu etkilenmiştir. Elde edilen sonuçlar frenk soğanının çimlenme ve erken fide gelişiminde tuzluluğa dayanıklı olduğunu göstermiştir

Anahtar Kelimeler: Frenk soğanı, Çimlenme, Tuzluluk stresi, NaCl

EFFECT OF SALT (NaCl) STRESS ON GERMINATION AND EARLY SEEDING GROWTH OF CHIVE (*Allium schoenoprasum* L.)

ABSTRACT

Salt stress is an important abiotic stress factor that presents an increasing threat to plant agriculture. In this study, the effects of different salt concentrations (0, 2, 4, 8, 12, 16, ve 20 dS m-1) on the germination and early seedling stages of chive were investigated. Investigation was performed as Randomized Complete Block Design with four replications each salinity level. Surface sterilized seeds were germinated at 25 ±1 °C for 14 days in the dark. The results showed that the differences between all the characters examined, except the germination rate, were statistically significant. High germination rate (94-98%) was obtained at all salt concentrations. The mean germination time (3.05-4.51 days) increased significantly with increasing salt concentrations. The applied salinity levels affected early seedling growth, While root number (1.02-1.45 no./plant) increased with increasing salinity root length (0.51-2.35 cm), root fresh weight (0.527-0.897 mg), root dry weight (0.0116-0.0229 mg), shoot length (1.52-5.37 cm), shoot fresh weight (2.665-9.465 mg), shoot dry weight (0.123-0.527 mg) were significantly decreased. Shoot growth was positively affected by salt concentration of 4 dS m^{-1}, and root growth was positively affected by salt concentration of 8 dS m^{-1}. The results obtained showed that chive was resistant to salinity in germination and early seedling development.

Keywords: Chive, Germination, Salinity stress, NaCl

DEĞİŞEN TÜRKİYE'NİN DEĞİŞEN ANNELERİ

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ÖZET

Her ne kadar 'çocuklar' kaçınılmaz olarak insanlık tarihinin doğuşuyla birlikte var oldularsa da 'çocukluk' kavramı ve çocuğa yüklenen anlamlar tarihsel süreçte defalarca değişip dönüşmüştür. Geçmişten günümüze çocukluk, içinde bulunulan zaman diliminin aynası olma özelliğini korumuştur. Zaten çocukluğun farklı zamanlarda farklı boyutlarıyla anlamlandırılmasının sebebi de temelde bu ayna işlevinden kaynaklanmaktadır. Başka bir deyişle, yüzyıllar arasındaki geçişlerde yaşanan sosyo-kültürel yapılardaki değişim çocuk ve çocukluğun değişiminde başat aktör olmuştur. Örneğin Antik çağda iyi bir vatandaş yetiştirmenin aracı haline gelmiş çocuk, Ortaçağ'da ilk günahın gözle görülür bir nişanesi olarak görülmüştür. İçinde bulunduğumuz zaman dilimindeki çocuk kavramına yaklaşılması için ise Rönesans'a kadar beklemek gerekmiştir. Modern toplumların ortaya çıkması, beraberinde çocukluk algısı ve dolayısıyla çocuk eğitimindeki değişimi de getirmiştir. Tarihi süreci incelediğimizde bu değişimlerin yaşanması için yüzyıllar geçmesi gerekirken; teknolojik gelişmelere, tüketim odaklı yaşam tarzının benimsenmesine ve devlet politikalarının yön değiştirmesine paralel olarak değişim hız kazanmıştır. Bu çalışmada, henüz 1980 darbesini görmemiş, neoliberal politikaları benimsememiş bir Türkiye'de çocukluğun nasıl anlamlandırıldığı sebepleriyle birlikte tartışılmış ve 2000'ler Türkiye'sinin çocukluk kavramıyla karşılaştırılarak nelerin hangi sebeplerden değiştiği üzerinde durulmuştur. Bu çalışma çocukluk kavramındaki değişime değinse de, çalışmanın öznesi annelerdir. Çocukluk dönüşürken elbette annelik de dönüşmüştür. Bu dönüşümü sebep ve sonuçlarıyla ortaya koymak amacıyla 1976 yılında yayınlanmaya başlayan ve günümüzde de yayınlanmaya devam eden Türkiye'nin ilk anne ve çocuk dergisi olan Elele dergisinin ilk ve son sayıları incelenmiştir. Yaklaşık yarım asırdır faaliyet gösteren bu derginin geçirdiği değişim ve dönüşüm, biyolojik bir yetkinliğin sonucu olarak tezahür eden "annelik" olgusunun kamusal inşasını değerlendirmek açısından çalışmada yol gösterici olmuştur. Dergideki dönüşüm devletin ve kamusal algının dönüşümüyle de paralellik göstermektedir. Bu doğrultuda anneliğin devlet, toplum, eğitim ve her türlü iletişim kanalının katkısıyla inşası ve yeniden inşası değerlendirmiştir. Derginin ilk ve son sayılarındaki bölümler içerik analizine tabi tutulmuş ve elde edilen bulgular karşılaştırmalı olarak analiz edilmiştir. Çalışmanın sonucunda, çocukların bakım ve yetiştirilme görevi temelde annelere bırakıldığı için elbette değişimden en çok annelerin etkilendiği tespit edilmiştir. Elde edilen bulgular "19. yüzyıl erkeklerin, 20. yüzyıl kadınların, 21. yüzyıl ise çocukların yüzyılıdır" görüşünü destekler niteliktedir.

Anahtar Kelimeler: çocukluk, annelik, toplumsal cinsiyet, içerik analizi

CHANGING MOTHERS OF A CHANGING TURKEY

ABSTRACT

Although the notion of 'child/ren' inevitably existed with the birth of human history, the concept of 'childhood' and the meanings attributed to children have changed and transformed many times in the historical process. From past to present, childhood has preserved its feature of being a mirror of the current time period. In fact, the reason why childhood is given meaning with different dimensions at different times is basically due to this mirror function. In other words, the change in socio-cultural structures experienced in the transitions between centuries has been the leading actor in the change of child and childhood. For example, the child, who became a tool for raising a good citizen in ancient times, was seen as a visible sign of original sin in the Middle Ages. It was necessary to wait until the Renaissance in order to approach the concept of "child" in the current time period. The emergence of modern societies has brought with it a change in the perception of childhood and therefore in child education. When we examine the historical process, it takes centuries for these changes to occur; in concordance with technological developments, the adoption of a consumption-oriented lifestyle and the change of direction in government policies, change has accelerated. In this study, how the meaning of childhood is interpreted in a Turkey that has not yet seen the 1980 coup and adopted neoliberal policies is discussed together with the reasons and compared with the concept of childhood in 2000s Turkey, what has changed and why has been emphasized. Although this study refers to the change in the concept of childhood, the subject of the study is mothers. As childhood transforms, of course, motherhood has also transformed. In order to reveal this transformation with its causes and consequences, the first and last issues of Elele, Turkey's first mother and child magazine, which started to be published in 1976 and continues to be published today, were examined. The change and transformation of this magazine, which has been operating for nearly half a century, has guided the study in terms of evaluating the public construction of the phenomenon of "motherhood", which appears as a result of a biological competence. The transformation in the journal parallels the transformation of the state and public perception. In this direction, the construction and reconstruction of motherhood with the contribution of the state, society, education and all kinds of communication channels has been evaluated. The chapters in the first and last issues of the journal were subjected to content analysis and the findings were analyzed comparatively. As a result of the study, it was determined that mothers were most affected by the change, since the duty of care and upbringing of children was basically left to mothers. Obtained findings verify the opinion that "19. century is the century of men, the 20th century is the century of women, and the 21st century is the century of children".

Keywords: childhood, motherhood, gender, content analysis

OKSİDATİF STRES ARACILI HÜCRE ÖLÜMÜNDE ASİDİTENİN ÖLÜM MODUNA ETKİSİ

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ÖZET
Solid tümörlerin karakteristik özelliklerinden biri olan asidik ekstrasellüler pH'ın, tümör hücrelerinin enerji metabolizmasını yeniden düzenlemesi sonucu ekstraselüler ortama hidrojen iyonlarını salgılaması nedeniyle meydana geldiği bilinmektedir. Ekstrasellüler pH'daki değişimlerin birçok kanser türünde kemoterapik cevabı değiştiyor olması, bu değişimlerin hücre ölüm modunda etkilere neden olabileceğini düşündürmektedir. Bu çalışmada, *Saccharomyces cerevisiae*'de asiditenin Hidrojen Peroksit (H2O2) ile indüklenen oksidatif stres aracılı hücre ölümünde ölüm moduna etkisinin koloni oluşturan birim (CFU) ve Hoechst 33342 ve PI boyaması yöntemleri kullanılarak araştırılması amaçlanmıştır. Verilerimiz, asidik pH'ın, H2O2 uygulamasına yanıt olarak, normal pH'a kıyasla hücrelerin canlılığını önemli ölçüde etkilememesine rağmen, hücre ölüm modunun bu kültürler arasında farklılık gösterdiğini ortaya koymaktadır. Normal pH'da H2O2 uygulaması hücrelerin %83,59'unda erken apoptoza yol açarken, asidik pH'da H2O2'e maruz kalan hücrelerin %99,26'sında geç apoptoz veya nekroz gözlenmiştir. Bu veriler hücre dışı asidifikasyonun oksidatif stres kaynaklı apoptoz üzerinde önemli bir etkisi olduğunu göstermektedir.

Anahtar Kelimeler: Asidite, hücre ölümü, *Saccharomyces cerevisiae*, apoptoz

EFFECT OF ACIDITY ON THE MODE OF CELL DEATH IN RESPONSE TO OXIDATIVE STRESS

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ABSTRACT
Extracellular acidic pH is a hallmark of solid tumors and considered to be generated by reprogramming of cellular energy metabolism which results in secretion of hydrogen ions to the extracellular environment. The fact that alterations in extracellular pH affect chemotherapeutic response in many cancer types, suggests that acidity have an impact on the mode of the cell death. Here, we investigated the effect of acidity on the mode of cell death of *Saccharomyces cerevisiae* cells in response to H2O2-induced oxidative stress by colony forming assay and Hoechst 33342 and PI staining. Our data revealed that although acidic pH does not significantly affect the viability of cells compared to that of regular pH in response to H2O2 treatment, the mode of cell death differs between these cultures. While H2O2 treatment in regular pH leads to early apoptosis in 83.59% of cells, treatment with H2O2 in acidic pH resulted in late apoptosis or necrosis in 99.26% of cells. These data indicate that extracellular acidification have a significant impact on oxidative stress induced apoptosis.

Keywords: Acidity, cell death, *Saccharomyces cerevisiae*, apoptosis

ESNEK DİMONOİDLERE GİRİŞ

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ÖZET
Gerçek yaşam koşullarında, ekonomi, mühendislik, çevre, sosyal bilimler, tıp bilimleri gibi alanlarda bazı karmaşık problemler her zaman net veriler içermez. Bu durumu aşmak için olasılık teorisi, bulanık küme teorisi, kaba küme teorisi gibi teoriler ortaya atılmıştır. Bu teoriler başarılı olmalarına rağmen, parametreleştirme aracının yetersizliğinden kaynaklanan karmaşıklıkları vardır. Bu nedenle Molodtsov, klasik matematiksel yöntemlerin üstesinden gelemediği belirsizliklerle başa çıkmak için etkili bir matematiksel araç olarak esnek küme teorisini önerdi. Son zamanlarda, esnek küme teorisi ve uygulamaları ile ilgili araştırmalar hızlı bir tempoda gerçekleşmektedir. Esnek kümeler üzerinde yeni yapılar tanımlanmıştır. Bu yapılardan biri de J.-L Loday tarafından 2001 yılında tanımlanan dimonoidlerdir. Bu çalışmada, esnek dimonoidler kavramı sunulmakta ve dimonoidlerle ilgili bazı önemli özellikler incelenmektedir. Birkaç esnek dimonoid yapısı tanımlanmıştır. Ayrıca, yumuşak dimonoidlerin alt yapıları detaylı olarak incelenmiştir.

Anahtar Kelimeler: Esnek küme, monoid, dimonoid, esnek dimonoid.

AN INTRODUCTION TO SOFT DIMONOIDS

ABSTRACT
In real life conditions, the some complex problems in economics, engineering, environment, social science, medical science etc. do not always contain crisp data. To overcome this situation, some theories such as probability theory, fuzzy set theory, rough set theory have been introduced. Although these theories are successfull to tackle, they have complexities which reason from the inadequacy of the parametrization tool. For this reason, Molodtsov proposed the theory of soft sets as an effective mathematical tool for dealing with uncertainties which classical mathematical methods cannot handle. Recently, the research in the fields of soft set theory and its applications has been taking place in a rapid pace. New structures have been defined on soft sets. One of these operations is dimonoids defined by J.-L. Loday in 2001. In this study, the concept of soft dimonoids is presented and some important properties associated with dimonoids are examined. Several soft dimonoids constructions are suggested, Also, the substructures of soft dimonoids are studies in detail.

Keywords: Soft set, monoid, dimonoid, soft dimonoid.

OKUL YÖNETİCİLERİNDE TEKNOLOJİ YETERLİLİK ALANINDAKİ GELİŞMELER

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ÖZET
Bu araştırma; 2020 yılında yapılan, okul yöneticilerinin teknoloji kullanımı konusundaki yeterliliklerinin özdeğerlendirme şeklinde belirlendiği araştırmanın, devamı biçiminde yapılmıştır. Araştırmada amaç; son iki dönemde Kuzey Kıbrıs'ta yapılan okul yöneticiliği sınavları sonrasında, ilkokul yöneticilerinin süreç içerisindeki gelişimlerini belirlemektir. Amaç doğrultusunda, araştırmada 2020 yılında kullanılan ölçek, aynı sayıda okul yöneticisine yeniden uygulanmıştır. Bu bağlamda araştırmada, 2022-2023 yılında ilkoulda yöneticilik görevinde bulunan 147 kişilik çalışma grubu kullanılmıştır. Araştırmanın verilerini elde etmek için "Teknoloji Yeterliliği Özdeğerlendirme Ölçeği" kullanılmıştır. Dört farklı alt boyutu bulunan ölçekte; 5 tane e-posta alt boyutu ile ilgili soru, 5 tane web-internet alt boyutu ile ilgili soru, 4 tane entegre uygulamalar alt boyutu ile ilgili soru ve 10 tane de teknolojiyle öğretim alt boyutu ile ilgili soru yer almaktadır. Araştırmada elde edilen veriler, SPSS programında analiz edilmiştir. Araştırma bulgularına göre, her iki yılda da e-posta alt boyutu ve web internet alt boyutu genel ortalamada çok iyi düzeyde, entegre uygulamalar alt boyutunun maddeleri kendi içinde yıllara göre değişiklik göstermekle birlikte ortalaması 2000 yılında iyi, 2022 yılında ise çok iyi düzeyde çıkmıştır. Teknoloji ile öğretim alt boyutu ise 2000 yılındaki araştırmada orta düzeyde çıkarken; 2022 yılındaki araştırmada iyi düzeyinde çıkmıştır. Ölçeğin genel toplamında ise 2000 yılında yapılan araştırmada, okul yöneticilerinin teknolojik yeterlilikleri orta, 2022 yılında ise iyi olarak bulunmuştur. Yine bulgulara bakıldığı zaman, teknoloji yeterlilik ölçeğinin genel toplam puanı, her iyi yılda da eğitim düzeyi, yaş, kıdem değişkenlerinde farklılık gösterirken; medeni durum, ödül alma ve okulun bulunduğu bölgenin sosyo-ekonomik düzeyi değişkenlerinde farklılık göstermemiştir. Araştırmanın sonucunda; üç yılın içinde farklı zamanlarda, iki kez yapılan ve okul yöneticilerinin teknolojik yeterlilliklerini ölçen ankette yıllara göre farklılıklar bulunmuştur. Bu araştırma bir sonraki yönetici seçme sınavının ardından yeniden tekrarlanarak, son üç sınavın ardından okul yöneticilerinin teknoloji yeterliliği konusundaki gelişmeleri yeniden değerlendirilebilir.
Anahtar Kelimeler: Okul yöneticileri, teknoloji kullanımı, yönetici ve teknoloji

DEVELOPMENTS IN THE FIELD OF TECHNOLOGY QUALIFICATION IN SCHOOL MANAGERS

ABSTRACT

This research; It was conducted as a continuation of the research conducted in 2020, in which the competence of school administrators in the use of technology was determined in the form of self-assessment. The purpose of the research; The aim of this study is to determine the development of primary school administrators in the process after the school administration exams held in Northern Cyprus in the last two periods. For the purpose, the scale used in the research in 2020 was re-applied to the same number of school administrators. In this context, a study group of 147 people who were in the primary school managerial position in 2022-2023 was used in the research. "Technology Competence Self-Assessment Scale" was used to obtain the data of the research. The scale has four different sub-dimensions; There are 5 questions about the e-mail sub-dimension, 5 questions about the web-internet sub-dimension, 4 questions about the integrated applications sub-dimension, and 10 questions about the teaching with technology sub-dimension. The data obtained in the research were analyzed in the SPSS program. According to the research findings, in both years, the e-mail sub-dimension and the web-internet sub-dimension were at a very good level in the general average, and the items of the integrated applications sub-dimension changed according to the years, but the average was good in 2000 and very good in 2022. While the sub-dimension of teaching with technology was at a moderate level in the research in 2000; In the research in 2022, it was at a good level. In the general total of the scale, in the research conducted in 2000, the technological competences of school administrators were found to be medium, and in 2022 it was found to be good. Again, when the findings are examined, the overall total score of the technology proficiency scale differs in the variables of education level, age, and seniority in each good year; marital status, receiving awards and socio-economic level of the region where the school is located did not differ in variables. As a result of the research; In the survey, which was conducted twice in three years at different times and measuring the technological competencies of school administrators, differences were found according to years. This research can be repeated after the next administrator selection exam, and the developments in technology proficiency of school administrators can be re-evaluated after the last three exams.

Keywords: School administrators, technology use, manager and technology

ULUSLARARASI SÖZLEŞMELER İLE MEVZUATIMIZDA KADIN İŞÇİLERİ KORUYUCU DÜZENLEMELER

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ÖZET
Kadınların çalışma hayatı içerisinde bulunmalarının birçok nedeni bulunmaktadır. Ailevi yükümlülüklerin yerine getirilmesi için bir gelire ihtiyaç duyulması, ekonomik kaygılar önemli bir nedendir. Bunun yanında kadınların kendi ayakları üzerinde durabilme isteği, ekonomik özgürlüğe sahip olma arzusu, kariyer planlaması, sosyalleşme ve ruhsal tatminde kadınların çalışma hayatında bulunmalarının nedenleri arasında sayılabilir. Kadınların çalışma hayatında bulunmaları ile birlikte çalışma ilişkilerinde korunması, karşılaşacakları sosyal risklere karşı güvencelerinin artırılması gerekliliği doğmuştur. Kadınların çalışma hayatında korunmaları gerektiği yönünde Birleşmiş Milletlerin, Uluslararası Çalışma Örgütünün ve Avrupa Birliğinin düzenlemeleri bulunmaktadır. Bu düzenlemelerin temelinde kadın-erkek eşitliğini sağlamak ve ayrıca cinsiyet ayrımcılığına dayalı davranışlara son vermek yatmaktadır. Yapılan çalışmalarda kadın işçileri koruyucu düzenlemelerin pozitif ayrımcılığa dayandığı görülmektedir. Pozitif ayrımcılık, eşit fırsatlardan yararlanmak için, eşit olana kadar bu hakları eksik kullananlara ayrımcılık uygulanması gerektiği düşüncesine dayanmaktadır. Uluslararası düzenlemelerin ulusal hukukumuzda da etkileri zaman içerisinde görülmüştür. Anayasamızda, Türk Borçlar Kanununda, İş Kanununda, İş Sağlığı ve Güvenliği Kanununda ve Sosyal Sigortalar ve Genel Sağlık Sigortası Kanununda uluslararası belgelerde yer alan hükümlere paralel düzenleme yapılmıştır. Kadın işçilerin karşı karşı kalacakları sorunların bir kısmı erkek işçilerin sorunlarıyla aynı olsa da gerek fiziksel yapıları, gerek özel hayatlarında aldıkları sorumlulukların fazla oluşu yapılacak düzenlemelerle özel olarak korunmalarını zorunlu kılmaktadır. Kadın işçinin sırf kadın olması nedeniyle diğer işçilerden farklı bir işleme tabi tutulamaması, işverenin eşit davranma borcunun gereğidir. Mevzuatımızda kadın işçilerin yer ve su altında çalıştırılması mümkün değildir. Kadın işçilerin gece çalıştırılması ise belli koşullar altında mümkünken gebe işçilerin gece çalışması mümkün değildir. Ayrıca kadın işçilerin gebelik ve emzirme dönemlerinde çalışma süreleri bakımından koruyucu düzenlemeler mevcuttur. Kadınların çalışma hayatında bulunmasını kolaylaştırmak amacıyla getirilen bu düzenlemeler ülkenin ekonomik ilerlemesi için de önemlidir. Kadınların çalışma hayatındaki karışılacakları zorluklara ilişkin getirilen tüm yasal düzenlemeler, doğru şekilde uygulanması halinde fayda sağlayacaktır. İşverenlerin hukuk kurallarını uygulamaması halinde ise etkili ve caydırıcı niteliğe sahip yaptırımların uygulanması gerekmektedir.

Anahtar Kelimeler: kadın, analık, emzirme, pozitif ayrımcılık, yer altı maden işleri

REGULATIONS THAT PROTECT WOMEN WORKERS IN INTERNATIONAL TREATIES AND IN OUR LEGISLATION

ABSTRACT

There are many reasons why women are in working life. The necessity for an income to fulfill family obligations and economic concerns are some of the important reasons. In addition to these, the desire of women to stand on their own feet, the aspiration to have economic freedom, career planning, socialization and spiritual satisfaction can be counted among the reasons why women are in working life. With the participation of women in working life, it has become an necessity to protect them in working relations and to increase their security against the social risks that they could encounter. There are regulations of the United Nations, the International Labour Organization and the European Union that aim to protect women in working life. The basis of these regulations is to ensure equality between men and women and also to put an end to behavior based on gender discrimination. In the studies, it can be seen that the protective regulations for women workers are based on positive discrimination. Positive discrimination is based on the idea that in order to benefit from equal opportunities, discrimination should be applied to those who use these rights incompletely until they are equal. The effects of international regulations on our national law have also been seen over time. Our constitution, Turkish Code of Obligations, Code of Labor, Code of Occupational Health and Safety Law and Code of Social Insurance and General Health Insurance Law have been arranged in parallel with the provisions in international documents. Although some of the problems that female workers may face are the same as those of male workers, their physical structure and the excess of responsibilities they take in their private lives necessitate special protection through regulations to be made. The fact that a women worker can not be treated differently from other workers just because she is a woman is a requirement of the employer's obligation of equal treatment. In our legislation, it is forbidden for female workers to work underground or underwater. While it is possible for women workers to work at night under certain conditions, it is forbidden for pregnant workers to work at night. In addition to these, there are protective regulations in terms of working hours of female workers during pregnancy and lactation. These regulations, which were introduced to facilitate the participation of women in working life, are also important for the economic progress of the country. All legal regulations regarding the difficulties that women may encounter in working life will be beneficial if they are implemented correctly. In case of disobedience of employers to the rules of law, effective and deterrent sanctions should be applied.

Keywords: woman, maternity, lactation, positive discrimination, underground mining works

11 EYLÜL SONRASI TÜRKİYE AB İLİŞKİLERİNE DİNAMİK OYUN MODELİ ÇERÇEVESİNDE BİR DEĞERLENDİRME

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ÖZET
Türkiye AB ilşkileri 60 yılı aşkın bir geçmişse sahiptir ve resmi olarak 1995 yılında gerçekleşmesi gereken üyelik henüz gerçekleşmemiştir. Bugünkü süreçte ise ABD merkezli Batı bloğu çok büyük bir jeostratejik saldırı yaşamış ve 11 Eylül 2001 sonrası Dünya ekonomik güç ekseni Atlantik kıyılarından Pasifik kıyılarına doğru kaymaya başlamıştır Bu Batı Doğu ekseninde yeni paradigma Türkiye ve AB ilişkilerinde de önemli değişim yaratmış ve gelecekte olası değişimlere gebedir. Bu çalışmada her iki tarafın Türkiye'nin üyeliği konusunda politika değişimleri oyun teorsi çerçevesinde incelenecektir. Modelin ana yapısı, iki aşamalı, dinamik, fakat sınırlı bilgiye dayalı bir oyun kuramıdır. Karşılıklı kararlar aynı zaman diliminde olmasına rağmen bir karşılıklı sıra içinde olduğu için dinamik bir oyun olarak değerlendirilmelidir. Bu iki taraf yani Türkiye ve AB başlıca iki oyuncudur. İktisadi modelleme için taraflar arasındaki siyasi, ekonomik ve hukuksal tüm ilişkiler oldukça basite indirgenmiştir. Bununla birlikte gerek Türkiye ve gerekse AB ülkeleri ve kurumları arasında arka planda, benzer şekilde karar mekanizmasını etkileyecek oyunlar oynanmaktadır.

Anahtar Kelimeler: Nash Dengesi, Oyun teorisi, Türkiye-AB İlişkileri

AN ASSESSMENT ON TURKEY-EU RELATIONS AFTER 11 SEPTEMBER WITHIN THE FRAMEWORK OF DYNAMIC GAME MODEL

ABSTRACT

Turkey's EU relations have a history of more than 60 years and the formal membership that was supposed to take place in 1995 has not yet taken place. In today's process, the US-based Western bloc experienced a huge geostrategic attack and after September 11, 2001, the world economic power axis started to shift from the Atlantic coast to the Pacific coast. In this study, policy changes of both sides on Turkey's membership will be examined within the framework of game theory. The main structure of the model is a two-stage, dynamic, but limited knowledge based game theory. Although mutual decisions are in the same time period, it should be considered as a dynamic game because it is in a mutual order. These two parties, namely Turkey and the EU, are the two main players. For economic modeling, all political, economic and legal relations between the parties have been simplified. However, there are games played in the background, which will similarly affect the decision mechanism, between both Turkey and EU countries and institutions.

Keywords: Nash Equilibrium, Game theory, Turkey-EU Relations

ERGENLİK DÖNEMİNDE BAĞIMLILIĞA YATKINLIĞIN BİYOPSİKOSOSYAL MODELE GÖRE DEĞERLENDİRİLMESİ

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ÖZET

Çocukluk ve yetişkinlik arasında yaşanan ergenlik dönemi önemli yaşlar olarak belirtilirken; hem davranışsal hem de kimyasal bağımlılıklar için riskli görülmektedir. Erişkinliğe geçiş süreci, kişinin fizyolojik ve psikolojik değişiklikler yaşarken sosyolojik açıdan da gelişim gösterdiği önemli bir dönem olarak tanım almaktadır. Ergenlik dönemini kemik yaşına göre ele alan çalışmalarda, kız çocukları 10-11 yaşında ergenlik çağına geçerken, erkek çocuklarının ise 11-12 yaşlarında bu dönemi yaşamaya başladıkları belirtilmektedir. Dünya Sağlık Örgütü (WHO) ise, ergenlik çağını 10 ila 19 yaş arasındaki dönem olarak kabul etmektedir. Epidemiyolojik çalışmalar, bağımlılık yapıcı maddelerin kullanımı ve bağımlılığa yatkınlık oluşturan davranış kalıplarının ağırlıklı olarak ergenlik dönemi ve gençlik çağlarında görüldüğünü ortaya koymaktadır. Ergenlik sürecinde nörogelişiminin bağımlılığa yatkınlık oluşturmasının yanı sıra, kişinin sahip olduğu biyolojik mirası, içine doğduğu aile yapısı ve gelişim gösterdiği sosyal çevre de belirleyici faktörler arasında gösterilmektedir. Bağımlılık tarihsel süreçte kişilik bozukluğu, ahlaki sorun, iradesizlik olarak tanılanırken; günümüzde bağımlılığın bir beyin hastalığı olduğu teşhis ön plana çıkmaktadır. Ergenlik dönemindeki risk faktörlerinin başında, beynin prefrontal korteksi işaret edilirken, bağımlılıkta salt bir belirleyiciliğin olmadığı da bilinmektedir. Bu yüzden, çalışma içeriği biyopsikososyal modele dayandırılarak, bağımlılık olgusu özellikle ergenlik dönemindeki yatkınlık bağlamından ele alınacaktır. Biyolojik eksende, genç yetişkinlik dönemine kadar beynin prefrontal korteksindeki olgunlaşmanın tamamlamamış olması üzerinde durulacaktır. Biyolojik olarak bağımlılığın gelişmesinde de etkili olduğu öne sürülen bu etken dışında psikolojik ve sosyolojik etkenlere de değinilecektir. Araştırma, ergen kişilerin beyni üzerine yoğunlaşan araştırma raporları ve beyin görüntüleme merkezlerinden elde edilen fMRI görüntü bulgularına dayandırılarak fizyolojik kanıtların sunulduğu literatür incelemesini kapsamaktadır. Bu açıdan yapılan değerlendirmelerde, fiziksel gelişimi devam eden ergen kişilerin; beyinlerinin henüz gelişimini tamamlamamış bölümü olan ön korteksi (prefrontal korteks) sebebiyle dürtüselliklerinin baskın olduğu ve duygusal tepkilerini yoğun yaşadıkları bildirilmektedir. Konuyla ilintili olarak, bilişsel işlevlerin yönetildiği beynin prefrontal korteksinin fonksiyonlarına ayrıntılı şekilde yer verilerek; ergenlik döneminde bağımlılığa eğilimli olunmasıyla ilişkisi bulunan mekanizmaya dikkat çekilmesi amaçlanmıştır.

Anahtar Kelimeler: Bağımlılık, Davranışsal Bağımlılık, Kimyasal Bağımlılık, Ergenlik Dönemi, Prefrontal Korteks.

ADDICTION IN ADOLESCENSE AND EVALUATION ACCORDING TO THE BIOPSYCOSOCIAL MODEL

ABSTRACT

Adolescence period between childhood and adulthood is stated as important ages; It is seen as risky for both behavioral and chemical addictions. The transition to adulthood is defined as an important period in which a person develops sociologically while experiencing physiological and psychological changes. In studies dealing with the adolescence period according to bone age, it is stated that girls reach adolescent at the age of 10-11, while boys begin to experience this period at the age of 11-12. On the other hand, The World Health Organization (WHO) defines adolescents as those people between 10 and 19 years of age. Epidemiological studies reveal that the use of addictive substances and behavioral patterns to addiction predominantly seen in adolescence term and youth. Neurodevelopment can create a predisposition to addiction during adolescence, but this is not the only reason. There are many different factors that can affect for addiction, example; the biological heritage, the family structure - culture and where was educated or lives in social environment. In the historical process, addiction has been diagnosed as a personality disorder, moral problem and lack; but today, the diagnosis of addiction as a brain disease comes to the fore. While the prefrontal cortex of the brain is pointed out at the beginning of the risk factors in adolescence term; it is emphasized that, there is not just one determinant of addiction. Therefore, this study content will be based on the biopsychosocial model, and the phenomenon of addiction will be discussed in the context of susceptibility, especially in adolescence. On the biological axis, the focus will be on the incomplete maturation of the prefrontal cortex in the brain until young adulthood. Apart from this biological factor, psychological and sociological factors will be mentioned. The research includes research reports focusing on the brain of adolescents and a literature review that presents physiological evidence based on fMRI image findings obtained from neuroimaging centers. In the evaluations of this respect, due to physical development continues that occur during adolescence period; reported that their impulsivity is dominant and they experience intense emotional reactions due to the frontal cortex (prefrontal cortex), which is the part of their brain that has not yet completed development. This study will provide about prefrontal cortex of the brain, where cognitive functions are managed and it is aimed to draw attention to the mechanism associated with being prone to addiction in adolescence.

Keywords: Addiction, Behavioral Addiction, Chemical Addiction, Adolescence, Prefrontal Cortex.

GÖRSEL HİKAYELİ HECELER İLE İLKOKUMA YAZMA ÖĞRETİMİ YÖNTEMİNİN(GHHOYÖ) ETKİLİLİĞİ (YABANCI UYRUKLU EBEVEYNLİ ÖĞRENCİ ÖRNEĞİ)

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ÖZET
Bu araştırma ilk okuma- yazma öğreniminde güçlük yaşayan ikinci sınıf öğretim düzeyinde olan çocuğun, ilk okuma-yazma öğrenimi sürecini konu alan bir eylem araştırmasıdır. Çalışmada nitel araştırma yaklaşımı benimsenmiştir. Araştırmanın katılımcısı 2022-2023 eğitim –öğretim yılında ikinci sınıfa kayıtlı bir erkek öğrencidir.Öğrenci E'nin annesi yabancı uyruklu olup biraz Türkçe konuşabilmektedir.Ancak öğrenci E'ye derslerinde yardımcı olamamaktadır. Öğrenci E, 2021 - 2022 eğitim öğretim yılında birinci sınıfa başlamıştır. Öğretim yılı boyunca okuma yazma becerisi edinememiştir. Araştırmacı tarafından hazırlanan Görsel Hikayeli Heceler İle İlk Okuma Yazma Öğretimi Yöntemi**(**GHHOYÖ) etkinlikleri 40 oturum olarak uygulanmıştır. Araştırmacı katılımcı gözlemcidir. Veriler gözlem, görüşme, öğrenci dokümanları ile toplanmıştır. Veriler betimsel ve içerik analiz yöntemleri ile analiz edilmiştir. Elde edilen bulgulara göre; E'nin Görsel Hikayeli Heceler ile İlk Okuma Yazma Öğretimi Yöntemi (GHHOYÖ) etkinlikleri ile ilk okuma- yazma becerisi kazandığı gözlemlenmiştir. Araştırmadan elde edilen sonuçlara göre, gerek olası bir özel eğitim gerektiren gerekse normal süreçte artikülasyon bozukluğu yaşayan öğrencilere yönelik Görsel Hikayeli Heceler ile İlk Okuma Yazma Öğretimi Yöntemi (GHHOYÖ) alternatif bir ilkokuma yazma öğretim yöntemi olarak önerilebilir.

Anahtar Kelimeler: Özel gereksinim, artikülasyon bozukluğu, ilkokuma- yazma.

EFFECTIVENESS OF THE METHOD OF TEACHING PRIMARY READING AND WRITING WITH VISUAL STORY SYLLABLES (GHHOYÖ) (STUDENTS WITH FOREIGN NATIONAL PARENTS)

ABSTRACT

This research is an action research about the first literacy learning process of a second grade child who has difficulty in learning to read and write. Qualitative research approach was adopted in the study. The participant of the research is a male student enrolled in the second grade in the 2022-2023 academic year. Student E's mother is a foreign national and can speak a little Turkish. However, student E cannot help her in her lessons. Student E started first grade in the 2021-2022 academic year. He could not acquire literacy skills during the academic year. The Visual Story Syllables and First Literacy Teaching Method (GHHOYÖ) activities prepared by the researcher were applied in 40 sessions. The researcher is a participant observer. Data were collected through observation, interview and student documents. The data were analyzed with descriptive and content analysis methods. According to the findings; It was observed that E gained the first literacy skill with Visual Story Syllables and First Literacy Teaching Method (GHHOYÖ) activities. According to the results obtained from the research, Visual Story Syllables and First Literacy Teaching Method (GHHOYÖ) can be recommended as an alternative primary reading and writing teaching method for students who need a possible special education or who have articulation disorders in the normal process.

Keywords: Special needs, articulation disorder, primary literacy.

ICOSAHEDRON Cu_6Zn_6Al, Cu_6Al_6Zn ve Zn_6Al_6Cu TOPAKLARINDA MERKEZ KATKI ATOMUNUN ELEKTRONİK ÖZELLİKLERİ ÜZERİNE ETKİSİ

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ÖZET
Şekil hafızalı alaşımlar (SMA'lar) çeşitli uygulamalarda farklı alanlarda kullanılmaktadır. Bazı şekil hatırlamalı alaşımlar, şekil hatırlama özelliğinden dolayı gözlükler, kateterler ve ortodonti gibi endüstri alanlarında ayrıca birçok medikal uygulamada da kullanılmaktadır. Son yıllarda CuZnAl üçlü alaşımlar ile ilgili çalışmalar yapılmaktadır. Mikroyapısal çalışmalarda da CuZnAl alaşımlarının daha iyi anlaşılması sağlanmıştır [1, 2, 3]. Yapılan çalışmalarda alfa çökeltileri ve martensit yapılar gözlenmiştir. CuZnAl alaşımlarının yapısal, kristolografik, termal, mekanik özellikleri gibi birçok özellikleri incelenmiştir [4, 5]. Ancak, nano boyutta CuZnAl alaşımları ile ilgili teorik çalışmalara az rastlanılmaktadır. Bu çalışmada ikosahedral CuZnAl alaşımının elektronik özellikleri kuantum mekaniksel metod kullanılarak çalışılmıştır. DFT hesaplamaları ile bir dizi 13 atomlu CuZn nanoalaşım topakları incelenmiştir ve sonuçlar, bakırca zengin topakların yapılarının kompakt, genellikle ikosahedral olma eğilimindeyken, çinko bakımından zengin topakların, tamamlanmamış bir kabukla çevrili kompakt bakır çekirdeklere sahip olduğunu göstermektedir. Cu_6Zn_7 topağı literatürde ikosahedron yapıdadır [6, 7]. Bu çalışmada katkılı merkez atomun, ikosahedron Cu_6Zn_6Al, Cu_6Al_6Zn ve Zn_6Al_6Cu topaklarının elektronik özellikleri üzerindeki etkisi yoğunluk fonksiyonel teorisi kullanılarak incelenmiştir [8]. İlk olarak, tüm nanoalaşım topaklarının global minimumu elde edilmiştir. Daha sonra Al, Cu ve Zn ikili alaşım topaklarının global minimum yapılarına merkez atomu katkılandırılmıştır. Elde edilen verilerden; topakların yapısal, elektronik özellikleri ve elektrostatik potansiyel yüzeyleri analiz edilmiştir.

Anahtar Kelimeler: Cu-bazlı Alaşım, Topak, Katkılı, DFT.

EFFECT OF THE DOPED CENTRE ON THE ELECTRONIC PROPERTIES OF ICOSAHEDRON Cu_6Zn_6Al, Cu_6Al_6Zn and Zn_6Al_6Cu CLUSTER

ABSTRACT

Shape memory alloys (SMAs) are used in different fields in various applications. Some shape memory alloys are also used in many medical applications in industrial areas such as eyeglasses, catheters and orthodontics due to their shape memory feature. In recent years, about CuAlNi and CuZnAl ternary alloys works are being done. CuZnAl alloys with better mechanical properties are the most popular among the Copper-based SMA [1, 2, 3]. A better understanding of CuZnAl alloys has also been made in microstructural studies. In studies were observed alpha precipitates and martensite structures**.** Many properties of CuZnAl alloys such as structural, crystallographic, thermal and mechanical properties were investigated [4, 5]. In this study, the electronic behavior of CuZnAl alloy was studied. A series of 13-atom Cu-Zn nanoalloy clusters was also studied by DFT calculations, and the results indicate that structures of copper rich clusters tend to be compact, often icosahedral, whereas zinc rich clusters have compact copper cores surrounded by an incomplete shell of solvated Zn atoms. Cu_6Zn_7 structure is based on the icosahedron in literatüre [6, 7]. In this study, the doped effect of centre atom on the electronic properties of icosahedron Cu_6Zn_6Al, Cu_6Al_6Zn and Zn_6Al_6Cu cluster are studied by using density functional theory [8]. Firstly, the global minimum of all nanoalloy clusters are obtained. Then, Al, Cu and Zn is doped the global minimum structures of binary alloy clusters. From obtained data; the electronic properties and electrostatic potential surfaces of the clusters are analyzed.

Keywords: Cu-based Alloy, Cluster, Dope, DFT

BIANCHI V TİPİ UZAY ZAMAN MODELİNDE TSALLIS HOLOGRAFİK KARANLIK ENERJİ MODELİ VE SKALER ALANLAR

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ÖZET
Elde edilen gözlemler sonucunda evrenimizin artık ivmeli bir şekilde genişlediğini biliyoruz. Beklenmeyen bu ivmeli genişlemeye sebep olan şeyin Karanlık Enerji ve Karanlık Madde olduğu düşünülmektedir. Son zamanlarda bilim insanları yaptıkları çalışmalarında karanlık enerji ve karanlık madde üzerine yoğunlaşmaktadır. Özellikle karanlık enerji konusunda yoğunluğu yazılmış olan birçok model bulunmaktadır. Güncel olarak Tsallis holografik karanlık enerji modeli de bunlardan bir tanesidir. Yapılan bu çalışmada Bianchi tipi V uzay zaman modeli ele alınarak Tsallis holografik karanlık enerji modeli ile bazı skaler alanlar (quintessence, takyon, dilaton skaler alanları vb.) arasında bir ilişki kurulmaktadır. Adı geçen ilişki Granda-Oliveros (GO) kesilimi çerçevesinde ele alınmaktadır. Çizilen grafikler yardımıyla durum denklemi parametresi hesaplanarak evrenimizin bu model için hangi fazda olduğu ve kinetik enerji ile skaler potansiyelin zamanla nasıl değiştiği bulunmaktadır.

Anahtar Kelimeler: Bianchi Tipi Uzay Zaman Modelleri, Karanlık Enerji, Skaler Alanlar.

TSALLIS HOLOGRAPHIC DARK ENERGY AND SCALAR FIELDS IN BIANCHI TYPE-V SPACE-TIME MODEL

ABSTRACT

As a result of the observational data, we know that now our universe has accelerated expansion. Dark Energy and Dark Matter are believed to be responsible for this unexpected accelerated expansion. Recently, scientists have focused on dark energy and dark matter in their studies in the literature. Many models have been written, especially on dark energy. Currently, the Tsallis holographic dark energy model is one of them. In this study, the Bianchi type V space-time model is considered, and a relation is established between Tsallis holographic dark energy model and some scalar fields (quintessence, tachyon, dilaton scalar fields, etc.). The mentioned relationship is considered within the Granda-Oliveros (GO) cutoff framework. When we calculate the state equation parameter with the help of the graphs, we found that the phase of our universe for this model and how the kinetic energy and scalar potential change over time.

Keywords: Bianchi type Space-Time Models, Dark Energy, Scalar Fields.

BİYOGAZ TESİSİ ATIK SULARI İLE DOYURULMUŞ BİYOKÖMÜR UYGULAMALARININ MISIR (*Zea Mays* L.) BİTKİSİNİN BİTKİ BESİN ELEMENTİ İÇERİĞİNE ETKİSİ

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ÖZET

Biyogaz tesisi katı atıklarından 650℃ 'de piroliz yöntemiyle elde edilen biyokömürler, aynı tesise ait azot ve fosforca zengin hayvansal kaynaklı atık su (gübre şerbeti) ile doyurulmuştur. Atık su ile azot ve fosforca doyurulan ve herhangi bir doyurma işlemi yapılmamış biyokömürler farklı dozlarda (1, 2 ve 3 ton da^{-1}) toprağa uygulanmış, mısır (*Zea mays* L.) bitkisinin yapraklarında bitki besin elementi içeriğine etkisi incelenmiştir. Kontrol hariç tüm saksılara optimum N-P miktarının %50 azaltılmış uygulaması ile 1 ton da^{-1} olacak şekilde ahır gübresi uygulanmıştır. Mısır bitkisi 90. günde hasat edilmiş, yapraklarında makro (N, P, K, Ca, Mg) ve mikro (Fe, Zn, Mn, Cu) besin elementi içeriklerindeki değişimler incelenmiştir. Doyurmanın ve dozların etkisi ile mısır bitkisi yapraklarındaki N, P, K ve Mg konsantrasyonlarında meydana gelen artış istatistiki olarak önemli bulunmuştur. Makro besin elementi kapsamları incelendiğinde N, P ve Ca içeriklerindeki en büyük artış 3 ton da^{-1} doymuş biyokömür uygulamasında tespit edilmiştir. K içeriğindeki en büyük artış 1 ton da^{-1} doymamış biyokömür uygulamasında, Mg içeriğindeki artış ise 2 ve 3 ton da^{-1} doymuş biyokömür uygulamalarında tespit edilmiştir. Dozlardaki artış oranına paralel olarak Fe, Zn, Mn ve Cu elementlerinin içeriklerindeki artış istatistiki olarak önemli bulunmuştur. Biyokömürü azot ve fosforca zengin hayvansal kaynaklı atık su ile doyurmanın etkisi sadece Zn elementinin içeriğinde istatistiki olarak anlamlı bir artış sağlamıştır. Çalışmanın sonucunda 3 ton da^{-1} doymuş biyokömür uygulamasının mısır bitkisi yapraklarının besin maddesi kapsamında istatistiki olarak fark oluşturduğu tespit edilmiştir.

Anahtar Kelimeler: Biyokömür, atık su, makro besin elementi, mikro besin elementi, mısır

EFFECTS OF BIOCHARS APLICATIONS WHICH WERE SATURATED WITH BIOGAS PLANT WASTEWATER ON PLANT NUTRIENT OF MAIZE (*Zea Mays* L.)

ABSTRACT

The biochars produced from the solid digestate collected from biogas by pyrolysis at 650°C were saturated with nitrogen and phosphorus-rich biogas plant waste water (manure slurry). Biochars saturated with nitrogen and phosphorus and unsaturated biochars were applied to the soil at different doses (1, 2 and 3 tons da^{-1}), its effect on plant nutrient content in maize (*Zea Mays* L.) leaves was investigated. Except for the control, %50 reduced amount of optimum N-P amount and 1 ton da^{-1} of barnyard manure were applied to all pots. The maize plants were harvested on the 90th day, and the changes in the macro (N, P, K, Ca, Mg) and micro (Fe, Zn, Mn, Cu) nutrient contents in the leaves were investigated. The increase in N, P, K, and Mg concentrations in maize leaves with the effect of saturation and doses was found to be statistically significant. When the macronutrient contents are examined, the greatest increase in N, P and Ca contents was determined in the application of saturated biochar at 3 tons da^{-1}. The greatest increase in K content was detected in 1 tons da^{-1} unsaturated biochar application, while the increase in Mg content was determined in 2 and 3 tons da^{-1} saturated biochar applications. The increase in the contents of Fe, Zn, Mn and Cu elements with the increase in the doses was found to be statistically significant. The effect of saturating biochar with nitrogen and phosphorus-rich biogas plant waste water provided a statistically significant increase only in the content of Zn element. As a result of the study, it was determined that 3 tons da^{-1} saturated biochar application made a statistical difference in the nutrient content of maize leaves.

Keywords: Biochar, waste water, makro plant nutrients, mikro plant nutrients, maize

BÜYÜK SELÇUKLU İMPARATORLUĞU'NDA VE ANADOLU SELÇUKLU DEVLETİ'NDE KADININ YERİ VE ÖNEMİ

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ÖZET
Kadın, bir toplumu var eden, elinin değdiği her şeye değer katan, hayatı fedakarlıklarıyla sırtlayan koca bir evrendir. Ancak tarihsel süreç içerisinde kadınlar zaman zaman dışlandılar, ikinci sınıf muamele gördüler ve erkek hegemonyası altında ezildiler. Orta Çağ'ın geç dönemlerinde cadı olarak görülüp, yakıldıkları bile oldu. Peki Türk devletlerinde kadının yeri nasıldı? Eski Türk toplumlarında kadın her zaman hayatın içerisinde aktif olarak yer aldı. Örneğin Göktürklerde ve Uygurlarda kadın, ok atar, ata biner hatta güreş oyunlarına bile katılırdı. Atilla Döneminde, Hun Devletinde, kadın ve erkekler birlikte eğlenir, şarkılar söylerlerdi. Devlet yönetiminde kağandan sonra en yetkili kişi kağanın eşi hatun idi. Kadınların sadece devlet yönetiminde değil, aynı zamanda orduda da aktif görev aldıkları Çin kaynaklarında görülmektedir. Büyük Selçuklu Devleti kurulduktan sonra da kadın, eski Türk toplumlarında olduğu gibi, aktif bir şekilde hayatın içerisinde yer aldı. Büyük Selçuklu Devleti'nde kadınların siyasi manada etkilerine bakıldığında, hatunların söz sahibi olduğunu görmekteyiz. Örneğin hatunlar, emir-ferman çıkarabilmektedir. Bununla birlikte hatunun veziri, yardımcıları ve danışmanları da mevcuttur, hatta askeri teşkilatlarının var olduğu da bilinmektedir. Selçuklularda ilim alanında da birçok kadın alime yetişti ve yetişen bu Selçuklu kadınları birçok ünlü erkek alime ders verdi. Selçuklu Devleti'nde iyi eğitime sahip kadınlar, edebiyat alanında da önemli çalışmalar yaptılar. Bunun yanında mimari alanlarda da etkili oldular. Medrese, tekke, ribat, cami inşa ettirdiler. Anadolu Selçuklu Devletine baktığımızda, kadın, aile sorumluluğunu alan çocukların yetiştirilmesinde etkin rol oynayan kişidir. Hizmetçileriyle uzun seyahatlere çıkan, misafir ağırlayan kadınlar, bazı meslekleri icra etmişlerdir. Genellikle el işçiliğine dayalı, terzilik, dokumacılık, örgü işleri gibi işlerle uğraşmışlardır. Bunun dışında dadılık da o dönemde de kadınların yaptıkları meslekler arasındadır. Sağlık alanında ebelik kadınlar tarafından tercih edilen meslek olmuştur. Kısacası hem Büyük Selçuklu Devleti hem de Anadolu Selçuklu Devleti'nde kadınlar hayatın içerisinde etkin rol oynamıştır. Selçuklularda kadının yeri, çağdaş dönem farklı devletlerdekilerin aksine daha önemlidir.

Anahtar Kelimeler: Büyük Selçuklu, Anadolu Selçuklu, Kadın

THE POSİTİON AND IMPORTANCE OF WOMEN IN THE EMPİRE OF GREAT SELJUK AND ANATOLIAN SELJUK STATE

ABSTRACT

A woman is a whole universe that creates a society, adds value to everything she touches, and carries life with her sacrifices. However, historically, women have been excluded from time to time, treated as second-class, and crushed under male hegemony. They were even burned as witches in the late Middle Ages. What was the place of women in Turkish states? In old Turkish societies, women always took an active part in life. For example, among the Gokturks and Uighurs, women would shoot arrows, ride horses and even participate in wrestling games. In the Atilla Period, in the Hun State, men and women had fun and sang songs together. The state administration's most authoritative person after the khan was his wife. It is seen in Chinese sources that women take active roles in the state administration and the army. After the establishment of the Great Seljuk State, women took an active part in life, as in the old Turkish societies. When we look at the political effects of women in the Great Seljuk Emripe, we see that women had a say. For example, women can issue orders. However, the woman's vizier, assistants, and advisers are also present; it is even known that she has military organizations. Many women scholars were trained in the field of science in the Seljuks, and these Seljuk women gave lessons to many famous male scholars. Well-educated women in the Seljuk Empire also carried out important studies in the field of literature. In addition, they were influential in architectural fields. They had a madrasa, dervish lodge, ribat, and mosque built. When we look at the Anatolian Seljuk State, a woman is a person who plays an active role in raising children and taking family responsibility. Women who went on long trips with their maids and hosted guests performed some professions. They generally dealt with handicrafts such as tailoring, weaving, and knitting. Apart from that, nanny work was also among women's professions. In health, midwifery has become the profession preferred by women. In short, women played an active role in life in both the Great Seljuk Empire and the Anatolian Seljuk State. The place of women in the Seljuks is more important than in different states in the modern period.

Keywords: Great Seljuk, Anatolian Seljuk, Women

KENTSEL TASARIMDA YAĞMUR BAHÇELERİNİN KULLANIMI

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ÖZET
Hızlı kentleşme, yetersiz planlama ve iklim değişikliği nedeniyle, günümüzde kentlerde sıradan yağışlar bile hayatı olumsuz etkileyen olaylara neden olabilmekte, kuvvetli yağışlar ise kolayca kent selleri ve taşkınlarına dönüşebilmektedir. Bu tür olayların uzun vadede daha da artacağı ve kentsel kanalizasyon sistemlerinin yağmur sularıyla aşırı yükleneceği öngörülmektedir. Altyapı sistemlerini yenileme ve geliştirme işlemlerinin maliyet ve zor erişim gibi çeşitli nedenlerle, kentleşme hızına yetişememesi, bu alanda yeni arayışları beraberinde getirmiştir. Özellikle bu sorun üzerinde duran yağış suyu yönetimi kavramının önemli bir unsuru olan yağmur bahçeleri, yağmur sularının doğrudan yönlendirildiği ve üzerinde çoğunlukla doğal bitki türlerinin kullanıldığı alanlar olup, bu amaçla geliştirilmiş yeşil alt yapı sistemlerinin bir parçasıdır. Son zamanlarda tüm dünyada sürdürülebilir tasarımlara artan ilgi sayesinde, yağmur bahçelerinin popülerliği artmış olup, özellikle dünya genelinde büyük şehirlerde, altyapı sistemlerini destekleyeci unsurlar olarak kent dokularına entegre edilmeye başlandığı görülmektedir. Bu çalışmada yağmur bahçelerinin çeşitleri, kentsel tasarımda kullanımlarının kentlere sağlayabildiği faydalar ve kullanımlarında karşılaşılabilen zorluklar araştırılmış, kullanım önerileri getirilmiştir.

Anahtar Kelimeler: Yağış Suyu Yönetimi, Yağmur Bahçesi, Yeşil Altyapı.

USE OF RAIN GARDENS IN URBAN DESIGN

ABSTRACT
Due to rapid urbanization, inadequate planning and climate change, even ordinary precipitation in cities can cause events that affect life negatively, and heavy precipitation can easily turn into urban floods. It is predicted that such incidents will increase in the long term and urban sewer systems will be overloaded with stormwater. The fact that the renewal and development of infrastructure systems could not keep up with the pace of urbanization due to various reasons such as cost and difficult access has brought new searches in this field. Rain gardens, which are an important element of the concept of stormwater management that focuses on this problem, are areas where rain water is directed and composed of mostly native plant species, and they are a part of green infrastructure systems developed for this specific purpose. Recently, due to the increasing interest in sustainable designs all over the world, the popularity of rain gardens has increased and it is seen that they are integrated into urban fabrics as supporting elements of infrastructure systems, especially in big cities around the world. In this study, the types of rain gardens, the benefits of their use in urban design and the difficulties that can be encountered in their use have been researched and suggestions for use have been made.

Keywords: Stormwater Management, Rain Garden, Green Infrastructure.

LİNYİT BİRİKİMLİ TOPRAKLARDA HUMİK VE FULVİK ASİT MİKTARINDAKİ DEĞİŞİMİN BELİRLENMESİ

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ÖZET
Bu çalışmada, linyit birikiminin gerçekleştiği Manisa'nın Soma ilçesindeki bazı tarım topraklarının karbon (C) miktarlarındaki değişimler göz önüne alınarak toprakların humik ve fulvik asit kapsamlarındaki değişim ve tarımsal faaliyetler açısından bu durumun önemi ortaya konulmuştur. Araştırma toprakları Soma'nın içinden geçen Bakırçay'ın 8 km'lik hattın hemen yakınlarındaki topraklardır. Araştırmada kullanılan tarım topraklarındaki linyit birikimi linyit parçacıkları ile yüklü Bakırçayı taşkınlarına maruz kalma veya Bakırçayı'ndan gerçekleştirilen tarımsal sulamalarla gerçekleşmektedir. 18 örnekleme noktasından 3 tekerrürlü olarak alınan toprak örneklerinin kum, kil ve silt miktarları sırasıyla %27-50, %22-45 ve %23-36 arasında değiştiği, toprakların tekstür sınıflarının killi, tınlı, kumlu killi tın ve killi tın olarak farklılık gösterdiği belirlenmiştir. Linyit birikimi olmayan toprakların C kapsamlarının %4,50-4,87, linyit birikimi olan toprakların ise %5,64-26,45 arasında değiştiği tespit edilmiştir. Linyit birikiminin toprakların hem humik hem de fulvik asit kapsamlarında istatistiksel anlamda (P>0.0001) önemli değişikliğe neden olduğu belirlenmiştir. Linyit birikimi olmayan topraklarda humik asit miktarı %0,36-0,72 linyit birikimi olan topraklarda ise %2,71-9,88 arasında değişim gösterdiği belirlenmiştir. Bununla birlikte linyit birikimi olmayan topraklarda fulvik asit belirlenememiş ancak linyit birikimi olan topraklarda %0,22-1,02 arasında olduğu belirlenmiştir. Yapılan regresyon analizleri sonucu linyit birikimi olan topraklarda toprağın C, kum ve kil içerikleri ile humik asit kapsamları arasında anlamlı bir ilişkinin olduğu belirlenmiştir. Fulvik asit kapsamı bakımından linyit birikimi olan topraklarda yalnızca toprağın kum içeriği ile anlamlı bir ilişki kurulmuştur.

Anahtar Kelimeler: Fulvik Asit, Humik Asit, Karbon, Linyit, Toprak Tekstürü

SÜLEYMANPAŞA İLÇESİNDEKİ TARIMSAL FAALİYETLERİN DEĞERLENDİRİLMESİ

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ÖZET
Tarım ve hayvancılık insanın en temel beslenme ve giyinme ihtiyaçlarını karşılayabilmek için geliştirdiği, eskiye dayanan, en yaygın ekonomik ve zorunlu faaliyetler içerisinde yer almaktadır. Dünya nüfusunun hızlı artışı ve son yıllarda yaşanan çoğunlukla enerji krizine dayanan ekonomik zorluklar, tarım ve hayvancılığın önemini daha da vurgulamaktadır. Bu çalışmada yoğun tarımsal faaliyetler yapılan Tekirdağ ilinin Süleymanpaşa ilçesindeki mevcut tarımsal durumu, genellikle 2021 yılı istatistiki verileri dikkate alınarak değerlendirilmiştir. Süleymanpaşa ilçesi, kuzeyinde Muratlı ve Hayrabolu, doğusunda Çorlu, batısında Malkara ve güneybatısında Şarköy ilçeleri bulunan Tekirdağ ilinin merkez ilçesidir. Güneyinde ise Marmara Denizi bulunan Süleymanpaşa ilçesinde kara, deniz ve demir yolu ulaşılabilmektedir. Bunun dışında önemli bir liman kenti olması nedeniyle de sahip olduğu birçok avantajlar açısından tarım ve hayvancılık faaliyetleri önemli olan bir ilçedir. Tekirdağ ilinin ikinci en büyük yüzölçümüne sahip ilçesidir. İlçenin kıyı kesimlerinde genellikle Akdeniz iklimi özellikleri hüküm sürerken, iç kısımlara doğru gidildikçe karasal iklim özellikleri görülmektedir. Süleymanpaşa ilçesinin denize sahil uzunluğu 40 km'yi bulmaktadır. En önemlisi de ilçe topraklarının % 13 civarı çayır ve mera, % 77'si ekili-dikili

alanlardan oluştuğu için ülkemiz tarımına katkısı da oldukça önemlidir. İlçenin toplam arazi varlığı il toplamının % 12'si olup 759.227 da ve nüfusu ise 210.547'tür. Ekili alanların % 46'sını buğday, % 41'ini ise yağlık ayçiçeği oluşturmaktadır. Süleymanpaşa, oldukça verimli ve genellikle az eğimli topraklara sahip bir ilçe olup, yükselti düşüktür. İlçede modern tarım uygulamaları yaygın olmakla birlikte, makineleşme oranı yüksektir. İlçe genelinde ağırlıklı olarak tarla tarımı yapılmaktadır. İklimin elverişli olmasından dolayı ikinci üretim yapmaya imkan tanımaktadır. Hayvansal üretim olarak da önemli bir yere sahip ilçede, ağırlıklı olarak büyükbaş ve küçükbaş hayvanclık yaygın olmakla birlikte, süt inekçiliği yapılmaktadır. Arıcılık faaliyetleri de yaygınlaşmaktadır. Tarım ve Orman Bakanlığı tarafından verilen desteklerle yapılan projeler ilçe tarımına önemli katkı sağlamaktadır. İlçe tarımında yaygın olarak buğday-ayçiçeği ve ara ürün de sulamanın mümkün olduğu yerlerde mısır tarımı yapılmaktadır. Son yıllarda kanola ve lavanta ekiminde de artışlar olduğu bilinmektedir. İlçede yapılan akademik birçok çalışma sonuçlarına göre toprakların organik madde düzeylerinde azalışlar olduğu (ortalama % 1 civarında organik madde içeren topraklara sahiptir) ve yarayışlı Zn miktarında da yetersizlikler olduğu görülmektedir. İlçede tarımsal üretim yapan çiftçiler Türkiye ortalamasından daha fazla kimyasal gübre kullanmakta olup, Tarım ve Orman Bakanlığı'nın son yıllarda yaptığı teşvikler ile organik ve organomineral gübre kullanımında da yıldan yıla artışlar olduğu görülmektedir. Organik gübrelerden en fazla katı ve sıvı solucan gübresi (vermicompost) kullanılmakta olup bunun en önemli sebepleri arasında, ilçede faaliyet gösteren büyük kapasiteli bir vermikompost üretim tesisi olmasıdır. İlçede gelecek nesillerin rahatlıkla ve sağılıklı olarak yaşayabilmesi için ekip biçilebilicek sürdürülebilir toprakların oluşturulması ve korunması önem arzetmektedir.

Anahtar Kelimeler: Tarım, vermikompost, sürdürülebilir toprak, organik madde.

EVALUATION OF AGRICULTURAL ACTIVITIES IN SÜLEYMANPAŞA DISTRICT

ABSTRACT

Agriculture and animal husbandry are among the most common economic and compulsory activities, based on the past, the most basic nutritional and dressing needs of human beings. The rapid increase of the world population and the economic difficulties, mostly because of energy crisis, faced in recent years have emphasized the importance of agriculture and animal husbandry. In this study, the current agricultural situation in Süleymanpaşa district of Tekirdağ province, where intensive agricultural studies have been carried out, has been evaluated mostly according to the statistical data of 2021. Süleymanpaşa district is the central district of Tekirdağ province, which is surrounded by Muratlıand Hayrabolu in the north, Çorlu in the east, Malkra in the west and Şarköy in the southwest. Süleymanpaşa district, which has the Marmara Sea in the south of, can be reached by land, sea and railway. Except this, as it is an important port city, it is a district where agriculture and animal husbandry activities are very vital. It is the second largest district of Tekirdağ province while Mediterrian climate characteristics previal in the coastral parts of the district, continental climate characteristics are observed as you go towards the interior. The length of coast of Süleymanpaşa district to the sea reaches 40 km. Especially, its contribution to our country is agriculture is also very important, since 13% of the district's lands are made up of meadows and pastures, and 77% of it is cultivated-planted area. The total lead asserts of the district are 12% of the provincetotal, with a population of 759.227 decares and a population of 210.547. 46 % of the cultivated areas is wheat, 41% is sunflower oil. Field agriculture is mainly practiced in the district. Thanks to available climate, it allows the second production. In this district, which also has an important place in terms of animal production, mainly cattle and small cattle are common, but also dairy cow farming is carried out. Beekeeping activities are spreading. The projects carried out with the support given by The Ministry of Agriculture and Forestry make a significant contrubition to the agriculture of the district. In the district agriculture, wheat, sunflower and corn are cultivated in intermediate crops where irrigation is possible. It is known that there has been an increase in the cultivation of canola and lavender in recent years. According to the results of many academic studies in the district, it is seen that there are decreases in the organic matter levels of the soil (they have soil containing around 1% organic matter on average) and there are deficiencies in the amount of available Zn. The farmers engaged in agricultural production in the district use more chemical fertilizers than the average of Turkey, and it is observed that there is an increase in the use of organic and organomineral fertilizers from year to year with the incentives made by Ministry of Agriculture and Forestry in recent years. Among the organic fertilizers, solid and liquid vermicompost are used the most, and one of the most important reasons for this that there is a large- capacity vermicompost production facility operating in the district. In order for future generations to be able to live comfortably and healthily in the district, it is very important to create and save cultivated-planted soil.

Keywords: Agriculture, vermicompost, sustainable soil, organic matter.

LAVANTA ÜRETİMİNDE ENERJİ KULLANIMI VE SERA GAZI EMİSYONLARININ BELİRLENMESİ

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ÖZET

Bu çalışmada lavanta üretiminde enerji kullanımı ve sera gazı emisyonunun belirlenmesi amaçlanmıştır. Çalışma 2022 yılında Türkiye'nin Kırklareli ilinin Merkez ilçesinde yapılmış ve 2021-2022 üretim sezonunu kapsamaktadır. Lavanta üretiminde enerji kullanımı ve sera gazı emisyonlarını hesaplamak için tarımsal girdiler ve çıktı hesaplanmıştır. Çalışma sonuçlarına göre girdiler sırasıyla 5883.39 MJ ha^{-1} (%59.30) çiftlik gübresi enerjisi, 2425.51 MJ ha^{-1} (%24.45) dizel yakıt enerjisi, 732.02 MJ ha^{-1} (%7.38) kimyasal gübre enerjisi, 421.89 MJ ha^{-1} (%4.25) makine enerjisi, 276.70 MJ ha^{-1} (%2.79) insan işgücü enerjisi, 97.31 MJ ha^{-1} (%0.98) taşıma enerjisi ve 84.81 MJ ha^{-1} (%0.85) solucan gübresi enerjisinden oluşmaktadır. Toplam enerji girdisi ve çıktısı sırasıyla 9921.63 MJ ha^{-1} ve 12859.77 MJ ha^{-1} olarak hesaplanmıştır. Enerji kullanım etkinliği, spesifik enerji, enerji verimliliği ve net enerji sırasıyla 1.30, 2.86 MJ kg^{-1}, 0.35 kg MJ^{-1} ve 2938.13 MJ ha^{-1} olarak hesaplanmıştır. Toplam enerji girdisi %27.24 doğrudan, %72.76 dolaylı, %62.94 yenilenebilir ve %37.06 yenilenemez olarak sınıflandırılabilir. Lavanta üretiminde sera gazı emisyonu oranı 0.08 kg $CO_{2\text{-eq}}kg^{-1}$ olarak hesaplanmıştır.

Anahtar Kelimeler: Enerji kullanım etkinliği, Sera gazı emisyonu oranı, Kırklareli, Lavanta, Türkiye.

DETERMINATION OF ENERGY USAGE AND GREENHOUSE GAS EMISSIONS IN LAVENDER PRODUCTION

ABSTRACT

The purpose of this study is to reveal the energy usage and greenhouse gas emission in lavender production. The study has been conducted in 2022 in Center district of Kırklareli province in Turkey and covers the 2021-2022 production seasons. Agricultural inputs and outputs were calculated to calculate the energy use and greenhouse gas emissions in lavender production. According to the research results, the inputs are 5883.39 MJ ha^{-1} (59.30%) farmyard manure energy, 2425.51 MJ ha^{-1} (24.45%) diesel fuel energy, 732.02 MJ ha^{-1} (7.38%) chemical fertilizers energy, 421.89 MJ ha^{-1} (4.25%) machinery energy, 276.70 MJ ha^{-1} (2.79%) human labour energy, 97.31 MJ ha^{-1} (0.98%) transportation energy and 84.81 MJ ha^{-1} (0.85%), vermicompost energy, respectively. Total input and output energy were calculated as 9921.63 MJ ha^{-1} and 12859.77 MJ ha^{-1}, respectively. Energy use efficiency (EUE), specific energy (SE), energy productivity (EP) and net energy (NE) were calculated as 1.30, 2.86 MJ kg^{-1}, 0.35 kg MJ^{-1} and 2938.13 MJ ha^{-1}, respectively. The total energy input can be classified as 27.24% direct, 72.76% indirect, 62.94% renewable and 37.06% non-renewable. GHG ratio value was calculated as 0.08 kg $CO_{2\text{-}eq}kg^{-1}$ in lavender production.

Keywords: Energy use efficiency, GHG ratio, Kırklareli, Lavender, Turkey.

ÇUKUROVA KOŞULLARINDA BUĞDAY-II. ÜRÜN SOYA MÜNAVEBESİNDE FARKLI EKİM YÖNTEMLERİNİN BAZI TOPRAK PARAMETRELERİ ÜZERİNE ETKİSİ

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ÖZET

Bu araştırma, Çukurova koşullarında 2015-2016 üretim döneminde buğday+II. ürün soya münavebesinde farklı ekim yöntemlerinin toprağın bazı fiziksel özellikleri ve toprak sıkışıklığı üzerine etkilerini belirlemek amacıyla yapılmıştır. Her iki ürün içinde ekim yöntemleri olarak; "*düze ekim*", "*sırta ekim*" ve "*geniş sırta ekim*" yöntemleri incelenmiştir. Deneme toprağının bazı fiziksel özelliklerini (*Nem-hacim ağırlığı ve porozite*) belirlemek amacıyla her iki ürün hasadından sonra da iki farklı derinlikte (*0-15 ve 15-30 cm*) bozulmammış toprak örnekleri alınmıştır. Buğday hasadından sonra toprak nemi açısından 0-15 cm derinlikte "*yıl*" faktörü istatistiki olarak %5 önem seviyesinde önemli bulunur iken, 15-30 cm derinlikte ise önemli bulunmamıştır. Birinci yıl 0-15 cm derinlikte toprak nemi %19.77 (b) grubunda iken ikinci yıl ise %22.74 (a) grubunda yer almıştır. II. Ürün soya hasadı sonrası da 0-15 cm derinlikte "*yıl*" faktörü ve 15-30 cm derinlikte ise farklı ekim yöntemleri toprak nemi açısından farklı bulunmuştur. Birinci yıl soya hasadı sonrası 0-15 cm derinlikte toprak nemi %22.39 (a) iken ikinci yıl %21.22 (b) olarak bulunmuştur. Soya hasadı sonrası ekim yöntemleri açısından ise en yüksek toprak nemi; sırta ekim yönteminde %29.82 (a) iken en düşük toprak nemi de %24.80 ile "*geniş sırta ekim*" yönteminde bulunmuştur. Hacim ağırlığı bakımından buğday hasadı sonrası 15-30 cm derinlikte "*yıl*", "*ekim yöntemi*" ve "*ekim yöntemi*yıl*" interaksiyonu istatistiki olarak önemli bulunmuştur.15-30 cm derinlikte hacim ağırlığı değerleri; birinci yıl 1.43 g/cm^3 (b) ve ikinci yıl ise 1.57 g/cm^3 (a) olarak bulunmuştur. En yüksek hacim ağırlığı değeri; 1.53 g/cm^3 (a) olarak "*düze ekim*" yönteminde tespit edilmiştir. "*Ekim yöntemi*yıl*" interaksiyonunda ise en yüksek hacim ağırlığı değeri; 1.64 g/cm^3 ile "*sırta ekim*" yönteminin ikinci yılından elde edilmiştir. II. Ürün soya hasadı sonrasında da 15-30 cm

derinlikte "*yıl*" faktörü önemli bulunmuştur. Birinci yıl hacim ağırlığı değeri; 1.51 g/cm^3 (b) bulunurken; ikinci yıl bu değer 1.54 g/cm^3 (a) olarak tespit edilmiştir. Porozite bakımından buğday hasadı sonrası her iki derinlikte de istatistiki olarak önemli farklılıklar bulunurken; soya hasadı sonrası "*yıl*", "*ekim yöntemi*" ve "*ekim yöntemi***yıl*" interaksiyonu önemli bulunmamıştır. Birinci yıl buğday hasadı sonrası 0-15 cm derinlikte porozite değeri; %51.16 iken ikinci yıl bu değer %48.68 olarak tespit edilmiştir. 15-30 cm derinlikte ise birinci yıl %46.84 iken ikinci yıl %41.53 olarak saptanmıştır. Sonuç olarak; toprak derinliği arttıkça toprağın nem ve hacim ağırlığı değerleri artmış, porozite değerleri ise azalmıştır. Farklı ekim yöntemlerinde toprak sıkışıklığını ölçmek için ise digital penetrometre cihazı kullanılmıştır. 0-30 cm derinlikte 5'er cm aralıklarla toprağın penetrasyon dirençleri ölçülmüştür. Buğday hasadından sonra penetrasyon dirençleri "*sırta ekim*" yöntemlerinde 0-30 cm boyunca 2 MPa değerinin altında iken "*düze ekim*" konusunda ise penetrasyon değerleri 22 cm derinlikten sonra 2 MPa eşiğinin üzerinde gerçekleşmiştir. II. Ürün soya hasadından sonra ise "*düze ekim*", "*geniş sırta ekim*" ve "*sırta ekim*" yöntemlerinde sırasıyla 18, 26 ve 28 cm derinlikten sonra toprak sıkışıklığı değerleri 2 MPa değerinin üzerinde bulunmuştur.

Anahtar Kelimeler: Adana, münavebe, hacim ağırlığı, porozite, penetrasyon direnci

THE EFFECTS OF DIFFERENT SOWİNG METHODS ON SOME SOIL PARAMETERS ON WHEAT-SECOND CROP SOYBEAN ROTATION IN ÇUKUROVA CONDITIONS

ABSTRACT

This research was carried out to determine the effects of different sowing methods on some physical properties and soil compaction of wheat + second crop soybean rotation in Çukurova conditions in 2015-2016 production period. As sowing methods in both crops; "Flat sowing", "ridge sowing" and "wide ridge sowing" methods were examined. In order to determine some physical properties (moisture-volume weight and porosity) of the experimental soil, undisturbed soil samples were taken at two different depths (0-15 and 15-30 cm) after both crop harvests. After the wheat harvest, in terms of soil moisture, the "year" factor at 0-15 cm depth was statistically significant at the 5% significance level, while it was not significant at 15-30 cm depth. Soil moisture at a depth of 0-15 cm in the first year was 19.77% in group (b), while in the second year it was in group 22.74% (a). After the second crop soybean harvest, the "year" factor at 0-15 cm depth and different sowing methods at 15-30 cm depth were found to be different in terms of soil moisture. After the first year soybean harvest, soil moisture at 0-15 cm depth was 22.39% (a) and 21.22% (b) in the second year. In terms of sowing methods after soybean harvest, the highest soil moisture; While it was 29.82% (a) in the ridge sowing method, the lowest soil moisture was found in the "wide ridge sowing" method with 24.80%. In terms of volume weight, the interaction of "year", "sowing method" and "sowing method*year" at a depth of 15-30 cm after wheat harvest was found to be statistically significant. Volume weight values at 15-30 cm depth; it was found to be 1.43 g/cm^3 (b) in the first year and 1.57 g/cm^3 (a) in the second year. The highest volume weight value; It was determined as 1.53 g/cm^3 (a) in the "flat sowing" method. In the interaction of "sowing method*year", the highest volume weight value; It was obtained from the second year of the "ridge sowing" method with 1.64 g/cm^3. The "year" factor was found to be significant at a depth of 15-30 cm after the second crop soybean harvest. First year volume weight value; 1.51 g/cm^3 (b); In the second year, this value was determined as 1.54 g/cm^3 (a). While there are statistically significant differences in both depths after wheat harvest in terms of porosity; The interaction of "year", "sowing method" and "sowing method*year" after soybean harvest was not found significant. Porosity value at 0-15 cm depth after the first year wheat harvest; While it was 51.16%, this value was determined as 48.68% in the second year. At a depth of 15-30 cm, it was found to be 46.84% in the first year and 41.53% in the second year. As a result; As the soil depth increased, the moisture and bulk weight values of the soil increased, while the porosity values decreased. A digital penetrometer device was used to measure soil compaction in different sowing methods. The penetration resistance of the soil was measured at 5 cm intervals at a depth of 0-30 cm. After the wheat harvest, the penetration resistances were below 2 MPa along 0-30 cm in the "ridge sowing" methods, while the penetration values were above the 2 MPa threshold in the "flat sowing" after 22 cm depth. After the second crop soybean harvest, soil compaction values were found to be above 2 MPa after 18, 26 and 28 cm depth, respectively, in "flat sowing", "wide ridge sowing" and "ridge sowing" methods.

Keywords: Adana, rotation, bulk weight, porosity, penetration resistance

BAZI KURU FASULYE GENOTİPLERİNİN KALİTE ÖZELLİKLERİ AÇISINDAN KARŞILAŞTIRILMASI

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ÖZET
Günümüzde yürütülen ıslah çalışmaları kapsamında en önemli parametrelerin başında yüksek verimlilik gelmektedir. Ancak son yıllarda verimi yüksek çeşit/çeşitler geliştirmekle beraber kalite içerikleri yüksek çeşit/çeşitlerinde ortaya konulması da ön plana çıkmaya başlamış olup yüksek verimli ve kaliteli çeşitlerin çiftçiler tarafından sağlanabilir olması tarımsal sürdürülebilirlik açısından oldukça önemlidir. Bu çalışma, 5 adet kuru fasulye çeşidi (Yunus 90, Göynük 98, Önceler 98, Zülbiye, Şahin 90) ile 6 adet kuru fasulye hattı (A.27, A.40, A.130, K.1044, K.1084 ve G.K.314) olmak üzere 11 adet kuru fasulye genotipinin 2016 yılında Kırşehir ekolojik şartlarında kalite parametreleri (su alma kapasitesi, su alma indeksi, şişme kapasitesi, şişme indeksi, kabuk oranı ve protein oranı) bakımından karşılaştırılması amacıyla yürütülmüştür. Yürütülen çalışma tesadüf blokları deneme desenine göre üç tekerrürlü olarak kurulmuş olup yapılan varyans analizi sonuçlarına göre su alma kapasitesi hariç ele alınan bütün kalite parametrelerinde kuru fasulye genotipleri arasında istatistiksel anlamda çok önemli farklılıklar belirlenmiştir ($p<0.01$). Çalışmada en yüksek kabuk oranı Önceler 98 çeşidinde, en düşük kabuk oranı ise K.1044 genotipinde tespit edilirken buna karşın protein veriminde ise %22.87 ile G.K.314 genotipi ilk sırada gelirken en düşük protein verimi ise %20.42 ile Yunus 90 kuru fasulye çeşidinde görülmüştür. Tüm kalite parametreleri dikkate alındığında G.K.314 ve K.1044 genotipleri ile Zülbiye kuru fasulye çeşidinin dikkate değer sonuçlar verdiği belirlenmiştir.

Anahtar Kelimeler: Kuru fasulye, genotip, kalite, parametre, protein

COMPARISON OF SOME DRIED BEAN GENOTYPES IN TERMS OF QUALITY CHARACTERISTICS

ABSTRACT

High productivity is one of the most important parameters within the scope of breeding studies carried out today. However, in recent years, besides developing varieties/varieties with high yields, the introduction of varieties/varieties with high quality content has also come to the fore, and it is very important for agricultural sustainability that high-yielding and high-quality varieties can be provided by farmers. In this study, 5 dry bean varieties (Yunus 90, Göynük 98, Önceler 98, Zülbiye, Şahin 90) and 6 dry bean lines (A.27, A.40, A.130, K.1044, K.1084 and G.K.314), 11 dry bean genotypes were compared in terms of quality parameters (water absorption capacity, water intake index, swelling capacity, swelling index, shell ratio and protein ratio) in Kırşehir ecological conditions in 2016. The study was established in three replications according to the randomized blocks experimental design, and according to the results of the analysis of variance, statistically significant differences were determined between the dry bean genotypes in all quality parameters except water absorption capacity ($p<0.01$). In the study, the highest shell rate was found in Previously 98 variety, and the lowest shell rate was determined in K.1044 genotype, whereas G.K.314 genotype came first with 22.87% in protein yield, while the lowest protein yield was observed in Yunus 90 dry bean variety with 20.42%. Considering all quality parameters, it was determined that G.K.314 and K.1044 genotypes and Zülbiye dry bean cultivar gave remarkable results.

Keywords: Dry bean, genotype, quality, paremeter, protein

KURU FASULYE GENOTİPLERİNDE BAZI KALİTE ÖZELLİKLERİ ARASINDAKİ İLİŞKİLERİN KORELASYON ve PATH ANALİZİ İLE BELİRLENMESİ ÜZERİNE BİR ARAŞTIRMA

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ÖZET

Kuru fasulye, sulu tarım alanlarında münavebeye sokulacak önemli bir yemeklik tane baklagil bitkisidir. Ekim alanları ve üretim miktarları bakımından tüm yemeklik tane baklagil bitkileri içinde dünyada birinci, ülkemizde ise üçüncü sırada yer alan kuru fasulye üzerine gerek fenolojik gerekse agronomik parametreleri üzerine yeterince çok sayıda çalışmalar yapılmasına rağmen kalite parametreleri için yapılan çalışmaların sayısı ise oldukça düşük kalmıştır. Bu kapsamda 11 adet kuru fasulye genotipinin bazı kalite özellikleri arasında yer alan doğrudan ve dolaylı etkileri belirlenmek istenmiştir. Yürütülen araştırmada 5 adet kuru fasulye çeşidi ile 6 adet kuru fasulye hattı olmak üzere 11 adet kuru fasulye genotipi kullanılmıştır. İncelenen kalite parametreleri olarak su alma kapasitesi (g/tane), su alma indeksi (%), şişme kapasitesi (ml/tane), şişme indeksi (%), kabuk oranı (%) ve protein oranı (%) incelenmiştir. İncelenen özelliklere ait elde edilen veriler de parametreler arasında ilişki olup olmadığını belirleyebilmek için korelasyon analizi yapılmış olup ardından incelenen parametrelerin birbirleri olan dolaylı etkilerini belirleyebilmek için path analizi uygulanmıştır. 11 adet kuru fasulye genotipi üzerinden yürütülen çalışmada elde edilen sonuçlara göre protein oranı ile kabuk aranı arasında olumlu ve önemli (0.266*), su alma kapasitesi (0.143), su alma indeksi (0.214), şişme kapasitesi (0.074) ve şişme indeksi (0.118) arasında ise olumlu ve önemsiz ilişkiler tespit edilirken; su alma kapasitesi ile su alma indeksi (0.367**) ve şişme indeksi (0.322**) arasında olumlu ve çok önemli ilişkiler ortaya konulmuştur.

Sonuç olarak protein ve kabuk oranı ile şişme indeksi, kuru fasulye bitkisinde önemli kalite ölçütleri olarak değerlendirilmiştir.

Anahtar Kelimeler: Kuru fasulye, Genotip, Korelasyon, Path analizi, Kalite

A RESEARCH ON THE DETERMINATION OF THE RELATIONSHIPS BETWEEN SOME QUALITY CHARACTERISTICS IN DRIED BEAN GENOTYPES BY CORRELATION AND PATH ANALYSIS

ABSTRACT

Dry bean is an important edible legume plant to be used in alternation in irrigated agricultural areas. Although there are enough studies on both phenological and agronomic parameters of dry beans, hich ranks first in the world and third in our country among all edible legumes in terms of cultivation areas and production amounts, the number of studies on quality parameters has remained quite low. In this context, it was aimed to determine the direct and indirect effects of 11 dry bean genotypes, which are among some quality characteristics. In the research carried out, 11 dry bean genotypes, including 5 dry bean varieties and 6 dry bean lines, were used. The quality parameters examined were water absorption capacity (g/seed), water absorption index (%), swelling capacity (ml/seed), swelling index (%), seed coat ratio (%) and protein ratio (%). Correlation analysis was carried out in order to determine whether there is a relationship between the parameters in the data obtained from the examined features, and then path analysis was applied to determine the indirect effects of the examined parameters on each other. According to the results obtained in the study carried out on 11 dry bean genotypes, positive and significant (0.266*) relationships were determined between the protein ratio and the seed coat ratio. In addition, positive and insignificant relationships were found between protein ratio and water uptake capacity (0.143), water uptake index (0.214), swelling capacity (0.074) and swelling index (0.118); Positive and very important relationships were revealed between water absorption capacity and water absorption index (0.367**) and swelling index (0.322**). As a result, protein and seed coat ratio and swelling index were evaluated as important quality criteria in dry bean plant.

Keywords: Dry bean, genotype, correlation, path analysis, quality

NUTRIENT LEVEL IN SEDIMENTS AND WATER OF IKO RIVER

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ABSTRACT
This research was carried out to determine the nutrient level at Uta Ewa Estuary between August and September 2019. The aim of the study was to ascertain the percentage (%) of nutrients in Uta Ewa Estuary. An ultraviolet spectrophotometer was used to analyze the samples to get the amount of nutrients. The nutrients obtained in the water sample were: Nitrate (NO^{3-}), Phosphate (PO_4^{2-}), Nitrite (NO^{2-}) and sulphate (SO_4^{2-}). The result of this study reveals that in Uta Ewa Estuary, the % composition of the nutrient in the water column were SO_4^{2-} (33%), NO^{2-} (16%), NO^{3-},(16%), and PO_4^{2-} (11%). In the sediment, the percentage (%) composition of the nutrient were NO^{3-} (46%), PO_4^{2-} (11%), SO_4^{2-} (21%) and NO^{2-} (22%). The high percentage of SO_4^{2-} in the water column was as a result of the gasoline station located within the water body. The high percentage of NO^{3-} in the sediment column was as a result of the high percentage of agricultural activities, water runoff, refuse dump runoff, animal waste and contamination from human activities. The low percentage of PO_4^{2-}, was as a result of lack of iron and low level of degradation by rocks which produces phosphorus as one of its constituents. The denitification of NO^{2-} and NO^{3-}, caused the low concentration of nitrite in both the water Column and sediment.

Keywords: Denitrification, spectrophotometer

ŞİMDİ AL SONRA ÖDE KREDİ SİSTEMİ ÜZERİNE SİSTEMATİK DEĞERLENDİRMELER VE BİR SKORLAMA YAKLAŞIMI

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ÖZET
Finansal teknolojilerin, 4. endüstri devriminin tetiklemesiyle hızlı gelişimi, tüketicilerin harcama davranışlarında değişikliklere neden olmuştur. Bu değişime uygun olarak, Şimdi al sonra öde (BNPL) sistemi değişen müşteri ihtiyaçları sonrası ortaya çıkan yeni bir ödeme sistemi teknolojisidir. BNPL nakit borç vermeye değil, ürün ya da hizmet almaya yönelik bir yöntemdir. E-ticaret sitesinde ya da fiziki mağazada beğenilen ürün ya da hizmetin ödemesini uygun kişilere hızlıca sağlamak esastır. Örneğin bir tatil paketi alımında tur şirketleri BNPL yöntemi ile tüketiciye kredi kartı limitinden düşmeden ya da kredi kullandırmadan ödeme yapma olanağı sağlayabilmektedir. Ürün sahibi işletme BNPL kredisini bankalar aracılığı ile ve yapacağı ikili anlaşmalar doğrultusunda sağlamaktadır. Müşteri ise anlaşmalı bankaların sistemlerinden firma ismi ve ürün kategorisi belirterek BNPL kredi talebinde bulunmaktadır. Eş zamanlı olarak ilgili banka da müşterinin BNPL kredisi için uygun olup olmadığını belirlemek için güvenilirlik skorlaması yapmaktadır ve yüksek skoru olan müşteriye BNPL kullandırtmaktadır. Klasik krediden ayrılan en önemli noktalardan biri hedef müşteri kitlesidir. Klasik kredi skorlamalarında kişinin güvenilirliği belirlenirken kişinin bordrosu, daha önceki kredi/kredi kartı ödemelerindeki düzen, ipotek edebileceği mülkler ve benzeri şeyler dikkate alınır. Bu nedenle bordrolu olarak çalışmayan, hiçbir finansal kuruluşla daha önce etkileşimi olmayan, kredi puanlaması oluşmamış ya da düşük olan kullanıcıların kredi ya da kredi kartı erişimi kısıtlı olmaktadır. Bu kişilere harcamaya bağlı olarak kısa vadeli borç verme olarak görülebilecek kredi olanağı sağlanmaktadır. Hedef müşteri kitlesi arasında farklılıklar olduğu için klasik kredi skorlamaları BNPL'ye başvuran müşterilerin güvenilirlik açısından skorlamasında yetersiz kalmaktadır. Bu nedenle BNPL sisteminin en önemli gereksinimi tüketicilerin güvenilirlik skorlamasının yapılmasıdır. Mevcut durumda BNPL alanında yapılmış çalışmalar kısıtlı olup, BNPL odaklı yeterli bir skorlama sistemi bulunmamaktadır. Bu çalışmada, finansal teknolojilerin önemli bir alanı olan ödeme sistemleri kapsamında, BNPL sistemi üzerine, mevcut durum analizi, fırsatlar ve zorluklar ile skorlama ihtiyacı üzerine sistematik bir yaklaşım sunulmaktadır.

Anahtar Kelimeler: Finansal teknolojiler, ödeme sistemleri, Şimdi Al Sonra Öde kredi sistemi, skorlama.

SYSTEMATIC EVALUATIONS AND A SCORING APPROACH ON BUY NOW PAY LATER CREDIT SYSTEM

ABSTRACT

The rapid development of financial technologies, triggered by the 4th industrial revolution, brought along a number of innovations. There have been changes in consumers' spending behaviors. In line with this change, the buy now pay later (BNPL) system is a new payment system technology that emerged after changing customer needs. BNPL is a method of buying products or services, not lending cash. For example, in the purchase of a holiday package, tour companies can provide the consumer with the opportunity to pay with the BNPL method without deducting the credit card limit or using a loan. The owner of the product provides the BNPL loan through the banks and in line with the bilateral agreements it will make. The customer requests a BNPL loan from the systems of the contracted banks by specifying the company name and product category. Simultaneously, the relevant bank performs a reliability score to determine whether the customer is eligible for a BNPL loan and makes the customer with a high score use a BNPL. One of the most important points that differ from classical credit is the target customer group. While determining the reliability of the person in classical credit scoring, the person's payroll, the order of previous credit/credit card payments, properties that can be mortgaged and similar things are taken into account. Since there are differences between the target customer group, classical credit scoring is insufficient in scoring the customers applying for BNPL in terms of reliability. Therefore, the most important requirement of the BNPL system is the reliability scoring of consumers. Currently, studies in the field of BNPL are limited and there is not an adequate scoring system focused on BNPL. In this study, a systematic approach is presented on the current situation analysis, opportunities and challenges, and the need for scoring on the BNPL system within the scope of payment systems, which is an important area of financial technologies.

Keywords: Financial technologies, payment systems, Buy Now Pay Later credit system, scoring.

"CENNET KIZIN CİNNETİ"NDE SAVAŞIN KADINLAR VE TOPLUM ÜZERİNDEKİ YIKICI ETKİLERİ: BİR ELEŞTİREL SÖYLEM BİÇEMBİLİM ANALİZİ

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ÖZET
Bu çalışma Türk Edebiyatı'nın önde gelen isimlerinden biri ve aynı zamanda öğretmen, akademisyen ve siyasetçi olan Halide Edip Adıvar'ın 1925 yılında yayınlanan "Cennet Kızın Cinneti" adlı hikâyesini Eleştirel Söylem Biçembilim açısından çözümlemeyi hedefler. Dilbilim bünyesinde, dilbilimdeki gelişmelere paralel olarak ve daha önceki biçimci ve işlevselci yaklaşımlara ek olarak 1980'ler ve sonrasında ortaya çıkan Eleştirel Söylem Biçembilim edebî ya da edebî olmayan, yazılı metinlerin yanı sıra sözlü metinleri de inceleyen ve bir metnin algılanmasını etkileyen dilsel biçimleri ve yapıları belirlemeyi amaçlayan bir yaklaşım olarak tanımlanmaktadır. Bu yaklaşım biçem araştırmacılarını veya okurları eleştirel okumaya yönlendirerek onların metnin yüzeysel yapısında ya da yazarların seçtikleri dil kullanımlarında saklı ideolojileri, bakış açılarını, dünya görüşlerini, tutum ve değer yargılarını fark etmelerini sağlar ve bu ideolojileri, vb. inceleyebilmeleri için yöntemler sunar. İlk olarak M. A. K. Halliday tarafından ortaya konan bu yaklaşım günümüze kadar farklı dilbilimciler tarafından geliştirilmiş ve sadece küçük farklarla birbirinden ayrılan inceleme modelleri sunulmuştur. Bu modellerden biri de bu çalışmanın temelini oluşturan hikâyenin de inceleme aşamalarını oluşturan John Haynes'ın 11 alt başlıktan oluşan modelidir. Dolayısıyla, Cennet adındaki bir köylü kızının Sakarya Savaşı sırasında başından geçen bazı felaketler nedeniyle nasıl cinnet geçirdiğinin anlatıldığı "Cennet Kızın Cinneti" hikâyesinin böyle bir modelle incelenmesi öncelikle bu genç kızın başına gelenlerden gerçekte kim ya da kimlerin sorumlu olduğunun üzerinde düşünülmesi gerektiğini göstermiştir. Bu incelemenin ortaya koyduğu bir başka önemli nokta ise, yazarın sıfatlar başta olmak üzere yoğun olarak içerik sözcükleri ve benzeti, eğretileme gibi söz sanatları gibi farklı biçem seçenekleri aracılığıyla bir yandan Anadolu'nun küçük bir köyünde yaşanan bu hazin olaydan yola çıkarak savaş döneminde birçok kadının da aynı kaderi paylaştığı gerçeğinin altını çizmek istediğidir. Diğer yandan ise halkın içinde bulunduğu kötü durumu: yoksulluğu, bakımsızlığı, çaresizliği ve ümitsizliği etkili bir biçimde gözler önüne sermeyi amaçladığıdır.

Anahtar kelimeler: Eleştirel Söylem Biçembilim, Haynes, Halide Edip Adıvar, Cennet, kadın.

DEVASTATING EFFECTS OF WAR ON WOMEN AND SOCIETY IN "CENNET KIZIN CİNNETİ": A CRITICAL DISCOURSE STYLISTIC ANALYSIS

Abstract

This study aims to analyze the story "Cennet Kızın Cinneti" published in 1925 by Halide Edip Adıvar, one of the leading names in Turkish Literature and a teacher, academician and politician in terms of Critical Discourse Stylistics. Within linguistics, in parallel with the developments in linguistics and in addition to the previous formalist and functionalist approaches, Critical Discourse Stylistics, emerged in the 1980s and beyond, examines literary or non-literary, written texts as well as oral texts and aims to identify linguistic forms and structures that affect the perception of a text, is described as an approach. This approach directs stylisticians or readers to critical reading, enabling them to realize the ideologies, perspectives, worldviews, attitudes and value judgments hidden in the surface structure of the text or in the language use of the authors, and provides methods for them to examine these ideologies, etc. This approach, which was first introduced by M. A. K. Halliday, has been developed by different linguists to date, and analysis models that differ from each other with only minor differences have been presented. One of these models is John Haynes' model consisting of 11 sub-titles, which also constitutes the examination stages of the story that forms the basis of this study. Therefore, examining the story "Cennet Kızın Cinneti", which tells how a village girl named Cennet went insane due to some disasters she experienced during the Sakarya War, with such an approach, has primarily shown that it is necessary to think about who is actually responsible for what happened to this young girl. Another crucial point revealed by this study is that based on this sad event that took place in a small village in Anatolia, the author, through different stylistic options such as the frequent use of content words, especially adjectives, and figures of speech like simile, metaphor, wants to underline the fact that many women shared the same fate during the war, on the one hand. She aims to effectively reveal the plight of the people: poverty, neglect, helplessness and hopelessness, on the other.

Keywords: Critical Discourse Stylistics, Haynes, Halide Edip Adıvar, Cennet, woman.

TEACHING LANGUAGE SKILLS THROUGH SHORT STORIES

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ABSTRACT
Many teachers still feel that an EFL classes should solely focus on studying linguistic aspects because they believe that the main goal of EFL instruction is to help students converse successfully in the target language. However, a current trend in EFL instruction underlines the need of including literature because it has a high potential for providing a genuine model of language usage. Short tales appear to be the most appropriate literary genre because of its ability to assist pupils to improve the four abilities succesfully; reading, listening, speaking, and writing- as a result of the motivating advantage entrenched in the narratives. The goal of this article is to get EFL teachers acquainted with the usefulness of utilizing short tales in EFL education. Following the presentation of criteria for picking a short story, the conversation focuses on how to utilize a short story to improve students' language abilities.

Keywords: Literature, short narrative, linguistic abilities

DİL BECERİLERİNİ KISA HİKÂYELERLE ÖĞRETMEK

ÖZET

Birçok öğretmen hala İngilizce derslerinin yalnızca dilbilimsel yönleriyle incelemeye odaklanması gerektiğini düşünüyor çünkü İngilizce eğitiminin ana amacının öğrencilerin hedef dilde başarılı bir şekilde konuşmalarına yardımcı olmak olduğuna inanıyorlar. Bununla birlikte, İngilizce öğretimindeki mevcut bir eğilim, gerçek bir dil kullanımı modeli sağlama konusunda yüksek bir potansiyele sahip olduğundan, edebi metinleri dâhil etme ihtiyacının altını çizmektedir. Kısa öyküler, öğrencilere dört beceriyi başarılı bir şekilde geliştirmelerinde yardımcı olma potansiyellerinden dolayı en uygun edebi tür olarak görünmektedir; dinleme, konuşma, okuma ve yazma Bu makale, İngilizce öğretmenlerini İngilizce eğitiminde kısa masalların yararlılığı konusunda bilgilendirmeyi amaçlamaktadır. Kısa öykü seçme kriterlerinin ardından, öğrencilerin dil becerilerini geliştirmek için kısa bir öykünün nasıl kullanılacağına odaklanır.

Anahtar Kelimeler: Edebiyat, kısa hikaye, dil becerileri

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ÖZET
Bu araştırma 2017 yılında, Çukurova ekolojik koşullarında kışlık olarak Doğu Akdeniz Tarımsal Araştırma Enstitüsü deneme alanında Doğankent lokasyonunda yürütülmüştür. Nohut (Cicer aritinum L.) çeşit ıslahı amacıyla verim ve verim kompanentlerini, ve bazı özellikler arasındaki ilişkilerin tespiti ve çeşit geliştirme amacıyla yürütülmüştür. Araştırmada ülkesel ve ICARDA orjinli genotipler kullanılmıştır. Denemeler kışlık olarak ekilmiş ve kışlık ekimlerde nohut genotiplerinin adaptasyonlarını belirlemek amacıyla materyallerden kışlık ekime yönelik seleksiyon ve değerlendirmeler yapılmıştır. Araştırmanın yürütüldüğü yılda, 20 adet nohut genotipi ile denemeler tesadüf blokları deneme deseninde hazırlanarak tarla koşullarında yürütülmüştür. Bu araştırmada ekimlerde, sıra arası 45 cm, sıra üzeri 8 cm olacak şekilde, 5 m uzunluğundaki 4 sıraya 9 m^2'lik parsellere ekimler yapılmıştır. Ekim öncesi dekara 2-3 kg N, 5-6 kg P2O5 gelecek şekilde gübreleme uygulanmıştır. Elde edilen ortalama en yüksek tane verim SEÇKİN çeşidinden (267,03kg/da) ve en düşük tane verim değeri ise İNCİ-5 (140,37kg/da) çeşidinden elde edilmiştir. Yüz tane ağırlıkları bakımından 53,07 -33,83 gr arasında değerler elde edilirken ülkesel hatlar öne çıkmıştır. Çeşit ve hatlarda, erkencilik özelliği için de çiçeklenme (ortalama 81,1 gün) ve bakla bağlama (ortalama 96,6 gün) tarihleri; makinalı hasata uygunluk bakımından bitki boyları (ortalama 71,4cm) ve ilk bakla yükseklikleri (ortalama 34,8cm) değerleri öncelikli olarak incelenmiştir. Kalite değerlerinden protein % değerlerine bakılmış % 25,19-19,09 arasında değişimler tespit edilmiştir. Bu sonuçlar yapılan ıslah çalışmalarında belirleyici faktörleri oluşturmaktadır. Çeşit ve hatlar bölge koşulları içinde değerlendirilerek çeşit tesciline yönelik çalışmalar sürdürülmektedir.

Anahtar kelimeler: Nohut, kışlık ekim, ıslah ve verim

INVESTİGATİON OF CHİCKPEA (*Cicer aritinum L.*) LİNES AND VARİETİES İN WİNTER SOWİNG İN ÇUKUROVA REGİON

ABSTRACT

This research was carried out in 2017 at Doğankent location in Eastern Mediterranean Agricultural Research Institute experimental field in winter under Çukurova ecological conditions. It was carried out to determine the yield and yield components and the relationships between some traits for chickpea (Cicer aritinum L.) variety improvement and variety development. National and ICARDA-originized standing genotypes were used in the research. The trials were sown as winter crops and selection and evaluations were made from the materials for winter crops in order to determine the adaptation of chickpea genotypes in winter crops. In the year the research was conducted, 20 chickpea genotypes were used in the field conditions with a randomized block design. In this research, sowings were made in 4 rows of 5 m length and 9 m^2 plots with 45 cm between rows and 8 cm above rows. Before sowing, fertilization was applied at the rate of 2-3 kg N and 5-6 kg P2O5 per decare. The highest average grain yield was obtained from SEÇKİN variety (267,03 kg/ha) and the lowest grain yield value was obtained from İNCİ-5 variety (140,37 kg/ha). In terms of hundred grain weights, values between 53.07 -33.83 g were obtained and the national lines stood out. In the varieties and lines, flowering (average 81.1 days) and pod setting (average 96.6 days) dates for earliness, plant height (average 71.4cm) and first pod height (average 34.8cm) values were examined primarily for suitability for machine harvesting. Among the quality values, protein % values were examined and changes between 25.19-19.09% were determined. These results constitute the determining factors in the breeding studies. Varieties and lines are evaluated within the conditions of the region and studies for variety registration are being carried out.

Key words: Chickpea, winter sowing, breeding and yield.

SİLAJ YAPIMINDA KRİTİK KONTROL NOKTALARI

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ÖZET
Ülkemiz hayvancılığında, verim yönünden ve işletmedeki hayvan varlığı açısından son yıllarda önemli gelişmeler gözlenmektedir. Genellikle, işletmeler hayvan sayısı bakımından büyük ölçekli bir yapıya bürünmüşlerdir. Ülkemizde hayvancılığın gelişmesi, yüksek verimli kültür ırkı hayvanların kullanımı yanında kaliteli kaba yem kullanımına da bağlıdır. Türkiye de kaliteli kaba yem üretimini artırmanın yanında, üretilen yemi hayvanların tüketeceği zamana kadar en az kalite kaybı ile muhafaza etmek çok önemlidir. Bu yöntemlerden biriside, yemleri silaj yaparak tüketim zamanına kadar saklanması yöntemidir. Silaj, yeşil yem materyallerinin fermantasyona uğratılması ile muhafazasında uygulanan bir yöntemdir. Ülkemizde silaj yapımı son yıllarda giderek artan bir hızla yaygınlaşmaktadır. Silaj yapımında, silajlık materyalin, ekim, hasat, depolama ve kullanım aşamalarında dikkat edilmesi gereken noktalar vardır. Bunlar, materyalin ekim zamanı, toprağın yapısı, hazırlanışı, kullanılan tohumun çeşidi, silajlık materyalin hasat zamanı, yapılan silajın yapılış süreci ve kapatılması, fermantasyon süresi bunlardan bazılarıdır. Silaj, açıldıktan sonrada veriliş şekli, açıkta bekleme süresi, mikrobiyal bozulmaları göz önünde bulundurulması gerekmektedir. Sonuç olarak, hayvanların beslenmesi için yapılan silajın yapım sürecinin, her aşamasında dikkat edilmesi gerekmektedir.

Anahtar Kelimeler: Silaj, süt sığırı, fermentasyon, aerobic stabilite

CRITICAL CONTROL POINTS IN SILAGE MAKING

ABSTRACT
In recent years, important developments have been observed in animal husbandry in our country in terms of yield and animal presence in the enterprise. Generally, enterprises have taken on a large-scale structure in terms of the number of animals. The development of animal husbandry in our country depends on the use of high-quality roughage as well as the use of highly productive culture breeds. Silage is a method used for the preservation of green feed materials by fermentation. In our country, silage production has become increasingly widespread in recent years. In silage production, there are points to be considered during the planting, harvesting, storage and use stages of the silage material. These are the sowing time of the material, the structure of the soil, its preparation, the type of seed used, the harvest time of the silage material, the making and closing process of the silage, and the fermentation period. The way the silage is given after opening, the waiting time in the open, and its microbial spoilage should be taken into consideration. As a result, care must be taken at every stage of the production process of the silage for animal feeding.

Key Word: Silage, dairy cows, fermantation, aerobic stability

KORUNGA YEM BİTKİSİNDE TOHUM KÖKENLİ *Alternaria alternata*'NIN UÇUCU YAĞLAR İLE MÜCADELE OLANAKLARININ ARAŞTIRILMASI

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ÖZET

Bu çalışmada, korunga yem bitkisinde tohum çürüklüğü hastalığına neden olan *Alternaria alternata* (Fr.) Keissl. patojenine karşı, kekik (*Thymus vulgaris*), okaliptüs (*Eucaliptus globulus*), defne (*Lauris nobilis*), mersin (*Myrtus communis*) ve adaçayı (*Salvia officinalis*) bitkilerinden elde edilen uçucu yağların *in vitro* koşullarda antifungal aktiviteleri araştırılmıştır. Bu amaçla uçucu yağların in vitro koşullarda 1 µl/petri, 10 µl/petri, 50 µl/petri dozları uygulamaya alınmıştır. Uçucu yağlar otomatik mikro pipetlerle steril kültür antibiyogram disk kâğıtlarına damlatılmış ve Petri kapları parafilm ile kapatılmıştır. Kontrol olarak hazırlanan petrilerin kapaklarındaki ise aynı miktarda steril destile su eklenmiştir. *In vitro* denemeler sonunda 8. günde gelişme göstermeyen fungusların misel parçaları, uçucu yağsız steril PDA ortamlarına alınıp 8 gün süreyle gözlenmiştir. Bu süre sonunda herhangi fungal koloniyal gelişim gözlenmemiştir, bu durumda gözlenen etki fungisidal etki olarak kaydedilmiştir. Araştırma bulguları, uçucu yağlardan kekik, okaliptüs, defne ve mersinin 50 µl/petri dozlarında *A. alternata* 'ya karşı sırasıyla %100, %94,21, %84,92 ve %80,64 oranında antifungal etki göstermişlerdir. Adaçayı uçucu yağı ise 50 µl/petri dozlarında %43,46 oranında patojen fungusun miseliyal gelişimini engellemiştir. Denemeye alınan tüm uçucu yağlarda 1 µl/petri, 10 µl/petri dozları arasında fungal patojenin baskı altına alınması yönünden herhangi bir fark olmadığı gözlemlenmiştir. Uçucu yağlardan kekik, okaliptüs, defne ve mersinin 1 µl/petri, 10 µl/petri dozlarında *A. alternata* 'ya karşı sırasıyla %99,80, %63,57, %58,78 ve %56,78 oranlarında antifungal etki göstermişlerdir. Gelecekte sürdürülebilir tarım stratejileri ile in vivo çalışmalarda alternatif doğal kontrol yöntemleri olabilecek araştırma verilerine ihtiyaç duyulmaktadır.

Anahtar Kelimeler: Korunga, *Alternaria alternata*, uçucu yağ, fungisidal etki, *in vitro*

INVESTIGATION OF CONTROL POSSIBILITIES OF SEED BORNE *Alternaria alternata* WITH ESSENTIAL OILS IN SAINFOIN FEED PLANT

ABSTRACT

In this study, in vitro antifungal activities of thyme (*Thymus vulgaris*), eucalyptus (*Eucaliptus globulus*), laurel (*Lauris nobilis*), myrtle (*Myrtus communis*) and sage (*Salvia officinalis*) essential oils were investigated against *Alternaria alternata*, which causes seed rot disease in sainfoin plant. For this purpose, 1 µl/petri, 10 µl/petri, and 50 µl/petri doses of esssential oil were applied *in vitro* conditions. Essential oils were dropped on sterile culture antibiogram disc papers with automatic micropipettes and Petri dishes were closed with parafilm. The same amount of sterile distilled water was added to the lids of the petri dishes prepared as a control. Mycelial parts of fungi that did not develop on the 8th day at the end of *in vitro* experiments, they were taken into sterile PDA environments without essential oil and observed for 8 days. At the end of this period, no fungal colonial growth was observed, in which case the observed effect was recorded as a fungicidal effect. As a results showed 100%, 94.21%, 84.92% and 80.64% antifungal effects against *A. alternata* at 50 µl/petri doses of essential oils of thyme, eucalyptus, laurel and myrtle, respectively. On the other hand, sage essential oil inhibited mycelial growth of the pathogenic fungus by 43.46% at 50 µl/petri doses. It was observed that there was no difference in suppression of fungal the pathogen between 1 µl/petri and 10 µl/petri doses of all essential oils included in the experiment. The essential oils of thyme, eucalyptus, laurel and myrtle showed antifungal effects at 1 µl/petri and 10 µl/petri doses against *A. alternata* at 99.80%, 63.57%, 58.78% and 56.78%, respectively. There is a need the research data that can be alternative natural control methods in *in vivo* studies with strategies for sustainable agriculture in the future.

Key Word: Sainfoin, *Alternaria alternata*, essential oil, fungicidal effect, *in vitro*

EKLEMELİ İMALAT YÖNTEMİNDE SONLU ELEMANLAR ANALİZİNİN UYGULAMASI ÜZERİNE BİR ARAŞTIRMA

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ÖZET
Eklemeli imalat (EÜ) teknolojisi veya 3D baskı süreci, karmaşık yapıdaki bileşenlerin üretimi için yenilikçi bir teknoloji olarak sürekli büyümektedir. EÜ ile üretim geleneksel tekniklere göre hem malzeme tasarrufu hem de zaman tasarrufu sağlamaktadır. Bu teknolojide tercih edilen malzeme tipine göre farklı üretim teknikleri uygulanmaktadır. Bu teknikler içerisinde kaynaşmış biriktirme modellemesi (FDM), en çok tercih edilenlerden bir tanesidir. FDM, yüksek termal gradyanlar, göz ardı edilemez deformasyonlar ve artık gerilimler içeren bir üretim süreci olduğundan, 3D baskılı bileşeni etkileyebilir. Sonlu Eleman Analizi (FEA), bir parçanın veya montajın kullanım ömrü boyunca nasıl performans göstereceğini analiz etme yöntemidir. FEA, potansiyel tasarım sorunlarını tahmin etmemizi ve dolayısıyla ürün, kâr ve iş için riski en aza indirmemizi sağlar. Birçok çalışmada ANSYS, CATIA, COMSOL ve ABAQUS gibi sonlu elemanlar analiz programı kullanılarak FDM sürecinin simülasyonları yapılmaktadır. Metodolojik süreç ayrıntılı olarak tanımladıktan sonra, çeşitli parametrelerin ve modelleme seçeneklerinin (örneğin, mesh boyutu, malzeme modeli, zaman adımı boyutu) simülasyon sonuçları üzerindeki etkisi araştırılmakta ve elde edilen sonuçlar ile deneysel sonuçlar doğrulanmaktadır.

Anahtar Kelimeler: Eklemeli üretim, FDM, 3D baskı, Sonlu elemanlar analizi.

A RESEARCH ON THE APPLICATION OF FINITE ELEMENT ANALYSIS IN ADDITIVE MANUFACTURING METHOD

ABSTRACT

Additive manufacturing (AM) technology, or the 3D printing process, is constantly growing as an innovative technology for the production of complex components. Fabrication with AM provides both material and time savings compared to traditional techniques. In this technology, different fabrication techniques are applied according to the preferred material type. Among these techniques, fused deposition modeling (FDM) is one of the most preferred. FDM being a manufacturing process with high thermal gradients, negligible deformations and residual stresses can affect the 3D printed component. Finite Element Analysis (FEA) is a method of analyzing how a part or assembly will perform over its lifetime. FEA enables us to anticipate potential design issues and therefore minimize risk to product, profit and business. In many studies, simulations of the FDM process are made using finite element analysis programs such as ANSYS, CATIA, COMSOL and ABAQUS. After the methodological process is described in detail, the effect of various parameters and modeling options (eg mesh size, material model, time step size) on the simulation results is investigated and the results obtained and the experimental results are validated.

Keywords: Additive manufacturing, FDM, 3D printing, Finite element analysis.

SİLAJ KALİTESİNE VE KURU MADDE KAYBINA ETKİ EDEN FAKTÖRLER

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ÖZET

Silaj yapmanın temel amacı silajı yapılacak materyalin besin değerini korumaktır. Silaj yapımındaki süreçler basit bir şekilde açıklanmaktadır. Aslında çok karmaşık ve birçok faktöre bağlı olarak gerçekleşmektedir. Silaj yapım süreci genel olarak 4 aşamaya ayrılmaktadır: Bu aşamalar şu şekilde sıralanmaktadır, 1. hemen hasattan sonra silodaki ilk aerobik faz, 2. fermantasyon aşaması 3. siloda depolama aşaması, 4. silajın silodan alınmadan önce, alınırken ve alınma sonrasında havaya maruz bırakıldığı dönemlerdir. Kaliteli bir silaj yemi yapımı, kuru madde kayıplarının en aza indirilmesi ya da önüne geçilmesi ile sağlanabilmektedir. Kayıpların en fazla olduğu başlıca aşamalar; tarla hasadı ve taşınma sırasında, silo solunumu, fermantasyonu, atık su üretimi, depolama ve oksijene maruz kalındığı açım dönemi sonrasındaki aşamalarıdır. Genel olarak depolama sürecinde ortalama olarak kuru madde (KM) kayıpları %6'dan %31.9'a kadar çıkabilmektedir. Özellikle, açıldıktan sonra silaj içerisine yoğun bir oksijen girişi meydana gelmektedir. Bu durum silajın bozulmasına neden olan maya, küf ve aerobik mikroorganizmaların aktif hale gelmesine ve sonuçta aerobik stabilitenin düşmesine sebep olmaktadır. Bunun bir sonucu olarak da silajda sıcaklık artışı, pH'da yükselme ve sonucunda da kuru madde kaybı meydana gelmektedir. Silaj yapımındaki bütün aşamalarda yapılan doğru uygulamalar kuru madde kayıplarını minimum seviyeye indirmektedir. Bazı kayıplar kaçınılmaz olsa da, iyi yönetim uygulamalarıyla, kaliteli silaj yapımı gerçekleştirilerek kuru madde kayıpları azaltılabilir. Bu kayıpların en aza indirilmesi, silaj kalitesinde olası kayıpları en aza indirmektedir. Bu derlemede silolama öncesi tarla koşulları, silolamada solunum, sıcaklık ve fermantasyon açısından kuru madde ve kalite kayıplarına etki eden faktörler açıklanmaya çalışılmıştır.

Anahtar Kelimeler: Silaj, kuru madde kaybı, fermentasyon, silaj yönetimi, aerobik stabilite.

FACTORS AFFECTING SILAGE QUALITY AND DRY MATERIAL LOSSES

ABSTRACT

The main purpose of silage is to preserve the nutritional value of silage materials. Silage making process can be explained simply. It is actually very complex and dependant on many factors. The silage making process is generally divided into 4 stages. These stages are listed as follows: 1. the first aerobic phase in the silo immediately after harvest, 2. fermentation phase 3. the storage phase in the silo, 4. the periods when the silage is exposed to air before, during and after it is taken from the silo. A quality silage feed can be made by minimizing or preventing dry matter losses. The main stages with the highest losses; during field harvesting and transportation, silo respiration, fermentation, waste water production, storage and after the starvation period when exposed to oxygen. In general, dry matter (DM) losses during the storage process can range from 6% to 31.9% on average. In particular, after opening, an intense oxygen entry occurs into the silage. This situation causes the yeast, mold and aerobic microorganisms to become active, which cause the silage to deteriorate, resulting in a decrease in aerobic stability. As a result of this, temperature increase in silage, increase in pH and dry matter losses occur as a result. Good managements at all stages of silage production reduce dry matter losses to a minimum. While some losses are unavoidable, dry matter losses can be reduced by making good quality silage with good management practices. Minimizing these losses minimizes possible losses in silage quality. In this review, it has been tried to explain the factors affecting the dry matter and quality losses in terms of field conditions before ensiling, respiration, temperature and fermentation in ensiling.

Keywords: Silage, dry matter losses, fermentation, silage management, aerobic stability

MODIFIED COMBUSTION METHOD SYNTHESIS OF CuO-NiO NANOCOMPOSITES FOR PHOTOCATALYTIC DEGRADATION OF METHYLENE BLUE UNDER SOLAR LIGHT IRRADIATION

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ABSTRACT
The ever-evolving technology while benefiting mankind also increases the problems faced by the environment. Recently, although there are many problems, one of the main problems faced by the environment is water pollution. Industries are the major source of water pollution. Textiles, food and printing industries mostly use dyes for finishing their products. The Prominent dye, methylene blue ,utilized by various industrial plants is a chemical compound. Industrial wastes containing methylene blue dyes impact the environment in a negative way. There are different methods including chemical, physical, biological and natural to remove the dye from water. Nowadays, semiconductor nanomaterials are extensively used in photocatalysis due to its cost effective, small band gap and environmental friendly nature. The combination of two or more nanomaterials can produce nanocomposites with superior physical and chemical properties leading to relatively higher performance in photocatalytic applications. In this work, CuO-NiO nanocomposites synthesized by modified combustion method were employed for the photocatalytic degradation studies of methylene blue under solar light irradiation. The characterizations of the prepared nanocomposites were carried out by the X-ray diffraction (XRD), scanning electron microscopy (SEM), Fourier transform infrared (FTIR) spectroscopy and ultraviolet–visible (UV-Vis) spectroscopy. Photocatalytic degradation of methylene blue with the presence of CuO-NiO nanocomposites under the solar light were observed by analyzing absorption spectra of the dye solution containing CuO-NiO nanocomposites at equal intervals of time. The percentage of photocatalytic degradation of methylene blue and rate constants of the reaction showed that CuO-NiO nanocomposite is a good photo catalyst with potential applications.

Keywords: CuO-NiO nanocomposites, Methylene blue, Photocatalytic degradation

EGE DENİZİ'NDEKİ UYUŞMAZLIKLARIN DENİZ ULAŞTIRMASINA OLASI ETKİLERİ

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ÖZET
Tarihin her döneminde büyük önem taşıyan Ege Denizi'ndeki ulaştırma hatları, Marmara, Batı Anadolu ve Karadeniz'i Dünyanın diğer deniz alanlarına bağlamaktadır. Ege Denizi'ndeki yük akışları ve limanlardaki mevcut yoğunluk, bu alanın her geçen gün daha da dikkat çekici hale getirmektedir. Küreselleşmeyle birlikte Dünya ticaretindeki yük akışlarındaki artış, Ege Denizi'ne kıyıdaş olan ya da olmayan ülkelerin de bu alandaki sorunlara dâhil olmasında önemli bir etkendir. Özellikle karşılıklı kıyılara sahip olan Türkiye ve Yunanistan açısından söz konusu deniz alanındaki sorunlar, karasuları ve deniz alanlarının sınırlandırılmasına ilişkin anlaşmazlıklarla ilerleyip, özellikle 1970'lerin sonlarında başlayan petrol arama çalışmaları ile yeni bir boyut kazanmıştır. Bu çalışma kapsamında öncelikle Ege Denizi'nde karasuları, kıta sahanlığı, Egemenliği Uluslararası Anlaşmalarla Yunanistan'a Devredilmemiş Ada, Adacık ve Kayalıklar (EGEAYDAK), gayri askerî statüdeki adaların silahlandırılması ve arama kurtarma sorumluluk sahasına ilişkin sorunlar kısaca açıklanmıştır. Ardından Ege Denizi'ndeki tüm bu sorunların küresel deniz ticaretine olası etkileri değerlendirilmiştir. Her ne kadar Birleşmiş Milletler Deniz Hukuku Sözleşmesi, "açık denizlerin serbestliği" ilkesini ön plana çıkarmış olsa da uygulamada karşılaşılan bazı sorunlar, bu ilkeye ilişkin önemli bir çelişkinin varlığını düşündürmektedir. Bu nedenle söz konusu çalışmada, Ege Denizi'ndeki uyuşmazlıkların bu rotayı kullanan ticari gemilere ve dolayısıyla deniz ticaretine etkileri incelenerek örnek vakalar yorumlanmış ve çalışma sonuçlandırılmıştır.

Anahtar Kelimeler: Aegean Sea, maritime areas, maritime trade

POTENTIAL EFFECTS OF AEGEAN SEA DISPUTES ON MARITIME TRANSPORTATION

ABSTRACT

The transportation lines in the Aegean Sea, which are of great importance in every period of history, connect the Marmara, Western Anatolia and the Black Sea to other sea areas of the world. The cargo flows in the Aegean Sea and the current density in the ports make this area more and more remarkable day by day. The increase in freight flows in world trade with globalization is an important factor in the inclusion of riparian or non-riparian countries in the Aegean Sea into the problems in this area. Especially for Turkey and Greece, which have reciprocal coasts, the problems in the sea area in question progressed with the disagreements regarding the delimitation of territorial waters and sea areas, and gained a new dimension with the oil exploration studies that started in the late 1970s. Within the scope of this study, first of all, the problems related to territorial waters, continental shelf, Islands, Islands, Islets and Rocks whose Sovereignty Was Not Transferred to Greece by Agreements (EGEAYDAK), arming of non-military islands and search and rescue responsibility area in the Aegean Sea are briefly explained. Then, the possible effects of all these problems in the Aegean Sea on the global maritime trade were evaluated. Although the United Nations Convention on the Law of the Sea has highlighted the principle of "freedom of the high seas", some problems encountered in practice reveal an important contradiction regarding this principle. For this reason, in the aforementioned study, the effects of disputes in the Aegean Sea on commercial ships using this route and their effects on maritime trade were examined and case studies were interpreted and the study was concluded.

Keywords: 3-6 words.

USE OF ELECTROSPUN CELLULOSE ACETATE NANOFİBER COATİNG İN CORROSİON PROTECTİON OF ST37 STAİNLESS STEEL

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ABSTRACT
Corrosion is the process of degeneration of material because of their interactions with its environment. Corrosion is an undesirable phenomenon as it is a great economic, safety and labor loss for the whole world. The term corrosion is continually being extended to other materials not just metals such as glasses, polymeric solids, ionic solids. For this purpose, different protection measures such as coating (metal, polymer etc.), use of inhibitor, material design, environmental control, anodic and cathodic protection etc. continue to be developed, to control metal corrosion. In this article The corrosion properties of ST37 stainless steel was investigated by protective polymeric coatings in a saltwater (3.5% NaCl) medium. ST37 sheet was being cut into small circular specimens with a diameter of 1cm using laser cutting technique. Cellulose acetate (CA) solution with a weight percentage of 15% was prepared by dissolving CA powder in a 2:1 ratio of Dimethylacetamide (DMAC) and acetone mixture. cellulose acetate (CA) nanofibers were coated on ST37 stainless steel by electrospinning coating technique under certain conditions. The effects of potential, deposition time and needle-collector distance during electrospinning on nanofiber production were interpreted by scanning electron microscopy. Fiber diameter result was presented

in terms of diameter mean while the mean value was evaluated by calculating 50 fiber diameters. Corrosion behavior studies of uncoated and coated ST37stainless steel were characterized using linear sweep voltammetry and electrochemical impedance spectroscopy. Based on linear sweep voltammetry studies, the corrosion inhibition efficiency of nanofiber coatings was obtained. According to electrochemical impedance spectroscopy results CA nanofiber coated steel sample with 73.9% inhibition efficiency exhibited excellent hydrophobicity and corrosion barrier properties against corrosive media. To conclude %15 CA solution deposition at 15 kv exhibited ideal hydrophobicity and resistance against harsh corrosive media and was selected as the finest coating parameters.

Key Words: Corrosion, electrospinning, coating

TÜRKİYE' NİN KATI ATIK ENERJİ POTANSİYELİNİN İNCELENMESİ: ESKİŞEHİR İLİ ÖRNEĞİ

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ÖZET
Bu çalışmada, Türkiye'deki katı atıkların işlenmesinden elde edilebilecek elektrik enerjisi miktarı için bir öngürüsel hesap yapılmıştır. Tahmini hesap Eskişehir İli Katı Atık İşleme Tesisinden elde edilen verilerin yanı sıra, ilin nüfus bilgilerine ve katı atık miktarına da dayanmakta olup ayrıca ulusal ölçeğede genişletilmiştir. Daha sonra, Türkiye İstatistik Kurumu'ndan alınan yakın tarihli nüfus verileri kullanılarak Aritmetik Artış Metodu (A.A.M.), Geometrik Artış Metodu (G.A.M.), Bileşik Faiz Metodu (B.F.M.) ve İller Bankası Metodu (I.B.M.) kullanılarak nüfus projeksiyonları hesaplanmıştır. 2019 yılı itibariyle, Eskişehir ili verilerine göre Türkiye'nin katı atıklarının işlenmesinden elde edeceği elektrik enerjisi üretim değerinin 4 743 796 megawatt saat (ya da 4 743 gigawatt saat) olacağı öngörülmüştür. 2017 yılına ait Türkiye geneli TÜİK verileri ile Eskişehir ilinin katı atıklardan elektrik enerjisi üretim değerleri kullanılarak yapılan oranlamalar sonucu katı atıkların Türkiye enerjisinin %1,52'lik kısmını oluşturacağı öngürülmüştür.

Anahtar Kelimeler: Enerji, Nüfus Projeksiyonu, Katı Atık.

INVESTIGATION OF TURKEY'S SOLID WASTE ENERGY POTENTIAL: EXAMPLE OF ESKİŞEHİR PROVINCE

ABSTRACT

In this study, for Turkey, We calculate the amount of electric energy obtained from the processing of solid waste. The estimated computation is based on dataset of solid waste processing plant in Eskişehir province as well as the population and the amount of solid waste in the province and the calculation is also extended to do national scale. Subsequently, population projections are calculated by Turkish Statistical Institute via the arithmetic increase, geometric growth, compound interest and the iller banks methods. As of 2019, according to Eskişehir provinces dataset, it is concluded that Turkey can generate approximately 4 743 796 megawatt hour (or 4 743 gigawatt hour) electricty from the processing of solid waste. National or provincial of 2017 Turkish Statistical Institute result, proportionate values are made using the electrical energy production from solid waste is foreseen to constitute Turkey % 1,52 of the energy of solid waste.

Keywords: Energy, Population Projection, Solid Waste.

FRACTIONAL INTEGRALS OF HERMITE-HADAMARD INEQUALITIES TYPE FOR MT-CONVEX STOCHASTIC

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ABSTRACT
By applying a multiple of fractional integral operators on MT-convex stochastic processes, we can obtain new inequalities of Hermite-Hadamard type, that allows us to provide new estimates on these types of Hermite-Hadamard inequalities for stochastic process whose first derivatives absolute values are MT-convex. Results obtained in this paper may be starting point for further research.

Keywords: Hermite-Hadamard Inequality, Fractional Integral, MT-convex Stochastic Process.

FRACTİONAL İNTEGRAL ON HERMİTE-HADAMARD İNEQUALİTİES FOR P-CONVEX STOCHASTİC PROCESS

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ABSTRACT
In this work we apply well known fractional integral operators such as Riemann-Liouville fractional integral, k-Riemann-Liouville fractional integral, Katugampola fractional operators, conformable fractional integral, Hadamard fractional integrals, etc, on P-convex stochastic processes in order to establish new integral inequalities of Hermite-Hadamard type.

Keywords: Stochastic process, Fractional integral, Hermite-hadamard inequality

1. INTRODUCTION

The stochastic processes is a significant branch of probability theory, it is usually defined as a family of random variables, and thus stochastic processes are used as mathematical models of systems and phenomena that appear to vary in a random manner probabilistic in time. And so the definition of a stochastic process is as follow :

(Ω, A, P) being a probability space. A function $X : \Omega \to \mathbb{R}$ is a random variable if A is measurable.

A stochastic processes is defined as function $X : \Omega \times I \to \mathbb{R}$ where $I \subset \mathbb{R}$ is an interval if for every $t \in I$ the function X(t,.) is a random variable.

The study of convex stochastic process was initiated by Nikodem in 1980, investigating some regularity properties of convex stochastic process. In 1992 Skowronski managed to obtain some further results on convex stochastic process, later on different types of convexities of stochastic processes were considered to derive new results.

2. DEFINITIONS

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2.1. definition

A stochastic process X: $\Omega \times I \to \mathbb{R}$,is MT-convex if $\forall t \in [0,1]$ b $\in I$, the following inequality is satisfied:

$$X(at+(1-t)b,\cdot) \leq \frac{\sqrt{t}}{2\sqrt{1-t}} X(a,\cdot) + \frac{\sqrt{1-t}}{2\sqrt{t}} X(b,\cdot)$$

2.2. Hermite-Hadamard inequality for a convex stochastic process

For convex stochastic process $X : \Omega \times I \to \mathbb{R}$ on the intervalle I where a and b $\in I$ and a<b , the inequality stipulate that :

$$X\left(\frac{a+b}{2},.\right) \leq \frac{1}{b-a}\int_a^b X(x,.)dx \leq \frac{X(a,.)+X(b,.)}{2}$$

The inequality became quickly very useful tool in the Theory of Probability and optimization.

2.3. Fractional integral

Fractional calculus, was introduced at the end of the nineteenth century by Liouville and Riemann, the subject of which has become a rapidly growing area and has found applications in diverse fields ranging from physical sciences and engineering to biological sciences and economics. In time different types of fractional integrals were introduced among wich we mention:

- The Riemann-Liouville integral exists in two forms, upper and lower. Considering the interval [a,b], the integrals are defined as :

$$I_{a^+}^{(\alpha)} f(x) = \frac{1}{\Gamma(\alpha)}\int_a^x (x-t)^{\alpha-1} f(t)dt$$

$$I_{b^-}^{(\alpha)} f(x) = \frac{1}{\Gamma(\alpha)}\int_x^b (t-x)^{\alpha-1} f(t)dt$$

Where Γ is Euler Gamma function.

- The K Riemann-Liouville fractional integral defined by:

$$I_{a^+,k}^{(\alpha)} f(x) = \frac{1}{k\Gamma_k(\alpha)} \int_a^x (x-t)^{\frac{\alpha}{k}-1} f(t)dt$$

$$I_{b^-,k}^{(\alpha)} f(x) = \frac{1}{k\Gamma_k(\alpha)} \int_x^b (t-x)^{\frac{\alpha}{k}-1} f(t)dt$$

Where: $\Gamma_k(\alpha) = \int_0^{+\infty} t^{\alpha-1} e^{\frac{-t^k}{k}} dt$

The main purpose is to use well known fractional integral operators such as RiemannLiouville fractional integral, k-Riemann-Liouville fractional integral, Katugampola fractional integrals, in order to establish new Hermite-Hadamard type inequalities for MT-convex stochastic processes.

NOVEL CONTROLLED PULSE DRIVE METHOD FOR COOLING PERFORMANCE

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ABSTRACT
Driving current of thermoelectric cooler(TEC) modules is one of the method to advance their cooling efficiency. Conventionally TEC modules driven with direct current(DC) or pulse width modulation(PWM) methods. However, some limitations of these methods exist in the application such as complex electronic circuits and distorting effect of high switching frequencies. A novel rectangular pulse current(RPC) driving method which is the constant duty cycle, was developed by optimising the input power due to low pulse frequency(≤1000Hz) of square wave to enhance the cooling efficiency and thermal stability of TEC module. An experimental set up including thermoelectric module, signal processing and temperature control parts was constructed and the system provides the same conditions for different driving methods. The measurement results show that the coefficient of performance of thermoelectric module with the RPC driving method was increased up to 19% as compared to DC driving method. The RPC driving method can be made a significant contribution to cooling challenges and technology in the field of semiconductor applications due to its particular properties.

Keywords: thermoelectric cooler module, cooling performance, drive method, rectangular pulse, direct current

SUSTAINABLE INTERNET OF MUSIC THINGS TOWARDS THE UBIQUITOUS MUSICOLOGICAL SMART CITY

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ABSTRACT
The smart cities represent the urban areas with distributed sensor networks which gather information used towards the efficient data management [1]. As a source of ubiquitous information [2], the smart city cretivities explore prospects to improve residents' urban responsiveness. However, composing sense of smart city sensor information is intriguing and there must be a large interval between the available sensor information and the application interfaces. We would illustrate the musicological smart city schema for interpreting the smart city information and the reconstruction of musicological experiences [3] for Internet of Behaviours. Smart cities leverage essential IoT devices such as the connected sensors, for collecting and analyzing data [4-5]. The cities then utilize these information for betterment of the system infrastructure, utilities, and required services [6]. The musicological smart city will be a promising paradigm in the context of the computational musicology [7] using the domains of ubiquitous music, sonic, and mobile music for qualitative musical compositions, reconstruction, generations, and analytics [4, 8]. The computational musicology [7] illustrates the in-depth study of musical components which are strictly associated with the socially and geographically distributed human beings or community, diverged musical sense, and socio-cultural diversities in the musical orgnisations. To represent the cultural-diverged musical disciplines, we have illustrated the Internet of Things-inspired music representation paradigm, titled as, the Internet of Music Things [4], where the independent musical attributes and performances can participate within an interconnected network to produce optimum musical experiences, composition, and musical arrangements. This paradigm can also be effective to define the preservation of the incorporeal cultural heritages [3], such as the musical heritage within a set of specific musical and cultural communities. With the rapid technological advancements, the IoT connects the smart city sensor devices to provide an unescapable platform also to associate musicians and music composers to assemble obligatry musical accomplishments. The projected ubiquitous smart city inspired contextual musicological paradigms can be an indispensable infrastructure in the analytical domains of distributed music composition, reconstruction, musification, preservation of sustainable as well as incorporeal cultural heritage, musical smart city arrangement, and context-sensitive music recommendation [9-10] to the end-users and audiences.

Keywords: Computational Musicology, Cultural Heritage, Sustainability, Internet of Music Things, Recommender Systems, Musification, Smart City.

IMPROVED FIREFLY ALGORITHM WITH DIFFERENT DISTANCE FORMULAE

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ABSTRACT
Modern optimization algorithms are often meta heuristic algorithms and they are promising in NP -hard problems. Nature inspired meta heuristic algorithms, those based on swarm intelligence, have attracted much attention in the last ten years. Firefly algorithm and its literature has expanded dramatically with diverse applications appeared in about five years ago. In this research work, we show that how to use the developed Firefly algorithm to solve non-linear designed problems, and briefly review the fundamentals of FA together with a selection of recent publications. Then we discuss the optimality associated with balancing exploration and exploitation which is essential for all meta heuristic algorithms. Firefly algorithm is an unconstrained and nature-inspired optimization algorithm, that works on the behavior of attraction to the flashing lights of fireflies at night. In this research work, we will use different distance formulae on FA search technique, which give us more better results. In order to demonstrate the performance of FA on different distance formulae, CEC 2019 unconstrained realparameters test functions suite will be used. The algorithm will be run 50 times independently for each problem in MATLAB environment. For performance evaluation, the simulation results of FA on different distance formulae will also be compared with the top three performing algorithms of CEC2019 and some other algorithms designed for unconstrained optimization.

Keywords: Optimization, Meta heuristics, Distance formulae, Firefly algorithm (FA), Exploration and Exploitation.

TOPOLOJİ OPTİMİZASYONU İLE HAFİFLEŞTİRİLMİŞ KRANK KOLU TASARIMININ YAPILMASI

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ÖZET

Trafik sorununun her geçen gün artmasıyla birlikte bisiklet, skuter gibi çevreyi kirletmeyen mobil araçlar daha fazla tercih edilir hale gelmektedir. Bisiklet herhangi bir yakıt tüketimi ve park derdi olmayışı sebebi ile de tercih edilmektedir. Gerçekleştirilen bu çalışmada, bisikletlerde kullanılan krank kolu parçası için topoloji optimizasyonu çalışması yapılmıştır. Krank kolu, bisiklet kullanıcısının bacaklarının ileri geri hareketini, zinciri tahrik etmek için kullanılan dönme hareketine dönüştüren bir bisiklet aktarma organının bileşenidir. Bu aktarma organı arka tekerleği tahrik ederek bisikletin hareket etmesini sağlamaktadır. İlk olarak pedallar üzerine binen yük, krank kolları ile dişlilere aktarılır. Dişlilere aktarılan yük zincir ile ruble dişlisine ve tekerleklere ulaşır. Bu sayede tekerlek döner ve yol katedilir. Orta göbek mili ve pedal mili arasındaki mesafeye de krank kolu uzunluğu denmektedir. Krank kolları genel olarak kompozit, çelik veya alüminyum alaşım malzemelerden imal edilmektedir. Topoloji optimizasyonu bir hedefi ve kısıtlama seti ile tanımlı bir tasarımda malzemenin parça içerisindeki en iyi dağılımı bulmaktır. Bilgisayar Tabanlı Mühendislik programları ve Sonlu Elemanlar Yöntemi ile kütle, hacim veya yer değiştirme gibi parametreleri en aza indirmek veya en üst düzeye çıkartmak için modeldeki malzeme bloğunda boşluklar oluşturur. Bu çalışmada amaç malzemenin plastik deformasyona uğramadan, ağırlığında azaltma elde edebilmektir. Bu kapsamda bir referans krank kolu numunesi üzerinde çalışılmıştır. Referans krank kolu 7005 Alüminyum alaşımından imal edilmiş olup, akma dayanımı 290 MPa, ağırlığı ise 291,87 g'dır. Referans krank kolunun mil yuvasına dikey yönde (Z ekseni boyunca) uygulanan kuvvet sonucu, parçada oluşan maksimum Von Misses Gerilmesi 93,59 MPa'dır. Ham maddesi 7005 alüminyum alaşımı olan topoloji optimizasyonu çalışması yapılan krank kolunda ise mil yuvasına dikey yönde (Z ekseni boyunca) uygulanan statik analizde de oluşan maksimum Von Misses Gerilmesi 93,67 MPa olarak ölçülmüştür. Topoloji optimizasyonu yapılmış olan yeni krank kolunun çalışma sonucunda toplam ağırlığı 210 g olarak ölçülmüştür. Referans numune ile kıyaslandığında yeni tasarımın ağırlığında %28,13 azalma elde edilmiştir.

Anahtar Kelimeler: Bisiklet, Krank Kolu, Tasarım, Hafifletme, Topoloji Optimizasyonu

CRANK DESIGN WITH TOPOLOGY OPTIMIZATION

ABSTRACT
As the traffic problem increases day by day, mobile vehicles such as bicycles and scooters that do not pollute the environment are becoming more preferred. Bicycles are also preferred due to the lack of fuel consumption and parking problems. In this study, a topology optimization study was carried out for the crank arm part used in bicycles. The crank arm is the component of a bicycle drivetrain that converts the reciprocating motion of the cyclist's legs into rotational motion used to drive the chain. This drivetrain drives the rear wheel, enabling the bike to move. First, the load on the pedals is transferred to the gears with the crank arms. The load transferred to the gears reaches the sprocket and wheels by the chain. In this way, the wheel turns and the distance is traveled. The distance between the bottom bracket shaft and the pedal shaft is called the crank arm length. Crank arms are generally made of composite, steel or aluminum alloy materials. Topology optimization is to find the best distribution of material within the part in a defined design with a goal and constraint set. With Computer Based Engineering programs and Finite Element Method, it creates voids in the material block in the model to minimize or maximize parameters such as mass, volume or displacement. The aim of this study is to reduce the weight of the material without undergoing plastic deformation. In this context, a reference crank arm sample was studied. The reference crank arm is made of 7005 Aluminum alloy, it's yield strength is 290 MPa and weight is 291.87 gram. As a result of the load vertically (along the Z axis) to the shaft seat of the reference crank arm, the maximum Von Misses Stress on the part is 93.59 MPa. In the crank arm, whose raw material is 7005 aluminum alloy, the topology optimization study was carried out, and the maximum Von Misses Stress, which occurred in the static analysis applied vertically to the rearend (along the Z axis), was measured as 93.67 MPa. As a result of the study, the total weight of the new crank arm with topology optimization was measured as 210 gram.

Keywords: Bicycle, Crank, Design, Topology Optimization

INVESTIGATION OF THE IN VITRO ANTI-PROLIFERATIVE ACTIVITY AND IN SILICO MOLECULAR DOCKING PROPERTIES OF NICKEL(II) COMPLEXES OF HYDRAZONOXYME LIGANDS BEARING THE PYRAZOLONE GROUP

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ABSTRACT

Cancer is described as the uncontrolled growth of abnormal cells. It is known that the cancer therapy can lead various side effects and can rise resistance to drugs over time. Therefore, the improvement of anti-cancer drugs which have low-toxicity and efficiency properties is vital. Besides, these drugs' precisely binding to the target is essential. New anti-cancer drug development studies in this field are increasing rapidly. There are proteins responsible for cancer cell development, proliferation and differentiation, which are important targets that must be inhibited by newly synthesized compounds. Oxidoreductase receptor of breast cancer and AR are examples of those. In this work, p-substitute aminobenzene derivatives (p-Methoxyaniline, p-Methylbenzylamine) L^1H_2 and L^2H_2 ligand and their divalent Ni(II) complexes were prepared according to the literature. Morover, in silico molecular docking studies were performed against oxidoreductase receptor of breast cancer and AR target proteins. Furthermore, *in vitro* cytotoxic effects of these L^1H_2 and L^2H_2 ligands and their Ni(II) complexes on breast cancer MCF-7 and prostate PC-3 cells were evaluated. The cytotoxicity test was carried out using MTT assay. $[Ni(L^1H)_2]$ and $[Ni(L^2H)_2]$ complexes showed higher binding affinity to oxidoreductase receptor of breast cancer and AR target proteins when compared to L^1H_2 and L^2H_2. Therefore, they can be suggested as hit compounds against these cancer proteins. In addition, the bioactivity results were found to be between the -5 and 0 which corresponds to moderate activity. Besides that, the metal complexes were strongly effective against breast (MCF-7) and prostate (PC-3) cancer cells. Different levels of cytotoxicity were displayed by the compounds such as excellent or weak activities against the cancer cells. There was observed a dose-dependent manner for the inhibition of cell proliferation. In conclusion, these Ni(II) complexes of L^1H_2 and L^2H_2 ligands are suitable compounds for further analysis in low toxic anti-cancer drug development with targeted properties.

Keywords: Pyrazolone, Cancer, Anti-proliferative activity, Molecular docking, Bioactivity.

XX.YÜZYIL BAŞLARINDA URMİYA VE ETRAFINDA VUKUBULAN SOSYO-POLİTİK OLAYLARIN OSMANLI ARŞİV BELGELERİNE YANSIMASI

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ÖZET

1918`de Azerbaycan`ın tarihi torpakları Urmiya, Salmas, Hoy ve diğer arazilerde yaşamış yerel Azerbaycan (türk) ahaliye karşı yapılan soykırım olayları ile ilgili geniş olarak araştırmalar yapılmakta ve tarihi eserlerde yazılmaktadır. Fakat sözkonusu olayların gerçekleşmesi için ihanetkar politik bir zemin hazırlanmasının daha önceki dönemlere tesadüf ettiğini de kaydetmemiz gerekiyor. XX. yüzyıl başlarında Urmiya ve etraf arazilerde sosyo-politik durumla ilgili olaylar şiddet göstermekteydi. Nitekim "Büyük devletler"in jeopolitik çıkarlarının kesiştiği işbu arazilerde 1900`den itibaren yerel Azerbaycanlı (Türk) ahaliye karşı maksadlı şekilde şiddet ve baskı uygulanmaktaydı. Bölgenin etno-politik ve dini manzarasını değişmek için devamlı olarak girişimler yapılmaktaydı. Bu amaçla komşu ve diğer arazilerden ermeni ailelerinin Urmiya ve etrafında yerel nüfusun daha yoğun yaşamakta olduğu arazilere toplu halinde yerleşmesi sağlanmaktaydı. Yerleşmiş "gelmeler" zaman zaman şehrin veya köyün sosyal hayatına giriyor, yerel nüfusla kaynaşıyordu. Belli zamandan sonra artık "yerel" ermeniler geliş amaçlarına uygun faaliyetlerini gerçekleştirmeye başlıyorlardı. Bildiri Güney Azerbayacan`ın Batı bölgesinde başgösteren sosyo-politik olaylarla ilgili Başbakanlık Osmanlı Arşivi`nde korunmakta olan ve tarihimizin sözkonusu dönemine ait belgelerde yer alan veriler temelinde hazırlanmış bulunuyor. Belgelerin Osmanlı sarayının Hariciye Nezaretine ve diğer makamlara gönderilmiş olan mektup, rapor ve dilekçelerden oluştuğunu da kaydetmemiz gerekiyor. Ağırlıklı olarak, 1901-1902 ve sonraki yılları kapsamakta olan arşiv belgeleri bünyesinde araştırmaya aldığımız konu ile ilgili değerlendirmeler yapılmış ve belirli sonuçlara varılmıştır.

Anahtar sözler: Azerbaycan, Osmanlı, Urmiya, Salmas, Arşiv Belgeleri

THE REFLECTION OF THE SOCIO-POLITICAL EVENTS OF THE EARLY 20TH CENTURY IN URMIA AND SURROUNDING AREAS IN THE OTTOMAN ARCHIVAL DOCUMENTS

ABSTRACT

The events of massacre and genocide committed against the local Azerbaijani (Turkic) population in 1918 on the historical Azerbaijan territories Urmiya, Salmas, Khoy and other surrounding areas, have been comprehensively covered in the historical literature and numerous researches. However, the political and treacherous preparation of the ground for these events dates back to earlier years. At the beginning of the 20th century, the socio-political events in Urmia and nearby areas became more strain. Thus, starting from 1900, targeted violence and oppression measures in these areas, where the geopolitical interests of the great powers intersected, were carried out against the local Azerbaijani (Turkic) population, and attempts were made to change the ethnic-political and religious landscape of the region. For this purpose, the mass migration of the living in neighboring states and other regions of the country Armenian families to the densely populated by locals areas of Urmia and surrounding regions was organized and their accommodation was ensured. Settled "newcomers" gradually entered the social life of the city or village and mingled with the local population. After a certain period of time, already assimilated Armenians started to carry out certain activities which corresponded to the purpose of their arrival. The present article was prepared on the basis of the data on the socio-political events that took place in the western region of South Azerbaijan at the studied period reflected in the documents of the relevant period of the history of Azerbaijan preserved in the Ottoman Archive of the Prime Minister's Office. The documents were addressed directly to the Ottoman palace, its Ministry of Foreign Affairs and other offices. Theses we put forward by drawing on several archival materials we involved in the research, mainly related to 1901-1902 and later years, were studied and certain conclusions were made.

Keywords: Azerbaijan, the Ottoman, Urmia, Salmas, archival documents

İMPLEMENTATİON AN INTERACTİVE MULTİMEDİA TEXTBOOK TO ORGANİZE FLİPPED CLASSROOM FOR PART-TİME EDUCATİON STUDENTS

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ABSTRACT
The existing form of learning for part-time education in Ukraine realizes a significant amount of independent work for students. One of the promising directions for organizing such learning is the flipped classroom. This concept offers that students independently study new material in advance, and during synchronous classes with a teacher they are more engaged in practice, group work, and problem-solving. The phase of learning new material in traditional learning was carried out under the guidance of a teacher. However, this appears to be a waste of teacher time, which is especially valuable in distance learning. The advantages of the flipped approach are that it promotes student self-direction, and provides opportunities for the teacher to repeatedly use the same resource, paying attention to feedback, rather than repeating the same thing in other classes. We have created interactive multimedia textbooks in a number of disciplines specifically for part-time education students in the form of a SCORM package using MS Powerpoint, iSpring Suite software, etc. Digital textbooks include video tutorials with built-in questions, fragments of documentary and feature films, dialogue simulators, interactive diagrams, crossword puzzles, quizzes, and other tasks. The results of their implementation indicate an increase in student satisfaction with distance learning in general and satisfaction with interaction with distance technologies. We use the Elaine Strachota's student satisfaction survey. The part-time students` satisfaction from interaction with distance technologies in July 2022 has increased to over 90 percent.

Keywords: student satisfaction, part-time education, flipped classroom, digital textbook.

THE İNFLUENCE OF FAKE İNFORMATİON ON URBAN CULTURE

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ABSTRACT
In today's society, the flow of information is spreading at high speed. In many ways, people do not even have time to deal with the correctness of the news they have heard, they immediately receive a number of new ones. Due to the large number of people, the transfer of information is carried out through dialogue or information leakage in social networks. Especially in urban cities, the outbreak of fake news is popular. And most importantly, this leads to the fact that house can become the cause of "fear", "ridiculous decisions", "mass congestion", and at worst, the cause of rallies and insurrection. Being a journalist it is very important to understand the importance of eco-friendly information. The main thing is to avoid spreading information that will cause any conflict. After all, people in big cities are more sensitive to risk. Urban culture plays a huge role in both political and economic issues. There are a number of issues that cannot be openly put up for public discussion. And the most popular of them are: interethnic conflicts, facts of terrorism. Urban culture serves not only the development of the state, but also its relations with neighboring countries in the world arena. To avoid all possible risks due to fake news, you need to start actions in an active manner. To do this, the government, together with the media, can launch useful lessons, life hacks, guides with step-by-step actions to verify any information received. To do this, you can start by covering online platforms for verifying information, or give a list of verified sources. It is also important to put a ban on dubious sources.

Keywords: Urban culture, fake news, development of urban cities

FAMİLY COHESİON, BULLY VİCTİMİZATİON AND EMOTİONAL BEHAVİORAL PROBLEMS İN SCHOOL CHİLDREN: A CORRELATİON STUDY

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ABSTRACT
The aim of the study was to explore the relationship between family cohesion, bullying victimization and emotional behavioral problems in school children. Sample was collected from schools of Lahore through purposive sampling (N=225).The data was collected through purposive sampling. There were 53.8 % boys and 46.2% girls with the age range of 9-17 (M= 14.78, SD=2.49). The measures used to assess the variables were Family Cohesion Scale (Saleem & Zahra, 2021), Bullying Victimization Scale (Khurshid, 2017), Emotional Behavioral Problem Scale (Saleem & Mahmood, 2011) and demographic Performa. Correlation analysis showed family cohesion has a low but positive and significant relationship with bullying victimization. Emotional behavioral problems have significant, positive but low relationship with family cohesion. There is a significant and moderately positive relationship between emotional behavioral problems and bullying victimization. It was also found from t-test that girls have more emotional behavioral problems than boys. To conclude, family and school both have significant roles to play in children's life as minor inconvenience in any of them leads to mental health issues.

Key words: Family Cohesion, Bullying Victimization, Emotional Behavioral Problems, School Children.

CAR REFUGEES AND CAMEROONIAN HOST COMMUNITY WOMEN AT CROSSROAD WITH RESILIENT LIVELIHOODS

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ABSTRACT

For more than 20 years today, the Republic of Cameroon has been hosting refugees from the Central African Republic who fled protracted conflicts and wars in their home country. Over 52% of the hundreds of thousands of refugees that flee the war from Centrale Africa and settle in the east region of Cameroon are women, children, and youth. The influx of refugees from CAR led to an increase in the population of up to 80% in some villages and exceeding 100% in others, causing pressure on natural resources, untold hardship, hunger, and poverty. As a result of this, refugees perceived that nobody would help them financially to set up businesses because of their lack of resources and means thus relying principally on relief assistance such as food aid, non-food items, shelter, and health care. This restricts Central African refugees at the very outset of their thinking and strategizing about what to do to sustain themselves, and what goals they can achieve. The protracted refugees find themselves between recovery and resilience actions. Therefore, this article assesses the extent to which refugees and Cameroon host community women have been shifting from recovery to actions that generate resilient livelihoods. This study is conducted by selecting 440 most vulnerable CAR refugees and Cameroonian host community women using the World Food Program vulnerability code to recruit respondents for the study working on funded food security and livelihood project. This study used focused group discussion and questionnaires for the collection of data from refugee and host community women in Lolo and Mbile camps and their host communities in the East region of Cameroon. Data were analyzed using micro soft excel. The outcome of the results revealed that major strides are being made by the target population in 5 livelihoods assets areas (human, physical, social, economic, and natural) revealing that there is a gradual shift from highly dependent relief/recovery to resilient livelihoods. However, this is still heavily dependent on the external support from the humanitarian organizations of which if not continued for at least 5 to 10years, the situation may degenerate. It is also noticed that several organizations' interests are facing out of the east region and it will require efforts from local organizations, government institutions, and councils to bridge the gap for just and self-reliant development.

Keywords: Livelihoods, refugee women and host community women, East region Cameroon

INFLUENCE OF THE MATERİAL GRAİN SİZE ON THE PHYSİCAL-MECHANİCAL BEHAVİOR OF SAND CONCRETE

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RESUME
Sand concrete is currently attracting interest because of its specific properties, compared to traditional concrete: excellent workability and cohesion, good adaptation to environments with heavy ironwork, aesthetic qualities. In addition, in some sand-rich regions, it can save money compared to traditional concrete. In this research, an experimental study was conducted on the influence of the granular class in the manufacture of sand concrete. The characterization of these concretes was made from their physical and mechanical properties in the fresh and cured state.
The results of the characterization tests show a considerable improvement in compressive and tensile strengths for sand concretes of higher granular class.

Keywords: sand concrete, granular class, mechanical behavior, physical behavior.

PHYSICAL-MECHANICAL BEHAVIOR OF CONCRETE BASED ON BLAST FURNACE SLAG SAND

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ABSTRACT
In this study, crystallized slag was introduced into concrete manufacturing for the valorization of blast furnace waste. Three concrete mixtures were studied: an ordinary concrete, a concrete where 50% of the natural sand was substituted by the crystallized slag sand, and another where 100% of the crystallized slag sand was used. The characterization of these concretes was carried out by their mechanical properties: compressive and tensile strength and their durability: capillarity, and massive absorption of water. Experimental results showed a beneficial effect related to the slag percentage used in the concrete.

Keywords: slag concrete, crystallized slag, mechanical behavior, valorization

ROLE OF SELF-ESTEEM İN PUNİTİVE PARENTİNG AND PSYCHOLOGİCAL REACTİONS OF ABUSE AND NEGLECT İN ADOLESCENTS

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ABSTRACT

The objective of the study was to examine the moderating role of self-esteem in the relationship between punitive parenting and psychological reactions to abuse and neglect. The sample of the study was 305 (Girls=49%, Boys=50%) adolescents with the age range of 12-16 years (M=14.25, SD=1.47) of class 6^{th} -10^{th} of 3 boys and 4 girls school selected through multistage sampling technique. Culturally developed punitive parenting scale, self-esteem scale, and psychological reactions to abuse and neglect scale were administered. Results were discussed in light of cultural expressions and indicators of self-esteem, punitive parenting, and psychological reactions to abuse and neglect. Results suggested that self-esteem significantly moderates the relationship between punitive parenting and psychological reactions to abuse and neglect (β=.013, SE. = - .005, p<.001). Regression analysis revealed that punitive parenting is a positive predictor (SE=.45, p<.001) of psychological reactions to abuse and neglect whereas self-esteem negatively predicts (β=-.006; SE=.08) psychological reactions to abuse and neglect in the association with punitive parenting in adolescents. Study findings suggest that punitive parenting significantly contributes to increasing psychological reactions to abuse and neglect in adolescents therefore the area of parenting needs noteworthy concerns to reduce mental health problems in adolescents.

Key Words: Self-Esteem, Punitive Parenting, Psychological Reactions, Adolescents

SPATIAL ANALYSIS OF HOME-BASED ENTERPRISES AND IMPLICATIONS FOR URBAN MANAGEMENT

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ABSTRACT
The addition of productive activities to the usual reproductive function of planned residential neighbourhood known as Home-Based Enterprise (HBE) has become a growing challenge to sustainable urban planning and development in global South cities. This growing challenge is attributed to Structural Adjustment Programme (SAP), economic crises and high rate of unemployment. The perception of urban managers that this unplanned combination is a contravention has created a scenario where this evolution is not given a thoughtful consideration. The fact that this combination, though a challenge to urban managers, actually provide employment and livelihood makes it deserve some rethink to sieve out possible potential of this trend. This necessitates empirical study of trend, which leads to this spatial analysis of HBEs to ascertain the actual location and types for a more informed, knowledgeable and sustainable management of the phenomenon. The objectives of the study are: to identify the spatial location of HBEs in the study area, to analyse the spatial location of HBEs using GIS, to determine the spatial pattern of HBEs in the study area using point pattern and statistical spatial Autocorrelation analysis and to recommend strategies for sustainable management of HBEs based on the findings of the study. Three planned residential neighbourhoods-Uwani, New Haven and Independence layout in Enugu city of Nigeria, selected through stratified random sampling, were used for this study. From the result of the analysis, the identified spatial location reveals that the proportion of buildings in the study area that has HBEs are 78.4%, 75.2% and 60.7% for Uwani, New Haven and Independence layout, respectively. The statistical spatial Autocorrelation report shows clustered, random and clustered for Uwani, New Haven and Independence layout, respectively. The study is significant as it portrays the pattern of HBEs in a typical global South city which may be applicable to similar cities.

Key words: Home-based enterprise, Spatial analysis, Urban, Management, Implications

SERVER CLONİNG İN AAA FOR AD HOC NETWORKS

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ABSTRACT
An ad hoc network is a collection of autonomous nodes that communicate with each other over wireless links but in the absence of any fixed infrastructure. Because of the limited range of each host's wireless transmission, to communicate with hosts outside its transmission range, a host needs to enlist the aid of its nearby hosts in forwarding packets to the destination. Due to lack of stationary infrastructure such as base stations, each node has to act itself as a router. The applications of such networks are normally in disaster relief, police and firefighting operations and battlefield environment where infrastructure is impractical and fast recovery from failures are significant concerns. Ad hoc networks are classified into Sensor networks and mobile ad hoc networks known as MANETs. Sensor networks are typically static and have very low resources of power, memory and computational processing. MANETs consist of mobile nodes which are free to move anywhere. They can join and leave the network at any time. Thus network topology may change rapidly and unpredictably over time. The network is decentralized, where all network activities including the topological discovery and delivering messages must be taken care of by the nodes themselves with routing functionality incorporated in mobile nodes. This dynamic topology and absence of any fixed infrastructure originate the need to trust the nodes of network for the services they provide. For that purpose we have to authenticate nodes before making them a part of the MANET. Furthermore a mechanism to identify and prove the identity of participating node is also required if different nodes have different access rights to access different network resources and services. Especially in any commercial applications some accounting methods are required to charge the users based on the consumed network resources and requested services.

Thus proper accounting and authentication mechanisms are required to manage the tasks of capacity planning, billing and auditing of resources consumed. To implement a centralized system for Authentication, Authorization and Accounting (AAA) architecture using static repositories, AAA policy database, and accounting logs on distributed and mobile nodes is a challenging job. Considering all above facts, the main contribution in this paper is to provide AAA architecture with replicated repositories in primary server, secondary server and clone server. Thus AAA functionality will be available on multiple network nodes to avoid single point of failure for AAA functionality and loss of AAA information for billing purposes. Authentication verifies the entities before disclosing any secret information while after authentication the entities are authorized for specific services as well as resources to consume. Accounting service is provided for auditing and billing purposes. To select these servers the existing mechanisms for holding elections as studied in literature are critically analyzed and other factors for elections and a scoring mechanism are also suggested.

DEMAND FORECAST MODELS FOR PERSONAL PROTECTIVE EQUIPMENT USING SUPERVISED LEARNING

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ABSTRACT
Personal Protective Equipment (PPE) are the materials used in the workplace to protect the safety of staff and environment. Minimizing the risks that may occur in the work process, preventing work accidents and occupational diseases, and providing a more comfortable and safe working environment are some of the advantages of PPE. The PPE consist of items for both hand and body protection, such as steel-toed boots, hard hats, masks, protective gloves, apparel and accessories that can withstand fire. According to Law 631 of the Occupational Health and Safety (OHS), the

employer must take all necessary measures to ensure OHS at the workplace and stock the PPE fully. The demand for PPE has increased due to factors such as price changes, unstable consumer preferences, and intense competition. Within this scope, this study aims to develop demand forecast models for work shoes which are one of the important items of PPE. For this purpose, Support Vector Machine (SVM) and Light Gradient Boosting Machine (LightGBM) have been used. The performance of the developed models has been evaluated using Mean Absolute Percentage Error (MAPE). The dataset includes 169 rows and weekly sales of work shoes from January 1st, 2019 to March 28th, 2022. Forecast models have been developed for 2 different months (August 2021 and February 2022) randomly selected from the dataset. The model developed with SVM has an MAPE of 10.38% for August 2021 and an MAPE of 6.74% for February 2022. The model developed with LightGBM has an MAPE of 4.36% for August 2021 and an MAPE of 18.27% for February 2022. The results show that it is possible to forecast PPE demand with reasonable error rates using supervised learning.

Keywords: Demand Forecast, Supervised Learning, Personel Protective Equipment.

TELESKOPİK TİP AMORTİSÖRDE SÖNÜMLEME KUVVETİNE ETKİ EDEN PARAMETRELERİN İNCELENMESİ VE OPTİMİZASYONU

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ÖZET
Günümüzde firmalar arasındaki rekabet ile ürün kalitesinin önemi her geçen gün artmaktadır. Firmalar kalite iyileştirme çalışmalarında farklı yöntemler kullanmaktadır. Bu çalışmada altı sigma metodu tercih edilmiştir. Üzerinde çalışılan projede öncelikle balık kılçığı yöntemi kullanılarak sönümleme kuvvetine etki edebilecek parametreler incelenmiştir. Proses kontrol noktasında sönümleme kuvveti dağılımında sapma tespit edilmiştir. Bunun sonucunda amortisörlerin alt parça geometrik ölçümleri ve proses parametre ölçümleri yapılmıştır. Minitab programı yardımıyla deney tasarım analizi yapılmıştır. Ürün üzerinde sönümleme kuvvetine en çok etki eden değişkenlerin somun sıkma torkları, taban valfi pim yüzey dikliği, piston kolu alın yüzey dikliği ve taban valfi yüzey çapı olduğu belirlenmiştir. İlk olarak piston kolu alın yüzey dikliği, taban valf pim yüzey dikliği, çapı ve somun sıkma torku incelenmiş, belirlenen tolerans aralığına uygun olduğu tespit edilmiştir. Piston valfi somun sıkma torku incelenmiştir ve 46-54 Nm aralığında torklanması gerekirken 60 Nm ile torklandığı görülmüştür. Bu değer beklenin üzerindedir ve bu durum amortisörde sönümleme kuvvetini arttırarak olması gereken sürüş güvenliğini bozmaktadır. Uygun somun sıkma tork değerinin belirlenmesi için 4 farklı değerle (45 Nm, 50 Nm, 55 Nm,60 Nm) amortisör numune üretimi yapılmış ve sönümleme kuvvet testi yapılmıştır. Deneysel tasarımda tespit edilen sönümleme kuvveti üzerinde etkisi olan somun sıkma tork kuvveti yapılan numune çalışmaları kapsamında simülasyonu yapılmıştır. Bu simülasyon sonrasında deney tasarımı analizi doğrulanmıştır. Yapılan çalışmalar sonucunda en uygun torklama değerinin 50 Nm olduğu görülmüştür. Bu çalışma neticesinde sönümleme kuvvetindeki sapma % 33 iyileştirilmiştir.

Anahtar Kelimeler: Sönümleme kuvveti, Altı sigma, Deneysel Tasarım, Minitab, Optimizasyon, Somun Sıkma Torku

INVESTION AND OPTIMIZATION OF THE PARAMETERS AFFECTİNG THE DAMPING FORCE IN TELESCOPIC SHOCK ABSORBER

ABSTRACT

Today, with the competition between companies, the importance of product quality is increasing day by day. Firms use different methods in their quality improvement studies. In this study, the six sigma method was preferred. In the project being studied, first of all, the parameters that can affect the damping force were examined by using the fishbone method. A deviation in the damping force distribution was detected at the process control point. As a result, sub-part geometric measurements of shock absorbers and process parameter measurements were made. Experimental design analysis was performed with the help of Minitab program. It has been determined that the variables that affect the damping force the most on the product are nut tightening torques, base valve pin surface perpendicularity, piston rod washer surface perpendicularity and base valve surface diameter. First of all, piston rod washer surface perpendicularity, base valve pin perpendicularity, diameter and nut tightening torque were examined and it was determined that they were suitable for the specified tolerance range. Piston valve nut tightening torque was examined and it was found that it was torqued at 60 Nm when it should be torqued in the range of 46-54 Nm. This value is above the expected and this situation increases the damping force in the shock absorber and impairs the driving safety that should be. In order to determine the appropriate nut tightening torque value, shock absorber samples were produced with 4 different values (45 Nm, 50 Nm, 55 Nm, 60 Nm) and damping force test was performed. The nut tightening torque force, which has an effect on the damping force determined in the experimental design, has been simulated within the scope of the sample studies. After this simulation, the experimental design analysis was verified. As a result of the studies, it was seen that the most suitable torque value was 50 Nm. As a result of this study, the deviation in the damping force has been improved by 33%.

Keywords: Damping Force, Six Sigma, Experimental Design, Minitab, Optimization, Nut Tightening Torque

ACCEPTANCE OF POINTILLISM WALL HANGING AS A MEANS OF COMMUNICATION AMONG STAFF OF CORPORATE ORGANIZATIONS IN ABEOKUTA METROPOLIS

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ABSTRACT
This study sought acceptability of pointillism wall hanging as a means of communication in corporate organization in Abeokuta. The objectives are to designing and producing samples of pointillism painting article, determine the awareness and examine the acceptability of the wall hangings for decorating their organizations and communicate an idea. Survey research design was conducted using questionnaire to collect data from respondents in Federal Medical Center (FMC) and Federal University of Agriculture, Abeokuta (FUNAAB) with a total sample size of 160 using proportionate sampling to determine the number of respondents in each organization and convenient sampling technique to select respondents. Data were analysed using frequency table, percentages, means and hypothesis analysed with Chi Square and PPMC. Result showed that (63.8%) of the respondents were male and female (36.4%) with range 43 – 58 ($\bar{x}$= 49.9) at the time of the study. Most were married (72.5%), and literate with majority having above secondary school education: OND/NCE (29.4%), BSC/HND (22.5%) and Postgraduate (13.1%). Majority of the respondents sampled in FUNAAB were administrative staff (74.3%) while in Federal Medical Centre (FMC) were Nurse (89.1%). Results also revealed respondents' awareness of pointillism painting wall hangings as majority in FUNAAB (66.7%) and FMC (69.1%) with mean ($\bar{x}$=1.35)

have come across pointillism painting, ($\bar{x}$=1.38) indicated that they have seen similar paintings somewhere, aware of the use of painting for interior decoration ($\bar{x}$=1.44), however they do not know the materials used for these pointillism paintings ($\bar{x}$=0.94), and do not have similar painting in both organization ($\bar{x}$ =0.86). The average mean score ($\bar{\bar{x}}$=1.12), indicates that respondents were aware of pointillism painting wall hangings even though they do not know the materials used and how it was produced. The result further revealed respondents' acceptability of the pointillism wall hanging as a means of communication each factor; uniqueness: FMC ($\bar{x}$= 3.04) and FUNAAB ($\bar{x}$= 2.53); suitability: FMC ($\bar{x}$= 2.89) and FUNAAB ($\bar{x}$= 2.42); communication: FMC ($\bar{x}$= 2.93) and FUNAAB ($\bar{x}$= 2.91); appearance: FMC ($\bar{x}$= 3.05) and FUNAAB ($\bar{x}$= 2.87); taste (appeal to the sensitivity of respondents regarding articles of interior decoration): FMC ($\bar{x}$= 2.69) and FUNAAB ($\bar{x}$= 2.83), and marketing: ($\bar{x}$= 3.39) and ($\bar{x}$= 2.87) for FMC and FUNAAB respectively. The overall acceptability score ($\bar{\bar{x}}$ = 2.87 implied that the pointillism wall hangings were acceptable. The chi-square result of the hypothesis at p >0.5 reveals that there is no significant relationship between the socio-economic characteristics (gender (χ^2 = 0.003); marital status (χ^2 =3.582); educational qualification (χ^2=1.623); occupation (χ^2=1.467); place of work (χ^2 =2.195)) of respondents and awareness of respondents on pointillism painting. The study concluded that majority of the respondents were aware of pointillism wall hanging as a means of communication, many of the respondents accepted the use of pointillism painting for interior decoration in the sampled area as they can be used to teach and send signal or communicate effectively to someone in any organization.

Key words: aesthetics, decoration, pointillism, interior, organization, Communication

SİLLS GAP İN UNDERGRADUATES FİSHERİES TRAİNİNG PROGRAMMES İN NİGERİA: CASE STUDY OF UNİVERSİTY OF PORT HARCOURT

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ABSTRACT
Nigeria's fisheries sector is growing very rapidly and therefore, requires an efficient and skilled workforce. The Bachelor of Fisheries programme of universities in Nigeria were designed to meet the manpower needs of the industry, comprising of aquaculture, capture fisheries, processing, marketing among others. A questionnaire was designed to assess undergraduates understanding of soft skills required for successful career in fisheries. The study population was made up of 12 lecturers and 90 students of the Department of fisheries, University Port Harcourt. 49 soft skills were identified and clustered into seven groups. 47 out the 49 skills were considered very important by both lecturers and students. However, there was difference in perception between the students and lecturers in six out of the seven cluster groups of soft skills. It is anticipated that the information from this study will assist redesigning the Bachelor of Fisheries programme and reposition it to meet the entrepreneurial mandate.

Keywords: Skills gap, soft skills clusters, professional competence, Bachelor of Fisheries

OPPRESSİON AND REVOLUTİON İN İN KURT WIMMER'S FILM, „EQUILIBRIUM"

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ABSTRACT
This presentation analyses how Kurt Wimmer's dystopian film, „Equilibrium", depicts various kinds of abuse exercised by a totalitarian power over its citizens in order to transform them into a mass of pliable material. In order to obtain total control over the bodies and minds of the people, the authority employs different repressive techniques: prescribed social functions, strict routine, surveillance, indoctrination, suppression of human emotions, disruption of personal relations, manipulation of history, etc. A revolution becomes necessary for the dystopian citizens to regain their humanity and their future.

ENGLISH LANGUAGE LEARNING AND CULTURE CLASH: CAN THE HURDLES TO EMPOWERMENT BE OVERCOME?

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ABSTRACT
The investigator, a teacher educator by profession has often seen students from low socio-economic backgrounds struggle to master a second language like English which is increasingly perceived as a passport to success in the 21st century. But the struggle from an impoverished background sans input of 'high culture' and perhaps values too can become a great hurdle to empowerment. Is there a solution? Can teachers of English who teach a language which has a cultural baggage help in the process? Has the time come for personal counseling with regard to attitude and motivation for learning and mastering English? Can a pragmatic approach to nurture in learners the love for English with aspects related to its culture and universal values help solve some of the problems one tends to see? This paper explores the issues, identifies the nature of the problem, and attempts to answer the questions posed by drawing on findings of recent studies related to ESL. It is hoped that the workable solutions proposed by the investigator is food for thought and trigger for future research and designing of effective sustainable English language empowerment programmes.

Key words: Culture, Disadvantaged, English Language, Empowerment, Sustainable

AUDIT ATTRIBUTES ON EARNINGS SMOOTHING OF QUOTED INDUSTRIAL GOODS COMPANIES IN NIGERIA

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ABSTRACT
This study examined the effect of audit attributes (using industry specialized auditor, total audit fees, audit tenure, and audit firm size) on earnings smoothing of industrial goods sector in Nigeria. Ex-post facto, correlation and longitudinal research design was employed and Panel Least Square (PLS) technique was used in the analysis of the secondary data collected from a sample of 10 firms for a period of ten years spanning (2011-2020). The Panel dataset for the variables of the study were sourced from the annual reports of the selected industrial goods companies, and were subjected to preliminary data tests such as descriptive statistics, Pearson correlation analysis and variance inflation factor (VIF), to ensure it meets the conditions stipulated by theory. The study employed the linear panel regression modeling approach which was estimated using the E-views statistical software. The empirical analysis using a total of 100 company-year observations, shows that auditor tenure exert positive and significant effects on earnings smoothing of quoted industrial goods companies in Nigeria at 5% level of significance while a negative but non-significant effect was documented for industry specialized audit and audit firm size. Again, it was discovered that audit fee has negative effect on earnings smoothing of industrial goods companies in Nigeria but was significant at 10%. Generally, the value of R- squared which is the coefficient of determination stood at 40.2% which implies that 40.2% of the systematic variations in the dependent variable were explained by the explanatory variables employed in the model while the remaining 59.8% were captured by the stochastic error term. In line with the above findings, this study therefore recommends among others that, long tenure of auditor should be discouraged while the maximum three years audit firm tenure policy of professional requirement for auditors in Nigeria should be backed up by law and strictly enforced. We therefore conclude that audit firms should reexamine the core reason for their existence and the ethical rationale behind the legislative mandate that all quoted companies engage their services in other to curb earnings smoothing to its barest minimum.

Keywords: Audit attributes and earnings smoothing

IMPACT OF SOCİO- CULTURAL FACTORS ON NUTRİTİONAL STATUS OF MOTHER AND CHİLDREN İN PUNJAB, PAKİSTAN.

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ABSTRACT

Pakistan has been reported to have one of the highest rates of maternal and infant malnutrition globally. It is known widely that malnutrition is one of the main factors contributing to morbidity and death in children. Malnutrition is a contributing factor in more than one-third of under-five child fatalities. The current study examined the major socioeconomic, cultural, and nutritional factors that contribute to maternal and child malnutrition. A sample of 600 qualified mothers was questioned using a structured interview process for a quantitative study. In-depth interviews and focus group discussions with informants (mothers) were conducted for the qualitative investigation. The quantitative study's findings revealed that majority of female about 44.9% thought that unfair distribution of resources is one of the major reasons of their poor nutritional condition. About 48.5% respondents thought that they are malnourished because they always took meal at last of their family members. Majority of mothers like about 63% thought that their child's nutrition is linked with their educational status. About 28.8% mothers think that the girls are still considered as economic burden on family. Almost 47.8% mothers responded that mother's autonomy affect the nutritional status of both mother and child in a household. 38% mothers pointed out that domestic violence is still among the major factor of malnutrition in mother and children. Universe of the investigation were the provincial zones of District Faisalabad, Multan and Rawalpindi. Socio-economic status does affect mother and child health. To reach the goal of eradicating Pakistan's malnutrition problem, the government should pay special attention to improving the literacy rate, standard of living, health, and hygienic practices. The nutritional status of women and children must be improved by broad campaigns including policymakers, administrators, community health workers, and medical personnel at all levels.

ULUSLARARASI HUKUK BAĞLAMINDA SREBRENİTSA SOYKIRIMININ VE ULUSLARARASI AKTÖRLERİN SOYKIRIM VE SONRASINA DAİR TUTUMLARININ DEĞERLENDİRİLMESİ

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ÖZET
II. Dünya Savaşı sırasında Alman ve Japon askerleri tarafından işlenen savaş suçları ile Naziler'in bir ırk olarak tanımladıkları Yahudiler ve başka birtakım azınlık gruplara karşı onları yok etme kastıyla gerçekleştirdiği toplu kıyımlar, Birleşmiş Milletler ("BM") Genel Kurulu tarafından 1948 tarihinde kabul edilip 1951 yılında yürürlüğe giren, Soykırım Suçunun Önlenmesi ve Cezalandırılması Sözleşmesi'nin ("Soykırım Sözleşmesi") ortaya çıkmasında en önemli etkenler olarak görülmektedir. BM tarafından 1948 tarihinde kabul edilen İnsan Hakları Evrensel Bildirisi ve arkasından gelen Soykırım Sözleşmesi'nin, uluslararası toplumun II. Dünya Savaşı'nda gerçekleşen vahşetin bir daha asla ("never again") yaşanmaması yönündeki iradesini ortaya koyduğu belirtilmiştir. Bununla birlikte, 1995 yılında Sırplar tarafından Srebrenitsa'da Müslüman Boşnak halkına karşı, tüm dünyanın huzurunda alenen gerçekleştirilen soykırım, BM ve uluslararası toplumun diğer üyelerinin söylemleri ile davranışları arasındaki çelişkiyi net olarak ortaya koymaktadır. "Güvenli Bölge" ilan edilen ve BM Barışgücü UNPROFOR askerleri ile NATO'nun sözde koruması altındaki Srebrenitsa'da Bosna Sırp ordusu tarafından gerçekleştirilen katliam, en az 8.372 Bosnalı'nın vahşice öldürülmesi; pek çok kişinin de tecavüz ve işkence gibi insanlık dışı muamelelere maruz kalmasıyla sonuçlanmış ve uluslararası hukuktaki soykırım tanımı çerçevesinde, tartışmasız olarak "soykırım" şeklinde nitelendirilmesi gereken bir olaydır. Srebrenitsa soykırımı, gerek gerçekleştiği sırada, gerekse gerçekleşmesinden sonra, başta "uluslararası barış ve güvenliğin teminatı" ve Soykırım Sözleşmesi'nin yaratıcısı konumundaki BM olmak üzere, uluslararası toplumun güç sahibi üyelerinin hipokratik tutumunu ortaya koyması yönünden ayrı bir önem taşımaktadır. Bu bildiri ile Srebrenitsa soykırımı uluslararası hukuk bağlamında incelenecek ve uluslararası aktörlerin bu soykırımda ne şekilde rol aldıkları, nelere sebep oldukları, soykırımdaki payları, yapmaları gerekirken yapmadıkları ve sair hususlar üzerinden bir değerlendirme yapılacaktır.

Anahtar Kelimeler: Soykırım, Soykırım Suçunun Önlenmesi ve Cezalandırılması Sözleşmesi, Srebrenitsa Soykırımı, Birleşmiş Milletler

AN EVALUATION OF THE SREBRENICA GENOCIDE AND THE ATTITUDES OF INTERNATIONAL ACTORS DURING AND AFTER THE GENOCIDE IN THE CONTEXT OF INTERNATIONAL LAW

ABSTRACT

The war crimes committed by German and Japanese soldiers during World War II, and massacres of Jews and other minority groups, with the intent to destroy them, are seen as the most important factors in the enactment of the Convention on the Prevention and Punishment of the Crime of Genocide ("Genocide Convention"), which was accepted by the United Nations ("UN") General Assembly in 1948, and came into force in 1951. It has been stated that the Universal Declaration of Human Rights adopted by the UN in 1948 and the following Genocide Convention, have revealed the attitude of the international community towards the atrocities committed in World War II, which was also summed up in the phrase "never again". However, the genocide that was carried out explicitly by the Serbs against the Muslim Bosniak people in Srebrenica for all the World to see in 1995, clearly reveals the contradiction between the discourses and behaviors of the UN and other members of the international community. The massacre, carried out by the Bosnian Serb Army in Srebrenica, where was declared a "Safe Zone" and under the so-called protection of UN Peacekeeping UNPROFOR soldiers and NATO, was an event that has resulted in brutal killing of at least 8,372 Bosnians and also inhumane treatment, such as rape and torture, of many more. What happened in Srebrenica, should be described as "genocide" without question within the framework of the definition of genocide in international law. The Srebrenica genocide, both during and after its occurrence, is of particular importance in terms of revealing the hypocratic attitude of the powerful members of the international community, especially the UN, which is the "guarantee of international peace and security" and the creator of the Genocide Convention. With this study, the Srebrenica genocide will be examined in the context of international law and an evaluation will be made on how the international actors took part in this genocide; what they caused, their share in the genocide, what they did not do when they should have done, and so on.

Keywords: Genocide, Convention on the Prevention and Punishment of the Crime of Genocide, Srebrenica Genocide, United Nations

MARMARAY HATTININ BULANIK TALEPLERLE ÇİZELGE VE ENERJİ TÜKETİMİ OPTİMİZASYONU

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ÖZET

İstanbul ilinin artan nüfusu ile büyük bir sorun haline gelen ulaşım sistemi zaman zaman yetersiz kalmaktadır. Özellikle iki kıtayı birbirine bağlayan köprülerin güzergahında meydana gelen trafik yoğunluğu, İstanbul'da yaşayan insanları, köprü güzergahını kullanmasalar dahi büyük bir zaman kaybının içine çekmektedir. Bu durum da şehir içi trafikten bağımsız olan ulaşım araçlarının önemini gündeme getirmektedir. Bunların başında yer alan raylı sistemler, yoğun talep görmektedir. Özellikle Anadolu ve Avrupa yakası arasında hizmet veren Marmaray hattı, şehir içi ulaşımın çok önemli bir parçasını oluşturmaktadır. Mevcut durumda hizmet veren trenler ve seferler, artan taleplerle ve pandemi etkisinin geride kalmasıyla, özellikle işe gidiş ve işten çıkış saatlerinde çok yoğun ve zaman zaman da yetersiz kalmaktadır. Bu çalışmada, yolcu sayılarının bulanık sayılarla ifade edildiği çok amaçlı bir optimizasyon modeli kurulmuştur. Bu model, belirlenen 2 farklı strateji ile çözümlenmiş ve belirlenen stratejilerden optimal değerleri veren strateji belirlenerek trenlerin kapasiteleri ve çalışma saatleri yeniden düzenlenerek optimal çizelge elde edilmeye çalışılmıştır. Belirlenen stratejiler hem yolcuların yolculuk sürelerini ve istasyonda bekleme sürelerini hem de işletmenin operasyonel maliyetini göz önüne alarak geliştirilmiştir. Stratejileren birisi trenlerin frekanslarını değiştirmek, diğeri ise hizmet veren trenlerin kapasitesini arttırmak veya azaltmak olmuştur. Bu stratejilere göre model, var olan çalışma sistemiyle ve belirlenen iki stratejinin koşulları ile çözülmüş ve üç durum karşılaştırılmıştır. Aynı zamanda trenlerin enerji tüketimi de göz önünde bulundurularak, enerji tüketimi minimum seviyede tutulmaya çalışılmıştır. Kurulan modelde dört farklı amaç fonksiyonuna yer verilmiş ve bu amaç fonksiyonlarının karar değişkenleri, istasyon yoğunluk oranı, tren yoğunluk oranı, yolcu hacmi ve enerji tüketimi şeklindedir. Dört farklı amaç fonksiyonunu tek bir amaç fonksiyonu olarak ifade edilebilmesi için kullanılan ideal nokta uzlaştırıcı yönteminde, her bir amaç fonksiyonuna optimal ağırlıklar atanmıştır. Belirlenen karar değişkenleri ile ifade edilen amaç fonksiyonlarından, her birinin ağırlığı, DEMATEL tekniği ile belirlenmiştir. Nihayet elde edilen çok amaçlı optimizasyon probleminin tek bir amaç fonksiyonuna indirgenmesi sonucu ortaya çıkan optimizasyon problemi, MATLAB'de genetik algoritma ile optimize edilmiştir.

Anahtar Kelimeler: Çizelge Optimizasyonu, Bulanık Sayılar, Genetik Algoritma, Şehir içi Ulaşım, Raylı Sistemler, Marmaray

MARMARAY TIMETABLE AND ENERGY CONSUMPTION OPTIMIZATION WITH FUZZY PASSENGER ARRIVAL-ALIGHTING RATES

ABSTRACT

The transportation system, which has become a big problem with the increasing population of the city of Istanbul, is inadequate from time to time. The traffic density, especially on the route of the bridges connecting the two continents, draws people living in Istanbul into a great waste of time, even if they do not use the bridge route. This situation brings the importance of transportation vehicles, which are independent of urban traffic, to the agenda. Railway systems which is the most important transportation systems among the others are in high demand. The Marmaray line, which serves between the Anatolian and European sides, constitutes a very important part of urban transportation. Trains and expeditions serving in the current situation are very busy and sometimes insufficient, especially the hours when people go to work and go back to home which means peak hours, with increasing demands and the effect of the pandemic being left behind. In this study, a multi-objective optimization model was established in which passenger numbers are expressed with fuzzy numbers. This model was analyzed with 2 different strategies determined, and an optimal schedule was tried to be obtained by determining the strategy that gives the optimal values from the determined strategies and rearranging the capacities and working hours of the trains. The determined strategies have been developed by considering both the journey times of the passengers and the waiting time at the station, as well as the operational cost of the business. One of the strategies was to change the frequencies of the trains, and the other was to increase or decrease the capacity of the serving trains. According to these strategies, the model was solved with the existing working system and the conditions of the two strategies determined, and the three cases were compared. At the same time, considering the energy consumption of the trains, the energy consumption was tried to be kept at a minimum level. In the established model, four different objective functions are included and the decision variables of these objective functions are station density ratio, train density ratio, passenger volume and energy consumption. In the ideal point compromise method, which is used to express four different objective functions as a single objective function, optimal weights are assigned to each objective function. The weight of each of the objective functions expressed with the determined decision variables was determined by the DEMATEL technique. Finally, the optimization problem, which is the result of reducing the multi-objective optimization problem to a single objective function, has been optimized by genetic algorithm in MATLAB.

Keywords: Timetable Scheduling, Fuzzy Logic, Genetic Algorithm, Urban Transportation, Railway Systems, Marmaray

STATISTICAL ANALYSIS OF CRIME RATE AND PRISON POPULATION IN NIGERIA

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ASBTRACT
Humans and society are vulnerable to criminality, and criminality can be compared to oil that can stain a white garment when it comes into contact with it. As a result, it is impossible for any society to claim to be completely free of crime. Crook behavior patterns are determined by a society's social and economic development. As a result, it is no longer surprising in a developing society to see an increase in violent crimes such as armed theft, politically motivated killings, the use of illegal guns, ethnic and spiritual conflicts, and so on. Secondary records were used to investigate the relationship between the crime rate and the number of jail inmates in Nigeria. The statistics were based on various crimes committed over the course of a year and were obtained from the National Bureau of Statistics. Analysis was accomplished with the use of a couple of linear regressions version. From the result it suggests that the pinnacle five states with the best quantity of criminals and prison populations are Lagos, Rivers, Delta, Abuja and Kano States. From the descriptive statistics, it was observed that all the crimes are significant with the R-squared value of 0.7249 and the P value of 1.354e-0.8. With these results, it was concluded that every aspect of the country is corrupt. This shows that it is not only the youths who are unemployed in Nigeria are involved in crime, even those in authority also commit crime.

Keywords: Crime, Prison, Population, Corruption, Violent, Regression Analysis.

AVRUPA BÜTÜNLEŞMESİNİN GELECEĞİ: AB'NİN UKRAYNA DÖNEMECİ

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ÖZET

Avrupa'nın geleceği, son yıllarda Avrupa Birliği kurumlarını ve üye ülke siyasilerini belki de en fazla meşgul eden konulardan birisidir. 2000'li yılların başlarından beri çeşitli krizlerle mücadele etmek zorunda kalan Avrupa Birliği (AB), son olarak özellikle Avrupa vatandaşlarının kararlara katılım olanaklarını genişletmeye yönelik birçok etkinlik düzenleyerek uzun zamandır AB ülkelerinde tartışılan demokrasi açığına bir çare bulmaya çalışmıştır. Daha bu tartışmalar bitmeden geçtiğimiz şubat ayında Rusya'nın Ukrayna'ya saldırması, Avrupa'da birçok açığın daha ortaya çıkmasına neden olmuştur: Avrupa Birliği'nde güvenlik açığı, NATO'ya ve bununla birlikte ABD'ye bağımlılık ve enerji konusunda Rusya'ya bağımlılık bunlardan sadece birkaçıdır. Ancak Rusya-Ukrayna savaşı Avrupa Birliği'ne, bütünleşmenin "tarihe karşı konuşlandırılmış bir proje" olarak, savaşları ve diğer çatışmaları önleme misyonunu unutturarak, Ukrayna'yı var gücüyle desteklemeye yöneltmiştir. Bu yüzyılın başlarından beri tekrar tekrar şiddetlenen Rusya-Ukrayna krizi önce "Turuncu Devrimi" beraberinde getirmiş, onu takiben Rusya Ukrayna'ya birtakım ekonomik yaptırımlar uygulamıştır. AB ile yakınlaşmayı kafaya koyan Ukrayna, 2014'teki Maidan Hareketi'nin bedelini ise Kırım'ın ilhakı ile ödemek zorunda kalmıştır. Rusya'nın 24 Şubat'tan bu yana Ukrayna'ya karşı sürdürdüğü savaş, misyonu savaşları önlemek olan AB'nin, savaşa neden olan bir AB'ye doğru mu evriliyor sorusunun sorulmasına neden olmuştur. Ayrıca açıkça olmasa da AB'nin savaşa kısmen taraf olarak Ukrayna'ya önemli mali yardımda bulunması ve savaş malzemesi teminine katkı sunması gözden kaçmamıştır. Rusya-Ukrayna krizi AB'nin bir başka ilkesini daha unutturarak savaş halinde bulunan Ukrayna'nın AB'ye üyelik başvurusunu hızlıca işleme koyarak, ülkeyi Moldova ile birlikte aday ülke ilan etmiştir. Literatür ve basın taraması yoluyla bu çalışma, Rusya-Ukrayna savaşının siyasi bütünleşmeyi hedefleyen AB'nin geleceğini nasıl etkileyeceği konusunu tartışacaktır.

CHALLENGES AND OPPORTUNİTİES OF APPLYİNG DECENT WORK İN AFGHANİSTAN

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ABSTRACT
Afghanistan is one of those countries which is focused by International Labor Organization (ILO) to facilitate job creation opportunities and applying "decent work" for Afghan male and women through different projects and interventions. This research is an attempt to find out the challenges and opportunities of applying decent work standards and rules in Afghanistan. The research design is a qualitative data and the research technique which is used in this study is Delphi technique to handle opinions rather than objective facts. A Delphi study is an appropriate research design for structuring a group communication process for allowing individuals to deal with complex problems which is considered in this research. The research findings show that, worst situation of economic infrastructure like transportation, electricity power, reducing the international trade, economic crisis and collapsing of financial and banking services, political instability, high unemployment rate, lack of professional employees' skills, isolation of Taliban new government in international communities are the main challenges of decent work applying in Afghanistan. The other challenges which also mentioned by the respondents are lack of monitoring and supervision by the government, lack of action plan to apply decent work standards in national level, lack and/or shortage of awareness about workers/employees' rights, absence of proper justice system to defend the workers' right. The finding also elaborates that young population of the country, existence of labor law and reducing corruption in Islamic emirate of Afghanistan are the opportunities affecting decent work applying in Afghanistan.

Keywords: Decent work, Challenges of applying decent work, opportunities of applying decent work

ON THE COMMUTATİVİTY DEGREE OF FİNİTE GROUP FOR

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ABSTRACT

Let be a finite group. The commutativity degree of, written, is defined as the ratio Pournaki et al. have studied and generalized this concept for the group and as follows: In this paper, we consider the following finitely presented group Then, by using the numerical solutions of the equation, we derive formula for calculating the probability of where G is a two generated group of nilpotency class 2.

Keywords: commutativity degree, finite group

"ADULTERY LAWS – AN ASSESSMENT UNDER INTERNATIONAL DOMAIN"

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ABSTRACT
The two mainstays of humankind, men and women have equivalent significance in evolution and advancement of the society, whereas law and legal system is a tool to social change. With lapse of time, a swap in system of society is necessary; otherwise, the effect will be outrageous. Law guarantees justice to cluster who are hegemonies or ill-treated in the society. Likewise, the concept of "Adultery" is highly debatable on the basis of point that "adultery is criminal offence or not?". Adultery is a consented sexual relation between individual who is married and the other is not the spouse of individual who is engaged in adulterous relation. In simple parlance, it can be said as extramarital affair with the party who is not spouse, married or unmarried and at extent it is considered as off putting in context of social norms. The provisions and the sensibility relating to adultery varies through each country. The criminal law definition of adultery maybe superficially genders neutral but adultery by men or women, both are prohibited in preponderance spaces. In context of religion, tradition, culture as well in some antiquity, the nature of adultery is discriminatory. In religious text like Bhagwat Gita, Bible and Quran, adultery is considered as heinous offence which is against the nature. With time frame modern society is moulding with modern thoughts and at tail end there is a reverberation of social change. Endorsement towards social change and giving rubber stamp to it is quite stiff. Correspondingly, in some country's adultery is a criminal offence and on the other side some western countries disfavour adultery as criminal offence. In many jurisdictions where adultery is decriminalized, it is still ground for divorce. The concept of adultery also comprises of issues that "status of child born out of adulterous relation would be?". Furthermore, it also leads to violation of fundamental rights of a person by not giving them the choice to live with or have a sexual relation with a person of their choice and making it a criminal offence. Hence the paper is enthralled to comparatively analyse "Adultery" laws at international sphere.

Keywords: Adultery, decriminalization, matrimonial affair

DEVELOPİNG LİGHTWEİGHT GEOPOLYMER CONCRETE USİNG LECA

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ABSTRACT
The concept of Sustainable development in construction industry brings in the use of waste and recycled materials like Fly-ash and slag, which are used to produce comparatively greener concrete in presence of alkaline activators like sodium silicate and sodium hydroxide, that can help achieve high strength concrete. Sustainability does not only pertain to using green materials or by-products to reduce embodied energy and carbon emission of the product itself, but it also relates to reduction of these two associated indirectly with the product like, transportation, placing, handling and maintenance. To work on these aspects as well, the need to reduce the weight of concrete is must which in turn directly affects these factors. The idea to use lightweight expanded clay aggregate is to reduce the overall weight of concrete. The compressive strength parameter is studied on cubes by replacing cement, which is completely replaced by 50% fly-ash and 50% GGBS as binders and strength development through polymerization is studied for 12 molarity of NaOH solution under ambient temperature. From the study of compressive and flexural strength parameters of lightweight geopolymer concrete made with LECA, it is observed that up to M35 grade concrete can be produced at a density range of 1950 – 2000 kg/m3. The compressive strength of about 38 N/mm2 can be achieved at 28 days with a density of 2100 kg/m3. While the concrete behaves poorly in flexural strength due to shear failure of LECA before conventional aggregates. From this, it is revealed that geopolymer concrete and lightweight geopolymer concrete can be used for non-structural elements in future respectively.

Keywords: Geopolymer, Fly Ash, Slag, Compressive strength, Alkaline Activators, Molarity, Ambient Temperature, Polymerisation, LECA, Lighweight

PREVENTİVE EDUCATİON ON DRUG ABUSE: NEED OF THE DAY FOR HUMAN RİGHTS

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ABSTRACT

Education is a tool for social reform which includes various steps starting from knowledge to empowerment and evaluation. Providing knowledge about the adverse consequences of consumption of illicit drugs and substances could be a strong tool against the evil of drug abuse. drug trafficking, trade and consumption are eating in to vitals of society. Drug consumption paralyses the mind, cripples the body and retards the intellect and ultimately affecting the growth of the nation. Many folds it degrades and plays with human rights like Right to health, Privacy, social security, food, dignified life and Freedom from arbitrary arrest, confinement, inhuman punishment, torture etc. Education in our country is a fundamental right and supported by the legal mechanism. This is the time when the same can be used as a preventive tool for the prevention of drug and substance abuse and protection of various human rights in India. At the school level this will be more suitable to introduce in the country and with the help of legal mechanisms. Therefore, in view of this, the present research work analyses the present system and also works for the required system. It also focuses on the adoption of preventive education as a tool and by way of law at school level. Risk of bias: There is no risk of bias because the quality of data is repetitively back checked physically and telephonic. Results: Results came as 92% respondents have admitted that preventive education could be an effective tool to combat the problem of drug abuse. Due care, guidance etc. could be panacea for difficult disease of drug abuse and protect the human rights better.

Objectives: The main objectives of the study are as following: Assessment of problem of drug abuse. To evaluate the availability, importance, scope of preventive education at School level.

Research Methodology Location; The study is confined to the various Upper Primary schools, Anand Path De addiction center, Barabanki of Uttar Pradesh India. Sample Size Randomly 25 teachers at higher secondary schools' level, Barabanki district, Uttar Pradesh and 25 drug users were interviewed for facilitating the purpose after the consent. The convenient method of sampling was used for the purpose of collection of data. Tool An interview schedule was used for conducting the interviews.

Keywords: Drug and Substance abuse, Education, Legal Mechanism, Society, Schools.

MOBİLE PHONE: A BOON TO HEALTH COMMUNİCATİON İN INDİA

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ABSTRACT

The legendary invention of mobile phone along with extraordinary facility of internet, has nuclearized the entire world in the hands. One click can connect an individual to different personals. From kids to old, it caters all ages of users. The increasing adaptation of mobile phone and internet users has prorogued a new era of information. Marshall McLuhan's concept of "technological determinism" is explicitly visible and experienced. Mobile phone has shaped the behaviour/ way we search, connect, relate and manifest. The more we are diving onto future, the more we advancing in both technology and information. The veracity in the usage of mobile phones took an upsurge in pandemic. When the entire world was suffering to survive deadly Corona virus, m-health (Mobile Health) services saved people to a great extent. 'M-health' or 'Mobile Health' is an emerging practice which covers healthcare promotion, treatment compliance, emergency management, mobile telemedicine etc. In rural India, mobile phone communication system is used and promoted even by the government hospitals for better service. Phone call reminders, tracking system, vaccination messages, polio drops updates etc are the facilities that are encouraged and practiced. Around 877 million wireless subscribers across the world, Indian stands on second place in terms of wireless communication subscribers. Along with that cheap tariff offers paves the way for m-health to flourish in India. This paper aims to thematically analyse the emergence and promotion of mobile phone as a tool of health communication in India which will come out with the journey, success and challenges of m-health in India so far.

METHANE EMİSSİON FROM ANİMALS AND İTS ENVİRONMENTAL CONSEQUENCES

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ABSTRACT
Cities are expanding to accommodate swiftly increasing human population and large areas of beautiful land scape are being converted to residential areas for living. Urbanization is rapidly increasing with the passage of time and there is huge pressure on environmental health and natural ecosystem. This is also detrimental to natural behavior of many species as well. Due to urbanization less land will be available to meet the food requirements in future and may be a big challenge to food security. Sustainable livestock production can combat this threat as it can play a vital role to meet food security problem. To get milk and meat requirements, animals with high production performance are desirable to rear rather huge numbers to increase production. But animals are also affecting environment health in shape of greenhouse gases which can increase atmospheric temperature as the livestock contributes about 18% of total greenhouse gas emission having major portion of methane which is 23 times stronger than carbon dioxide gas for producing greenhouse effect. Emission of gases from livestock is greater than emission of gases in all form of transportation. Moreover, up to 12% of consumed feed energy is lost due to formation of methane gas in ruminants which is considerable loss of natural resource and animal is unable to use it. Various plants extracts can be used as feed additives which are economical and nontoxic with the features to improve rumen fermentation and reduce methane emission. Different researchers are trying to contribute in this aspect to reduce methane emission from livestock and improve environment health. Black seeds (Nigella sativa), red algae, lemon extract, garlic and other plant extracts are being used in different experiments to evaluate their efficacy on methane emission for sustainable livestock production with minimal environmental hazard.

Key words: Urbanization, Environment health, Food security, Sustainable livestock production, Greenhouse effect, Methane emission, Plant extracts

IMPLICATIONS OF STREET TRADING ON THE VISUAL STREETSCAPES OF AN URBAN CITY CENTRE IN NIGERIA

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ABSTRACT
The main thrust of this paper is to evaluate the effect of street trading on the visual streetscapes of Jos City Centre, Nigeria. Field surveys by questionnaire and observation techniques were the main tools of data collection while secondary data were collected from relevant literatures. 133 questionnaires was distributed to street vendors, 99 were retrieved and used for final analysis. It was observed that encroachment of the streetscapes by traders is responsible for defacing of building facades, obstruction of perspective view, poor sanitary conditions, urban amenity disfiguring, accumulation of solid wastes on Splitter Island of the road and other related matters. The study recommends that enforcement should be made on existing laws from town planning authority on the trading of goods openly on the roads and land mark areas within the city Centre and more trading shops be provided, along with provision of sustainable waste management machinery.

Keywords: City centre, Streetscapes, Urban, Visual

ANTI FUNGAL ACTIVITY OF AZADIRACHTA INDICA ESSENTIAL OIL ON SEVERAL SELECTED Aspergillus SPECIES

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ABSTRACT
Plant essential oils are a rich source of new antimicrobial agents. Therefore, this study aimed to evaluate the antifungal activity of different oils extracted from A.indica on several Aspergillus species. A cold maceration process was used to extract the oil using n-Hexane, petroleum ether and methanol based on polarity. Phytochemical screening was performed using standard scientific methods. Antifungal activity was tested using the agar well diffusion method and the minimum inhibitory concentration (MIC) and minimum fungicidal concentration (MFC) using the broth dilution method. The results of the phytochemical screening showed the presence of steroids, anthraquinones and cardial glycosides while terpenes, tannins, saponins and carbohydrates were absent in all the oils. At $P \leq 0.05$ there was a significant difference in the antifungal activity with the methanolic oil having the highest activities on A.niger 0.00±0.00-12.53±0.47, A.fumigatus 0.00±0.00-7.36±0.35 and A.terrues 0.00±0.00-18.54±0.00, while the petroleum ether had activity only on A.terreus 0.00±0.00-8.97±0.71 and A.flavus 0.00±0.00- 11.90±0.59. n-Hexane did not affect any species of Aspergillus. The results of the MIC and MFC showed that the methanolic oil had MIC of 50% and MFC of 100% on A.niger and MIC of 25% and MFC of 50% on A.terreus, while the petroleum ether had MIC of 50% and MFC of 100% on A.terreus and MIC of 25% and MFC of 50% on A.flavus. The results of this research support the use of essential oils in folk medicine.

Keywords: Aspergillus species, antifungal activity, phytochemical screening, polarity.

DISCOVERIES AT LIVIAS NEAR SITE OF JESUS BAPTISM-JORDAN SOUTHERN LEVANT

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ABSTRACT
The Jordanian experts and private sector are implementing a development plan of the area so called historically Livia's near Wadi al-Kufrayn and Wadi Rama to the northern part of the Dead Sea in the lowest spot-on earth. This requires a cultural resources impact assessment during the project phases to avoid any expected threats to the existed and limited archaeological sites found during previous investigations conducted in the area during the past years. In addition, the Ministry of Tourism and Antiquities (MOTA) is about to finish the rehabilitation process of the Christian pilgrim's road to link Site of Jesus Baptism with Mount Nebo on the eastern side of Jordan River. The pilgrim's road passing through several historical and cultural heritage sites such as Tell Hammam, Tell Kufrayn, Tell Rama and Khirbet Kufrayn sites. A series of assessment operations was organized by the team of the study to prepare a more precise assessment about the presence of previously unrecognized archaeological remains in the area, to coordinate with the stakeholders several solutions to protect the discovered sites. The surveys, test soundings and excavations conducted in the Wadi al-Kufrayn since 1997 till nowadays have revealed a long sequence of occupation in Livia's and along the wadi. While more work is needed to fully understand human and environmental relationships during different periods, the results of the field work in Livia's and Wadi al-Kufrayn fill some gaps in the archaeological record of the area. The presence of a Hellenistic sites in Wadi al-Kufrayn are new additions to the early history of Jordan Valley and the the whole southern al-Ghor.

Keywords: Archaeology, Development, Route, Heritage.

TECH-ENABLED INVESTIGATIVE TECHNIQUES IN HUMAN TRAFFICKING: THE PHASED APPROACH

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ABSTRACT
In an epoch of information technology crime and criminals have strikingly escalated beyond geographic boundaries enabling illegal and inhuman activities amounting to gross violation of human rights. Unfortunately, India, mapped as a source point, transit and destination of human trafficking targets, in the same time engendering opportunities for human traffickers as well. According to Crime in India Report 2020 records that sexual exploitation for prostitution, domestic servitude and forced labour happens to be three critical purposes steering the crime of human trafficking. Resorting to technology empowered methods have proved promising and effective in investigation and prosecution to impede trafficking of humans. Through data processing advanced analytic techniques data trends are studied to sketch the pattern of trafficking in practice. Tracking locations, tapping calls, recording conversations marks the determining role that technology holds. Instances reveal that facial recognition technology (FRT) has often assisted investigative officers to identify actual perpetrators and potential victims involved in the process of trafficking. In order to frame preventive strategies initiatives should be paved to foster technology assisted investigative mode in horrendous crimes especially in human trafficking. Using technology through phased manner attempts to identify traffickers globally posing challenge to perpetrators of crime. The objective of the study strives to report surge in conviction rate through technological intervention that can deter human trafficking crime. This paper seeks to broach on technology-based tools used in investigative process to combat and counter human trafficking while intensifying fear of perpetrators and extending assistance to victims.

Keywords: Technology, Human trafficking, Investigation, Victim Justice

FOR SUSTAINABLE HEALTHY LIFE TO BE GUARANTEED, INDIVIDUAL'S CONTRIBUTIONS TOWARDS HEALTH CARE DELIVERY NEEDS TO BE ADDRESSED

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ABSTRACT
Objectıves: The study was aımed at assessıng how the drug consumer's behavıour have contrıbuted to the maıntenance of drug revolvıng scheme (drs) ın ırepodun local government area, kwara state. descrıptıve research of survey method was used for the study. multı-stage sampling technique was adopted to select two hundred and fıfty (250) respondents from the drug consumers ın the eleven (11) selected health centres. researcher's structured questıonnaire was used to collect data and valıdated by experts ın the department of health educatıon. Pearson product moment correlatıon was used to obtaın a relıabılıty coefficıent of 0.75r.four traıned research assıstants were used by the reseacher to admınıster two hundred and fıfty (250) questıonnaires. frequency count and percentage were used to analyse demographıc data, the hypotheses formulated were tested wıth the ınferentıal statıstıcs of t-test usıng statıstıcal package for socıal scıence (spss) versıon 20.0 @ 0.05 alpha level of sıgnıficance. All the three hypotheses were rejected because all the calculated t-values(20.751,15.728 and 19.321) were greater than the crıtıcal values of 1.96 @ df=242. Thıs means that there ıs sıgnıficant dıfference ın the assessment of consumer's behavıour especıally the ageds that fınd ıt dıfficult to be ın a long que before drugs are beıng admınıstered on to them and the low ıncome earners that can't afford the prescrıbed drugs but rather prefer self medıcatıon. The recommendatıons made from the fındıngs were: consumers should attend semınars on drs to reduce non-complıance cases and health workers should stop sellıng subsıdızed drugs at non-subsıdızed prıce or packıng drugs to theır prıvate pharmacıes and also gıve the aged specıal treatments and attentıons so that they wıll not be leavıng the long que.

Keywords: Drs, consumer's behavıour, counterfeıt drugs, health workers and health centres

GLOBALIZATION AND FEATURES OF THE ENGLISH-LANGUAGE SCIENTIFIC DISCOURSE

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ABSTRACT
This article discusses the issues of linguistic globalization. Particular attention is paid to the study of the English-language scientific discourse. In the global scientific discourse, it is extremely important to equally take into account the interests of all participants in communication, each of which can bring their own linguistic developments to this area and thereby expand the overall inventory of available language tools. Today, all countries of the world are covered by the process of globalization to varying degrees. Specific areas of globalization are moral and ethical values, as well as the modern language situation. Globalization also has a linguistic aspect. It is unthinkable without finding a common language in the literal and figurative sense. Intensive scientific understanding of the relationship between language and globalization factors has begun relatively recently. The relationship between language and globalization in linguistics is currently undergoing intensive scientific reflection. If we want to create a global society, then a global language is needed, because language is a means of communication, a means of expressing thoughts. Language serves communication, it is the most official and socially recognized form of all types of communicative behavior. This means that when creating a global society, it is necessary to ensure the possibility of unhindered communication in this society. Due to globalization and the rapid development of information technology around the world, the demand for English has increased dramatically. Many researchers are unanimous in their opinion that English is currently the only contender for the role of a global language.

Keywords: intercultural communication, community, culture, translation, language

INTERCULTURAL COMMUNICATION AND TRANSLATION

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ABSTRACT
This article is devoted to the question of the role of translation as a means of intercultural communication. Particular attention is paid to the study of the difficulties that arise during translation in the process of intercultural communication. The current stage of development of the world community opens up new opportunities for cultural and intercultural communication. Today intercultural communication, widely interpreted as communication between representatives of different cultures, implies mutual understanding of participants in a communicative act belonging to different national cultures. Intercultural communication involves the communication of people with different cultural backgrounds and their behavior in such communication. When communicating with multilingual people, a certain common language is needed that would help them understand each other. In such cases, a possible way to communicate is through translation. Translation is a means of dialogue in the system of intercultural communication, reflecting the form, content, cultural and linguistic realities of the language of the source text, as far as possible with the help of equivalents of the target language. Any use of a linguistic sign in speech, including translation as a special type of speech activity, is potentially or directly communicative. First of all, translation is intended for intercultural communication. A qualitatively recoded text is needed, understandable to a native speaker of the target language, reflecting the main content of the source text, in order to have communication. The translation must be understandable to a native speaker of another culture. At the same time, you need to handle the unique style, features of the source text and color carefully. Only then we can talk about successful intercultural communication, in which translation is one of the most important components.

Keywords: intercultural communication, community, culture, translation, language

TEMPERAMENT, QUALİTY OF PARENT-CHİLD RELATİONSHİP AND ADJUSTMENT DİFFİCULTİES İN PRESCHOOLERS

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ABSTRACT
The purpose of the research was to investigate the relationship between Temperament, Quality of Parent-Child Relationship and Adjustment Difficulties in preschoolers. Correlation research design was used and through purposive sampling technique a total of 165 preschooler mothers having children within the age range of 4-6 years (M= 4.82 & SD= .73) were taken as participants from different shopping malls of Lahore, Pakistan. Three measures, indigenously developed scale for Adjustment difficulties, Children's Behavior Questionnaire (Very Short Forms) (Putnam & Rothbart, 2006) and Child-Parent Relationship Scale (Pianta, 1992) were used to measure the variables under consideration along with Demographic variables. The findings of the study revealed negative significant relationship between effortful control and quality of parent-child relationship, as well as between negative affect and adjustment difficulties in the said population. In terms of demographic variables, boys scored higher in adjustment difficulties in comparison to girls and children from government school had higher adjustment difficulties in comparison to those from private school. Likewise, mother's education has significant positive relationship with the adjustment difficulties of preschool children. Whereas age, family system, class and father's education did not appear to have a significant impact on the adjustment difficulties of children.

Keywords: Adjustment Difficulties, Preschoolers, Temperament, Quality of Parent-Child Relationship, Children-Behavior Questionnaire.

HISTORICAL PERSPECTIVES OF TRADITIONAL METHODS OF CONFLICT RESOLUTION IN ENOGHI COMMUNITY OF EPKACHE NKOME IN CROSS RIVER STATE NIGERIA FROM 1850-1976

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ABSTRACT
This research work is designed to investigate the Traditional Methods of Conflict Resolution that existed in Enoghi Community of Ekpache Nkome in Ikom Local Government Area of Cross River State, Nigeria from 1850 To 1976. The Era was chosen because it was the period at which the people witnessed early Europeans presence in the area to the period when Ikom was distinguished as a Local Government Area. This study is necessary because of the unprecedented challenge of communal wars ravaging communities of recent. It had been noticed that conflict was not alien to African society, it had been as ancient as the African society yet the societies were not destroyed. However, each society had developed its own methods of resolving conflicts prior to the advent of western methods. Amongst the people of Ekpache Nkome of Cross River State, Nigeria, various methods of conflicts resolution had been identified and practiced in pre-colonial Enoghi society before the advent of the Europeans that had upheld the community together before the modern society of today. In the course of the study, it was discovered that the old methods of conflicts resolution which are ingrain and common to the people are as important as the new practiced today hence the need to study these methods and show how it could be applied correctly in conflicts ravaging communities in today's world. Also. traditional methods of conflict resolution are a plethora of ways adopted by Africans to resolve conflict, and the study revealed a number of them which the people of Ekpache Nkome of Cross River State, Nigeria are already using, there are the community-based method, Mediation and Negotiation Methods. And, the Arbitration and Reconciliation methods were identified as not being alien the people of Ekpache Nkome community. These methods although are given modern names are not different in the actual sense of it but are only different in nomenclature, space and time. Also, it was discovered that why conflicts protract and result to violence or war it is because the people fear to use the modern methods as it takes longer time to arrive at a conclusion and it cost more. Thus, the work suggested a look back at the use of these various method in ways that the people or grassroots will be effectively involve. This research also brought to limelight a community that housed a lot of lyrics of historical touch and with her rich sand beach side, investors in tourism can strife well.

LINGUISTIC PARALYSIS IN CIARAN CARSON'S" BELFAST CONFETTI"

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ABSTRACT
Irish Troubles have been fictionalised in various narratives by different writers. The degree of desolation and violence unleashed by the infamous Troubles has been discussed and debated to highlight the gory nature of the ethnic nationalist conflict. 'Belfast Confetti' is one of the poems reflecting on the troubling nature of the conflict. It echoes violence, identity crisis, and linguistic paralysis conceived by vicious plots and acts. The paper aims to highlight the impact of violence on physical and metaphorical dynamics of language. Moreover, it aims to highlight how language fails to address the horror and inhuman acts conjured by the people against their fellow citizens. In addition, it will highlight the relationship shared by violence and the linguistic parameters-the disruption of one by the other. The relevant theoretical framework would be undertaken to deconstruct the poem in the light of the Irish Troubles.

Keywords: Language, Linguistic, Violence, Irish, Troubles

ENHANCİNG EFFİCACY OF COTRİMOXAZOLE BY STABİLİZİNG IT WİTH MEDİCİNAL SYNTHETİC ALUMİNİUM MAGNESİUM SİLİCATE FOR TREATMENT OF TRYPANOSOMOSİS.

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ABSTRACT

Background: Mechanism of Cotrimoxazole (Septrin®) as bacterial drug is inhibition of Folic Acid but its anti-trypanocidal efficacy has not been investigated though Trypanosomes also require Folic Acid for replication. Development of resistance by Trypanosomes against drugs and toxicity of most trypanocides demand that search for new Trypanocidal drugs be continuous. Aluminum magnesium silicate (AMS) and its formulation named Medicinal synthetic AMS (MSAMS) have been reported to stabilize other medicines. Stabilizing medicines improves length of time they remain at high bioavailability and when drugs remain at high concentration in plasma for a long time, their efficacies improve. Improving anti-Folic acid efficacy of Cotrimoxazole may deny Trypanosomes Folic Acid to the extent that their replication could be inhibited.

Objectives:

a. To treat Trypanosoma brucei brucei infected West African Dwarf (WAD) sheep with Cotrimoxazole-MSAMS drug formulation.

b. Parasitaemia-determination in infected sheep treated with Cotrimoxazole stabilized with MSAMS.

Methods: Five (5) trypanosoma b. brucei infected sheep (WAD) were treated with Cotrimoxazole stabilized with MSAMS at dose of 120mg/kg while another group was left untreated.

Results: Mean parasitaemia of 80.49±7.56 million parasite per ml of blood was recorded just before commencement of the treatment but nine days after treatment with the Cotrimoxazole-MSAMS formulation the parasitaemia of the treated group reduced ($P \leq 0.05$) from 2.25±1.50 in the control to 0.00± 0.00).

Conclusions: MSAMS enhanced anti-Folic Acid efficacy of Cotrimoxazole so that it cleared Trypanosome parasitaemia and there was no relapse.

SIMULATION OF A MONO-POLAR HVDC LINK IN PRESENCE OF DC LINK FAULTS

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ABSTRACT
This paper aims to study the DC-link faults and recovery scenarios based on a 12-pulse HVDC (High Voltage Direct Current) link system. DC-link to ground fault is considered as one of the most serious fault that can occur on HVDC-link. Therefore, in order to understand the system behavior in the presence of this type of fault, two DC-fault scenarios are investigated. One scenario is at the sending end of the rectifier, and the other is at the receiving end of the inverter. The faults are applied mainly to study the dynamic performance of the recovery of HVDC-link system after faults, and to validate the proposed DC fault protection function. Influence of the Voltage Dependent Current Order Limiter (VDCOL) function is also studied. The digital real-time simulator laboratory (RT-Lab) platform HYPERSIM (OP-5600) is used in modeling and simulation of the HVDC-link system by means of Software-In-the-Loop (SIL) approach. The maintenance of the system stability is investigated to ensure a high performance recovery from the fault. Ramp-up recovery method used in the DC-bus voltage restoration provided by the VDCOL-function, and the validated operation of protection function against DC faults show high performance recovery from the faults. The results carried out ensure safe and desired recovery from the DC-bus faults.

Keyword: Digital real-time simulator, HVDC system, DC faults, DC protection function.

DETERMINATION OF THERMAL AND BIOFLUID PROPERTIES OF DIFFERENT WOOD SAMPLES USED FOR BUILDING AND HEAVY CONSTRUCTION WORKS IN NIGERIA

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ABSTRACT
Due to the increasing cases of collapse building in Nigeria, it there pertinent to conduct proper studies prior to selection of wood samples for building and heavy construction activities. The weights of these wood samples were measured and the densities obtained using weighing balance. Thermal conductivity (Lee Disc method), specific heat capacity (Heat exchange method), diffusivity, absorptivity and resistivity (Mathematically computed) were determined. The results indicated that thermal conductivity of Owen (Mitragyna Ciliate) wood is the highest (0.14±0.03 WM-1K-1) while that of Mahogany (Khaya spp.) wood is the lowest (0.10±0.02 WM-1K-1). The result also revealed that, Iroko (Milicia Excelsa) wood has the highest density value (1.0±0.4 gm-3) while that of Melina (Gmelina Arborea) has the lowest density value (0.39±0.2 gm-3). The specific heat capacity of Mahogany had the lowest value (1.03±0.24) Jg-1K-1 while that of Obechi (Triplochoton Schleroxylin) and Iroko were the highest (1.12±0.23 Jg-1K-1). Similarly, Iroko wood also had the highest values of thermal diffusivity (0.974±0.01 m2s-1), Mahogany had the highest value of resistivity (10.0±2.0 W-1Km) while the absorptivity of Obechi recorded the highest value (16.7±0.6 m-1). From the results, relationship between diffusivity and absorptivity produced a negative correlation and vice versa. However, these wood samples are good for building constructions and heavy engineering constructions because of their low thermal conductivity. The materials are therefore a better heat insulating materials than some commonly used timber.
Keywords: Thermal absorptivity, Diffusivity, Wood samples, Building, Construction works

PHYSICO-CHEMICAL GROUNDWATER QUALITY OF THE GHISS-NEKOR AQUIFER (CENTRAL RIF, MOROCCO)

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ABSTRACT
The Ghiss-Nekor coastal aquifer is located in the North-East of the Moroccan Mediterranean sea and in South-East of the city of Al Hoceima. This strategic resource of groundwater covers an area of approximately 100 km2 exposed to various sources of pollution, both natural and anthropogenic, this means that the quality of this water resource should be controlled regularly. The aim of this study is to identify and evaluate the physico-chemical groundwater quality of the Ghiss-Nekor aquifer. . Analyzes focused on various parameters (such as water temperature, conductivity, pH, and major chemical elements) from 25 sampling sites. According to the present study, the groundwater of the Ghiss-Nekor aquifer has a near-neutral pH respecting Moroccan drinking water standards, and is marketed by very high levels of mineralization. Graphical analysis indicated that the investigated waters were dominated by two types of chemical facies, and statistical analysis indicated that the 25 investigated water points could be classified into five different classes with similar chemical properties.

Keywords: Ghiss-Nekor aquifer, Groundwater, hydrochemistry.

EFFECT OF DOMESTICATION ON THE YIELD, CHEMICAL COMPOSITION AND BIOLOGICAL ACTIVITY OF ESSENTIAL OILS OF THYMUS IN MOROCCO

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ABSTRACT
Thymus is an aromatic and medicinal plant with a remarkable endemism in North Africa and the Iberian Peninsula, including Thymus maroccanus Ball, subspecies endemic to Morocco, and Thymus zygis L subsp gracilis subspecies endemic to Morocco and the Iberian Peninsula. This plant has a great reputation among generations due to its multiple uses, especially in traditional medicine, the flavoring of food products and the use of its essential oils as antiseptic and disinfectant. This leads to its vulnerability due to its intensive exploitation. In order to overcome the imbalance between the demand and supply of this species, especially in essential oils, we conducted a study on the effect of domestication on its quantitative, qualitative and biological properties. The results of the qualitative characterization of essential oils of this plant by gas chromatography coupled with mass spectrometry (GC-MS) show the richness of essential oils of the species studied in Carvacrol (1.69-66.77%), Thymol (0.48-34.92%), O-Cymene (5.44-24.98%) and γ -terpinene (8.66-19.21%) Thus, the aromatogram revealed that the essential oils of cultivated thymus species showed a strong activity than the spontaneous ones. In the light of these results obtained, it can be seen that domestication has a significant effect on the yield and chemical composition of the essential oils of the studied thymus species, as well as on their anti-bacterial activity towards some pathogenic bacteria.

Keywords: Thymus, Domestication, essential oil, yield, chemical composition, antibacterial activity, Morocco

ESTIMATION OF THE ORBITAL CORRECTION FUNCTION AND ENERGY OF THE TWO ELECTRON SYSTEMS

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ABSTRACT
In this work we examined the influence of electron correlation on the K-shell within the ground state of a series of He-like ions (He atom ,Li+ ion ,Be+2 ion , B+3 ion , C+4 ion) , by using the partitioning technique and calculation the orbital correction function for each electron in these systems. The properties that studied in this work are, the inter- particle distribution function f(r12) for Hartree-Fock (HF) and Configuration Interaction (CI) wave functions of two – electron system and for HF wave function for three- electron system . the one- particle radial density distribution function D(r) for HF and CI wave functions ,the expectation values <r1n> , <r12n> for HF and CI wave functions where n is integer number and take the values –2 n 2,the standard deviation for HF and CI wave functions ,the energies expectation values <V> ,<T> ,<E> for HF and CI wave functions , the orbital correction function and the radial part for HF and CI wave functions . All the properties are normalized to unity and the results obtained numerically by using Mathcad 2004 program ,finally the atomic units in our calculations was used .

Keywords: Hartree-Fock ,Atomic properties ,Wave function ,Atomic energy .

URBANIZATION AND FERTILITY IN THE INDUSTRIAL REVOLUTION 4.0 ERA

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ABSTRACT
The world is characterized by severe inequality in development achievement. Variation in population dynamics is among the causes, in particular the levels of fertility. The objective of this study was to investigate the association between urbanization and fertility controlling for the effects of other socioeconomic development including digital divide. The data used in the study were from the World Development Indicators of the World Bank with country as the unit of analysis. The dependent variable of the study was the total fertility rate. The main independent variable was the percentage of population living in urban areas. Control variables included GDP per capita, women business and law index, and mobile cellular subscriptions. A multiple linear regression model was employed for data analysis. The results of the study show that higher fertility was associated with lower percentage of population living in urban areas even after taking into account the effects of GDP per capita, women business and law index, and mobile cellular subscription. The study also found that higher fertility was associated with lower GDP per capita, women business and law index, and mobile cellular subscription. The findings from this study implied the importance of urbanization and digital divide reduction as a strategy to lower fertility in particular in high-fertility countries.

Keywords: Urbanization, Fertility, Digital divide, Socioeconomic development, Regression.

PRINCIPALS' ADMINISTRATIVE STRATEGIES AND SPECIAL NEEDS STUDENTS' ACADEMIC SELF-CONCEPT IN INCLUSIVE PUBLIC SECONDARY SCHOOLS IN CALABAR MUNICIPALITY, CROSS RIVER STATE, NIGERIA

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ABSTRACT

The study investigated whether principals' administrative strategies could improve the academic self-concept of special needs students in inclusive public secondary schools in Calabar Municipality. Research design was a cross-sectional survey. The population of the study consisted of all the public secondary schools in Calabar Municipality. A sample of 10 schools was obtained out of the 15 public secondary schools through purposive sampling. The study was carried out using 250 respondents (10 principals, 100 teachers/counsellors, 120 students- (20 of them were special needs), 20 parents/guardians of the special need students, selected by purposive sampling method. Three (3) research questions were raised and answered while two (2) null hypotheses (Ho) were formulated and tested at 0.05 level of significance using t-test statistics. A structured checklist and questionnaire instruments were used to collect data and the data were analysed using mean. Results shows that respondents were favourable. The instruments were validated by three (3) Test and Measurement experts. The questionnaire had a reliability index of 0.85 using Cronbach Alpha technique while a checklist instrument has an index of 0.82 using Kudar-Richardson 20 (KR-20) reliability technique. Disposed to more than 70% of principal administrative strategies in enhancing students' positive academic self-concept using an average mean rating of 2.5 on a four-point Likert scale. In conclusion, collaborative work and teachers' parents' relationship enhance positive academic self-concept of special needs students. It was recommended among others that principals, teachers, and parents in inclusive public secondary schools should have positive attitudes towards students receiving special education if "Education For All" must be attained for National Development.

Keywords: administrative strategies, inclusive, self-concept and special needs.

FACTORS DETERMİNİNG INDİVİDUAL ENTREPRENEURİAL ORİENTATİON: A SPECİAL REFERENCE TO MANAGEMENT GRADUATES FROM SRİ LANKAN STATE UNİVERSİTİES

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ABSTRACT
The purpose of this study is to find out the effect of educational support, relational support and structural support on entrepreneurial orientation of management undergraduates at university of Jaffna. Deductive approach was utilized in this study. In this approach, educational support, relational support and structural support were used as the independent variables to predict the impact on individual entrepreneurial orientation. It was examined in a sample of 391 management undergraduates from state universities, with the help of the online questionnaire. Research finding concludes that even though all three factors such as educational support, relational support and structural support have a significant impact on the individual entrepreneurial orientation of management graduates. Structural support has a somewhat more impact on individual entrepreneurial orientation. The sample consists entirely of management Undergraduates. It is revealed that the more in structural support, te more orientation you would have.Important limitation is that this study takes only three factors. Other factors were not considered in this study.

Keywords: Individual Entrepreneurial Orientation, Educational Support, Relational Support, Structural Support.

HRM PRACTİCES AND TASK PERFORMANCE: A SPECİAL REFERENCE TO EMPLOYEES İN MAS APPAREL INDUSTRY İN SRİ LANKA

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ABSTRACT
Having employees who perform well is the current thought of every organization, since the concern has increased towards ways to increase the performance of employees. However, there is still a puzzle that to what extent employees perform into the works. Thus, the present study investigates the impact of HRM practices such as recruitment and selection, performance management, training and development and compensation and rewards on task performance. Further, having performed employees in the workplace is more vital to for organizational efficiency. Since the little attention was paid on task performance specially, this study sheds the new light in Sri Lankan context with the HRM practices and task performance. A survey strategy was used for this study and data were collected from conveniently chosen 415 MAS apparel industry workers. SPSS 23.0 was utilized to analyze the data. The results unveil that individuals with a good HR Practices are more likely to have high employee performance. The more flexible HRM practices leads to more task performances in the work place. This is the first study to incorporate HRM practices and task performance research in MAS apparel sector. More employee outcome can be taken into consideration for the future

Keywords: HRM Practices, recruitment and selection, performance management, training and development and compensation and rewards and Task performance

AI DRİVİNG NEW GENERATİON COMPETENCİES, PRODUCTİVİTY AND ENGAGEMENT: LEADERSHİP PERSPECTİVE

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ABSTRACT
The era of artificial intelligence is gaining momentum as technology absorption and digitization is driving new generation practices. The importance of artificial intelligence (AI) proficiency as a determinant for AI adoption, remains a broad research areas for studies. This paper synthesizes this research gap with a mixed methods approach and validates other research findings. The fundamental objective of this research is to study the new generation competencies driven by AI in seeking employee development in leading organizations across all sectors. (AI) within data science is poised to play a crucial role in making sense of data, predicting disruptions, and assisting the leaders with business continuity. This paper also provides suggestions on talent management and operations for the organization from four aspects related to intelligent training and development, intelligence to espouse profession, intelligent promotion process, intelligence in career path, so as to help the organizations improve the level of talent management and drive performance and engagement in the organization The key findings of this study is that AI improving decision making, handling routine mundane tasks and enhancing productivity and performance. The study also collaborates with other scholarly conversations on the subject.

Keywords: Career, Engagement, Leaders, Technology, Work Practices

A DETAİLED EXAMİNATİON OF CHRİSTİNA ROSSETTİ'S POEM "REMEMBER" İN ORDER TO GET İNSİGHT İNTO REMEMBERİNG / FORGETTİNG.

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ABSTRACT
Memory is extremely crucial and significant in our daily lives. Remembering and forgetting are two sides of the same coin when it comes to memory. The current study looks at the theme of Remembering / Forgetting in Christina Rossetti's poem "Remember." This study will examine and analyze the poem's various topics such as life, memory, forgetting, loss or death, and love. The primary goal of this study is to comprehend the significance of grief in one's life, and this sadness is to be comprehended not from the standpoint of a mourner, but rather from the standpoint of the person to be lamented.

BUREAUCRATİC CORRUPTİON İN NİGERİA: A STUDY OF THE SUCCESSES AND CHALLENGES OF EFCC FROM 2010-2020

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ABSTRACT
Bureaucratic corruption in Nigeria has become an evil that affects effective performance of career officers and efficient results in Nigerian public sector. The anti-corruption agents are charged with the responsibility of curbing bureaucratic corruption in the public sector and the roles played by the EFCC, one of the agent cannot be overemphasized . The objective of the study is to examine the impact of the EFCC in combating the bureaucratic corruption in Nigerian public service .The research adopted an expo facto research design. This was necessary because the data for the study were obtained mainly from secondary sources. Extant literature was assessed to explain the variables of the study. The literature was evaluated with content analysis. The issues raised provided the basis for suggestions to improve the Nigerian public service bureaucratic system that will reduce bureaucratic corruption in Nigerian public service.

Keywords: Bureaucratic Corruption, Career Advancement, Public Service.

THE EFFECTS OF THE CRISIS OF FALL OF THE GOVERNMENT ON NON-GOVERNMENTAL EDUCATIONAL INSTITUTIONS IN BALKH PROVINCE, AFGHANISTAN

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ABSTRACT
During the last years, the widespread fall of the government, also the crisis of poverty and unemployment, have had a profound impact on the political, economic, social and educational situation of Afghanistan. Especially the educational sector has faced with many problems. In this study, while examining these crises, we studied their effects on non-governmental educational institutions (schools, courses, private universities) in Balkh Province, Afghanistan. The current research is applied in terms of purpose and descriptive-correlation in terms of the nature and method of the research, which was conducted in the field on 190 educational institutions in Balkh province and the obtained information has been analyzed with "Paired Samples test" and "one sample t test". The results obtained from the research show that the variable impact of recent crises (fall of the government, poverty and unemployment) on the variables of income, number of teachers, number of students, tuition fees, quality of education, people's interest in education, academic motivation, hope for the future, the quality of education assessment is significant.

Keywords: fall of the government, poverty, unemployment, academic motivation, quality of education.

SERİCULTURE AMONG THE TRİBE TO ALLEVİATE POVERTY A SOCİOECONOMİC STUDY OF THE DHARAMJAİGARH BLOCK, RAİGARH, CHHATTİSGARH

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ABSTRACT
Tropical Tasar and mulberry are grown commercially in Chhattisgarh. Kosa is Tasar's actual name. The tribal people of the established Districts of Baster, Raigarh, Bilaspur, and Surguja engage in sericulture. A total of 364 acres are used for mulberry farming in the research region. Tasar centres cover a total of around 3153.25 acres. 4729.88 acres are used for tasar raising in the forest. 3347 of the 5739 total beneficiaries in the district are tribal. The Raigarh district's Dharamjaigarh block would be the main location for the studies. Identification of the regions where tribal groups have been instructed to embrace sericulture practises for their way of life will be part of this. How long has this population been engaged in sericulture. How many men, women, and kids are taking part in this process?

Keywords: Poverty, sericulture, employment, income, tribal.

G**S-COMPACTNESSINTOPOLOGICALSPACESG

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ABSTRACT
In 2020, M. Anto and S. Andrin Shahila introduced and studied properties of a new class of sets in topological spaces namely sets and sets. We will extend the concept of compactness via sets by introducing in topological spaces and will investigate their relationships among them as well as their characterizations by making use of generalized mappings including functions and functions. The objective of this paper is to introduce the new concepts called space, space, space, space, and space in topological spaces and investigate fundamental properties and characterizations of these new notions in topological spaces.
2020 AMS Subject Classification. Primary: 54B05, 54D20, 54D30.

Keywords and Phrases: Topological space, space, space, space, space, space

MODERATİNG EFFECT OF GENDER ON THE İMPACT OF EMPLOYEE HAPPİNESS AND EMPLOYEE ENGAGEMENT: A SPECİAL REFERENCE TO APPAREL INDUSTRY WORKERS İN SRİ LANKA

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ABSTRACT
Engaging employees is the current thought of every organization, since the concern has increased towards ways to engage employees. However, there is still a puzzle that to what extent employees engage into the works. Thus, the present study investigates the impact of employee happiness and employee engagement through the lens of gender as a moderator variable. Further, having engaged employees in the workplace is more vital to for organizational success. Since the little attention was paid on green employee happiness, this study sheds the new light in Sri Lankan context with the association between employee happiness and employee engagement. A survey strategy was used for this study and data were collected from conveniently chosen 390 apparel industry workers. Smart PLS 3.0 was utilized to analyze the data. The results unveil that individuals with a high workplace happiness are more likely to have high employee engagement. No matter what the gender is, however the both gender have the same level of impact on engagement. No moderating effect was found. This is the first study to incorporate happiness and engagement in Sri Lankan apparel sector through the gender as a moderator. Future studies can focus on more moderator and mediator variables to have a deeper understanding of employee happiness and engagement through various moderator and mediator variable.

Keywords: Employee Engagement, Employee Happiness, Eudemonic Happiness and Hedonic Happiness

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Günümüzün danılmaz reallığı qloballaşan dünyada məlumatların geniş auditoriyalara yayılmasında sosial şəbəkələrin rolunun əvəzsiz olmasıdır. Nəzərə alsaq ki, bunlar həm də müxtəlif formalarda təqdim olunur: yazılı, şifahi-səsli, səsli-görüntülü və s. Razılaşmamaq çətindir ki, bu formalar da cəmiyyətin hər bir üzvünü təmin edir, ona görə ki real şəraitə uyğun yuxarıda qeyd etdiyim təqdimat formalarından birini seçir; həm vaxtında məlumat alır, həm real vəziyyətinə uyğun. Bu yerdə vaxt amilini çap mediasının bir qədər geridə qalması səbəbi kimi göstərməyi də unutmayaq. Hər halda saytlar, portallar qəzet, jurnal mediasını surətləri ilə əhəmiyətli dərəcədə geridə qoyur və bu dünyanın hər yerində belədir. XXI əsr elektron ünsiyyət dövrüdür, bir kliklə bir çox məlumat əldə edilir. Məlumatlar video, reklam və s. şəkildə sosial şəbəkələr vasitəsilə yayılmaqdadır. Sosial medianın, xüsusən Facebook, Whatsapp, Twitter, Tik-Tok, Telegram və s. platformalarının dünyanın hər yerində mediaya təsiri göz önündədir. Sosial şəbəkələrdən gələn informasiyaların "saxta xəbər" statuslu olanlarının qarşısını almaq çətinliyi onların çox, fasiləsiz və surətli olmasıdır. Yeri gəlmişkən "saxta xəbər" termini 2019-cu ildən başlayaraq Amerikada aktiv işlənməyə başlamışdır. Bütün bunları diqqətdə saxlamaqla əsas media strukturları "saxta xəbər" axınını azaltmağa o halda nail ola bilir ki, məlumatları hadisə baş verən yerdən, obyektiv, tərəfsiz və dərhal çatdırırlar. Bütün bu saydıqlarımız onları etibarlı xəbər yayımçısı – mənbə olmanı təmin edir. Sosial şəbəkələr media təyinatında olan xəbərlərdən başqa fərqli informasiyaları da yayır. Bunların arasında reklam, şəxsi toxunulmazlıq, hərbi və b. vardır ki, bunlara mütləq yanaşma sərişətəsi olmalıdır. İnformasiyanı yayarkən diletant olma səbəbindən şəxsin həyatına aid məxfilikdən tutmuş dövlət sirrinədək olan hüdudu bilmədən pozmaq olar. Buraya ictimai insan, professional peşə məsələləri, qeyri-etik münasibətlər haqqında informasiyalar da daxildir. Cəmiyyət üzvlərinin yaş fərqi olmadan, demək olar ki, hamısı sosial media və internetdən aldığı xəbərlərə çox açıq olur. Hətta bəzən bunların təbliğat, dezinformasiya saxta xəbər olmasını belə, təəssüf ki, fərq etmirlər. 2019-cu ildə aparılan hesabatların birində göstərilir ki, 8-11 yaş arası insanlar həftədə orta hesabla 13.5 saat, 12-15 yaş arası olanlar orta hesabla 20.5 saat vaxtlarını sosial şəbəkələrdə keçirir. Göründüyü kimi aktiv sosial media istifadəçiləri olan uşaqlar və yeniyetmələr ən böyük internet istifadəçi qruplarını təmsil etsələr də, əksər hallarda onlar da internetdə öz şəxsi məlumatlarını necə qoruyacaqlarını bilmir, eləcə də sosial mediada paylaşımlarına diqqət etmirlər. Cəmiyyət həyatına təsir edən saxta xəbərlərin manipulyasiyadan başqa bir şey olmadığını, onların yayılma səbəblərinin bəziləri haqqında danışmağı məqalədə qarşımıza məqsəd qoymuşuq.

Açar sözlər: saxta xəbər, sosial şəbəkələr, informasiya, sosial media

"FAKE NEWS" AS A PHENOMENON OF MODERN MEDIA SPACE

ABSTRACT

Today's undeniable reality is that the role of social networks in disseminating information to wide audiences in the globalized world is irreplaceable. Considering that they are also presented in different forms: written, oral-audio, audio-visual, etc. It is hard not to agree that these forms also provide each member of the society, because he chooses one of the forms of presentation I mentioned above according to the real conditions; receives information both in time and according to the real situation. Let's not forget to point out the time factor here as the reason why print media is lagging behind. In any case, websites and portals leave newspaper and magazine media significantly behind with their copies, and this is the case everywhere in the world. The 21st century is the era of electronic communication, a lot of information is available with one click. Data includes videos, ads, etc. is spreading through social networks. Social media, especially Facebook, Whatsapp, Twitter, Tik-Tok, Telegram, etc. The impact of its platforms on media around the world is evident. The difficulty in preventing the information from social networks with the status of "fake news" is that they are numerous, continuous and fast. By the way, the term "fake news" has been actively used in America since 2019. Keeping all this in mind, mainstream media structures can reduce the flow of "fake news" if they deliver information from the scene, objectively, impartially and immediately. All these factors make them a reliable news source. Social networks spread different information besides the news intended for the media. Among them are advertising, privacy, military, etc. there are those that must be approached competently. Due to dilettantism when disseminating information, one can unknowingly violate the border from personal privacy to state secrets. It also includes information about public people, professional issues, and unethical relationships. Almost all members of society, regardless of age, are very open to the news they receive from social media and the internet. Unfortunately, they do not even notice that sometimes these are propaganda and disinformation fake news. One of the reports conducted in 2019 shows that people between the ages of 8 and 11 spend an average of 13.5 hours a week, and those between the ages of 12 and 15 spend an average of 20.5 hours on social networks. Although children and teenagers who are apparently active social media users represent the largest groups of Internet users, in most cases they also do not know how to protect their personal information on the Internet, as well as do not pay attention to what they share on social media. In the article, we aim to show that fake news affecting social life is nothing more than manipulation, and to talk about some of the reasons for their spread.

Keywords: fake news, social networks, information, social media

THE ORIGIN OF PEKALONGAN CITY WITH THE NICKNAME : 'WORLD CITY OF BATIK'

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ABSTRACT
Pekalongan City is a city that borders the Java Sea in the north, Pekalongan Regency in the south and west and Batang Regency in the east. Since tens and hundreds of years ago until now, most of the production process of Pekalongan batik is done at home. As a result, Pekalongan batik is closely integrated with the life of the Pekalongan people. Batik has become the lifeblood of the Pekalongan people and is proven to still exist and not give up on the times, as well as show the tenacity and flexibility of its people to adopt new ideas. Finally, in 2011, Pekalongan City was dubbed the "World City of Batik" which was carried by Pekalongan City because of the branding that Pekalongan City launched it self. This research was conducted to explain the origin of the nickname Pekalongan city as the world city of batik. The method in this research is an empirical study of phenomenology in the form of library research using a qualitative approach. This study used secondary data obtained from previous studies and other literature with similar research topics. The results of the study explain that in 2011, Pekalongan City was dubbed the "World City of Batik" which was carried by Pekalongan City because of the branding that Pekalongan City launched it self, in order to welcome the city's 105th anniversary. And Batik is designated by UNESCO as a Humanitarian Heritage for Oral and Intangible Culture on October 2, 2009. Since then, every October 2 is always celebrated as National Batik Day.

Keywords: Pekalongan city, Motif, and Batik.

PEKALONGAN CITY UNIQUE THAT OTHER CITIES DO NOT HAVE

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ABSTRACT
Who doesn't know Pekalongan, a city on the north coast of Java Island, nicknamed the City of Batik, is getting more and more famous day by day. Maybe for people from outside the city, they will know Pekalongan through its Batik which is already famous throughout the archipelago, or the title is also the World Creative City from the UNESCO network. In fact, if you explore more deeply, you will find unique things that exist only in Pekalongan. This uniqueness is rarely or even not owned by other regions. This research was conducted to determine the uniqueness of Pekalongan City.The method in this research is an empirical study of phenomenology in the form of library research using a qualitative approach. This study uses secondary data obtained from previous studies and other literature with similar research topics. The results of the study explain that there are several unique features that Pekalongan City has, namely: the celebration of hot air balloons and firecrackers after Eid al-Fitr, the syawalan tradition, Pekalongan as the central axis of Java Island and the processing of Tofu Waste as fuel.

Keywords: Pekalongan city unique, Balloons, Firecrackers, and Syawalan.

THE INTRODUCTION OF A COMBINED TYPE PASSIVE SYSTEM (FPS-LRB) AND ITS EFFECTIVENESS IN REDUCING THE DYNAMIC RESPONSE OF A LOW-RISE BUILDING

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ABSTRACT
Following the enormous human and material damage caused by seismic events, new design approaches are needed to counteract this natural phenomenon. The technique of seismic insulation is an attractive alternative to this challenge. The purpose of this paper is to improve the performance of the structural elements of the structure by introducing a combined passive system (LRB-FPS), which can absorb a high intensity of seismic energy. Each of these systems has very powerful advantages. The LRB system has a damping rate in excess of 30%, with flexibility and restoring force provided by the elastomeric layers, and reduces lateral displacement by its lead core acting as an additional energy dissipation mechanism. The FPS system uses a sliding interface in the form of a bowl in order to dissipate the seismic energy by friction, gives the structure an overall movement similar to a pendulum, characterized by a strongly nonlinear behavior. A methodology for the design of the two systems has been implemented according to the American IBC 2000 regulations, which makes it possible to determine the optimal parameters of the two systems. To this end, a very extensive parametric study was carried out. Several configurations have been considered depending on the location of each isolator. A nonlinear dynamic analysis was carried out, therefore, the results of this investigation show the effectiveness of the integration of these artificial systems in reducing the response of the structure in terms of quasi-rigid displacement of the structure, in consequently a strong reduction in top floor displacement and the inter drift displacements, also the acceleration of the top floor, in addition a strong reduction in the shear base force. Consequently, the integration of this combined system affects the structure of great performance and allowing to improve the structural reliability of the building.

Keywords: Base isolation, LRB (Lead Rubber Bearing), FPS (Friction Pendulum System), seismic excitation, nonlinear analysis, Hysteresis curve

INVESTIGATING THE EFFECT OF CATIONIC CLEAVABLE SURFACTANT FOR THE CORROSION INHIBITION BEHAVIOR OF MILD STEEL IN 5% HCl SOLUTION

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ABSTRACT
A biodegradable surfactant, namely 2-(((dodecyloxy)carbonyl)oxy-N,N,N-trimethylethan-1-aminiumiodide referred to as TDC containing carbonate linkage at beta position was synthesized, and its structure elucidation was achieved by Elemental Analysis, FT-IR (Fourier Transform Infra-Red), and NMR (Nuclear Magnetic Resonance). The corrosion inhibition properties of the synthesized surfactant were tested for mild steel in 5% HCl at temperatures ranging from 40 to 80°C utilizing gravimetric analysis, and surface analysis methods such as SEM/EDAX (Scanning Electron Microscopy/Energy Dispersive X-Ray Analysis). According to the gravimetric measurement data, the best inhibitory effectiveness of 72.02% was attained at a concentration of 1x10-3 M when the temperature was 40°C. This efficacy improved to 79.53% when the temperature was 80°C. This behavior suggested its applicability as a good corrosion inhibitor to protect mild steel from high-temperature acid corrosion. The surfactant adsorbed on mild steel in accordance with Langmuir adsorption isotherm. SEM micrographs demonstrated that inhibited solutions had a clear surface smoothening impact, particularly when contrasted with solutions that lacked any inhibitor. Moreover, the EDS study confirmed the formation of the protective layer on the metal surface.

Keywords: Acid Corrosion, steel protection, high temperature, surfactants

GEOTECHNICAL CHARACTERIZATION OF MIOCENE MARLS, SAIS BASIN, MOROCCO

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ABSTRACT
In relationship with urban expansion at the level of cities located in the Sais basin, several projects have been carried out and others in progress. Therefore, the recognition of the mechanical characteristics of soils and subsoil remains essential before any construction project, in order to avoid the shrinkage-swelling phenomenon associated with marls soil. In order to minimize the risk of instability, settlement; deformation…etc. the present work consists of the characterization and study of the mechanical behavior of marls soils at the level of the sais basin, In-situ tests are performed in the field and samples are taken and then submitted to other tests in the laboratory, which are the odometer compressibility test and direct shear test.. The results obtained show that the marls soils studied exhibit strongly consolidated behaviors according to the depth according to Menard, and that comes down to the ratio of the pressiometric modulus (EM) and the corrected creep pressure (PL *).

Keywords: Mechanical behavior, Sais basin, marl, stability, consolidation, deformation, tests.

SPECTROSCOPIC CHARACTERIZATION OF NOVEL N-ALKYLATED ISATIN HYDRRAZONE AND PHENYL HYDRAZONE DERIVATIVES

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ABSTRACT
The chemistry of isatin (1H-indole-2,3-dione) has been extensively documented due to its wide applications, mainly in synthetic and medicinal organic chemistry [1]. In recent years, more attention has been focused on the coordination chemistry and biological properties of different N-alkylisatin thiosemicarbazones[2],bis-thiocarbonohydrazones[3],semicarbazones[4]and hydrazones [5] to establish a possible relationship between chemical structure and biological activity. Isatin hydrazone is an organic nitrogen compound with a broad spectrum of biological activity as anti-microbial [6], anti-inflammatory [7], anti-tumor [8] and anti-bacterial agents, given the richness of isatin chemistry, and the diversity of their applications. Due to the varied bioactivities exhibited by isatin, several efforts have been made to generate libraries of these compounds and screen them for potential biological activities such as anti-convulsant [9], anti-HIV, anti-microbial, anti-fungal and anti-cancer [10] activity. Fig. 1 provides some examples of

bioactive molecules possessing isatin moieties. We chose in the present work to examine the synthesis of new N-alkylated isatin molecules and hydrazone and phenylhydrazone derivatives of them, the former under phase transfer catalysis conditions using tetra-n-butylammonium bromide (TBAB) as catalyst and potassium carbonate as base [11] and the latter by condensation of those products with hydrazine and phenylhydrazine using the reported method [12] to obtain two different series of isatin derivatives: isatin hydrazones and isatin phenylhydrazone. The new products were characterized by nuclear magnetic resonance (1H and 13C NMR) techniques. The structures were confirmed by predicting the corresponding spectroscopic data.
Keywords: isatin, hydrazones, phenyl hydrazone, NMR .

GASTRO RETENTIVE DRUG DELIVERY SYSTEM: A REVIEW

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ABSTRACT
One novel approach in this area is GRDDSs (Gastro Retentive Drug Delivery System). GRDDSs can improve the controlled delivery of drugs that have an absorption window by continuously releasing the drug for a prolonged period of time before it reaches its absorption site. Prolonging the gastric retention of the drugs is sometimes desirable for achieving therapeutic benefits of drug that are absorbed from the proximal part of the GIT (gastro intestinal tract) or those are less soluble in or are degraded by alkaline pH or they encounter at the lower part of the GIT. GRDDS are beneficial for such drugs by improving their bioavailability , therapeutics efficiency and possible reduction of the dose. As stomach is one of the most important part of body which involves in GRDDS .There are four phases of inter digestive motility – Phase I,II,III and IV. There are various factors which affect the gastric retention time of the dosage form like density ,size ,shape ,fed and unfed state etc. Along with this there are various Strategies for delaying drug transit through GIT. The Various types gastro retentive drug delivery systems are there like floating system , swelling system , High density system, Mucoadhesive bioadhesive system, Magnetic system, Expandable system.

Keywords: Gastroretentive drug delivery system ; floating system; swelling; expanding system; bio/mucoadhesive system; high density system..

IMPACT OF GENDER ON THE AWARENESS OF ELECTRICITY CONSUMPTION IN ALGERIA

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ABSTRACT
The aim of this study is to measure the correlation between the gender of electricity consumers in Algeria and their awareness in the consumption process. This sort of research aims to check the awareness of consumers toward the ecological environment by including the gander's variable.
The method used is the quantitative one, through an online and face-to-face questionnaire between March and July 2022. It should be mentioned that respondents (42 persons) chosen randomly have to live in land houses which are more suitable for installing photovoltaic solar energy. However, the respondents should have an income in order to cover the cost of photovoltaic solar kit purchasing. The result through chi square test shows that is not any correlation between the two variables (p-value: 0.205) has been found. In the other hands, 74, 36% of men and 54.54 % of women were replied that they are aware in their electricity process.

Keywords: - Sustainable development – Green Marketing – Green consumers - Chi square test

ISLAMIC BANKING

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ABSTRACT
Islamic banking is a banking system that functions according to the guidelines laid down by Shariah (Islamic law). It follows the Shariah, called fiqh muamalat (Islamic rules on transactions). The two main pillars of Islamic banking are profit sharing and taking or giving no interest. The process is very simple a person deposits his/her money in an Islamic bank and the bank, in turn, gives an assurance of returning the money when he/she requires it. According to the Shariah guidelines, forward booking of currency is not allowed. So there is always a risk of currency fluctuation.It has been only years since Islamic banks have come into the banking sector and as compared to conventional banks, they are almost new. This paper focuses on the history and development of Islamic banking. The bank had a enormous development and as well as many crisis

APPLICATION OF HYBRID LSB-MSB ALGORITHM USING JPG and PNG DIGITAL IMAGES

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ABSTRACT
The combination of Least Significant Bit (LBS) and Most Significant Bit (MSB) algorithms is known as Hybrid LSB-MSB algorithm. LSB and MSB are information hiding steganography algorithms used in digital images for hiding information specifically text in this work. This paper projected a hybrid approach and test its effectiveness by hiding text in digital images. The proposed method takes one bit each of least significant bit and the most significant bit making two bits of the cover images and swapped it with a secret message which was implemented in Netbeans IDE. We use Mean-Squared Error (MSE), Peak Signal-to-Noise Ratio (PSNR) and the encoding time to test the effectiveness of the projected algorithm after embedding the secret message in to digital images. The Hybrid approach formed a stego-image with smallest amount falsification in image quality autonomous of the Mother Nature of data that was concealed. The hybrid approach is secured with smaller time of image and text coding. The stego-image of increased png image gives a better quality than the other Three images presented in the work which concluded that stego-images of png images are better than that of format.

Keywords: Digital images images, The Least Significant Bit (LSB), Most Significant Bit (MSB), Steganography.

PREVENTIVE MAINTENANCE USING RECYCLED ASPHALT

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ABSTRACT
To have connections between an area and another there should be roads built. It is one of the important infrastructures that should be included when planning to develop a city. The road network is the main element of the national infrastructure development plan where it will enable the citizens and visitors to easily transport goods and services and travel smoothly. Therefore, the aim of this research is to study the parameters that affect roadway maintenance producers, explore and examine recycled asphalt option as a road maintenance process in terms of environmental and economical perspectives, investigate the typical roadway maintenance versus recycled asphalt maintenance, explore the environmental and economic impacts of typical roadway maintenance, and prepare and suggest future maintenance plans based on the research outcomes. This will provide a more evolved and developed communities that are resulted from building a better quality and safer roads. There are different characteristics and parameters such as rutting, cracking, pavement quality Index, and roughness of pavements that are assessed to get the best solution. Depending on that, the maintenance on the roadway performance will be done by comparing the road to the codes and standards. This study will prevent any challenges during the life cycle of the road network and enhance the quality of roadways and will not only offer implications of recycled asphalt use in roadway projects but also offer insights regarding its social and human impacts on other processes.

Keywords: Pavement, roadways, recycled pavement, asphalt, road network,Pavement Condition Index.

THE KNOWLEDGE AND PRACTICE OF PERSONAL HYGIENE AMONG PRIMARY SCHOOL PUPILS IN PAKI COMMUNITY IKARA LOCAL GOVERNMENT AREA OF KADUNA STATES

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ABSTRACT
Background: For a healthy life personal hygiene must be maintain especially the personal hygiene of children, it is important to know for us to have a healthy adult we must first have a healthy child, and that will help to have a development of positive values about health and the use of health services. The increased spread of communicable diseases among schools children is due to poor personal hygiene practice and lack of sanitary conditions which remain concerns on the public health agenda in developing countries. Therefore school pupils need to be taught regarding importance of personal hygiene practice. The present research study was designed to assess the knowledge and practice of personal hygiene among primary school pupils in Paki community, Ikara local government area of Kaduna state. Methods: simple random sampling technique study was conducted with a sample size of 300 primary school pupils from four (4) selected primary schools in paki community, age group 7 to 14 years. Closed ended questionnaire was used. Results: The result shows knowledge of personal hygiene in Paki community is not significant at 0.57 significant value. Conclusion: Timely screening of health problems along with health education shall be given to the pupils in the primary school to improve their personal hygiene knowledge and thereby leading to a healthy life.

Keywords: Knowledge, Practices, Personal hygiene, Primary school pupils

PRİMER HİPEROKSALÜRİ TİP 1 TANILI AYNI GENOTİPE SAHİP AİLE ÜYELERİNDE FARKLI KLİNİK BELİRTİ VE BULGULAR

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ÖZET

Hiperoksalüri, hepatik oksalat aşırı üretimine (primer hiperoksalüri) yol açan kalıtsal glioksilat metabolizması bozukluklarından veya artan bağırsak oksalat emiliminden (sekonder hiperoksalüri) kaynaklanır. Hiperoksalüri, kalsiyum oksalatın üriner aşırı doygunluğuna ve kristal oluşumuna yol açarak ürolitiyazise ve kalsiyum oksalat kristallerinin böbrek parankiminde birikmesine katkıda bulunarak oksalat nefropatisi olarak adlandırılan duruma yol açabilir. Kliniğimizde primer hiperoksalüri tanısı ile takip edilen, genetik tanısı konulan iki erkek kardeş sırasıyla 16 ve 8 yaşında olup, retrospektif olarak incelendi. Diğer iki kız kardeşleri sağlıklı idi. Anne baba arasında akrabalık yoktu. Her iki erkek kardeşte de AGXT geninde bileşik heterozigot formda (c.121G>A; p.Gly41Arg) ve (c.779A>G; p.Tyr260Cys) iki adet missense mutasyonlar saptanmıştır. Bu mutasyonlar patojenik olarak tanımlanmıştır. Ayrıca anne heterozigot(taşıyıcı) c.779A>G; p.Tyr260Cys mutasyonu ve baba heterozigot (taşıyıcı) c.121G>A; p.Gly41Arg mutasyonu saptanmıştır. Bilateral böbreklerde multiple taşı olan, opere edilen ve taş analizinde kalsiyum oksalat taşı saptanan, idrarda oksalat atılımı yüksek olan iki erkek kardeşten büyüğü, kronik hemodializ tedavisi alıyor, kemikiliği tutulumu saptandı ve kombine karaciğer / böbrek transplantasyonu için beklemektedir. Küçük kardeşi ise b6 vitamini ve ürocit k tedavisi alıyor ve izleminde böbrek fonksiyon testleri normaldir. Bu sunuda böbrek taşı olan çocuklarda ve tekrarlayan kalsiyum oksalat taşı olan hastalarda primer hiperoksalüri olasılığının düşünülmesi gerektiği, primer hiperoksalürinin hızlı teşhisinin, sonraki komplikasyonları önlemek için esas olduğu vurgulanmak istendi. PH1 oldukça heterojen bir hastalıktır ve aynı genotipe sahip aile üyelerinde bile farklı klinik belirti ve bulgularla karşımıza çıkmaktadır. Kesin tanıda son yıllarda mutasyon analizleri sıklıkla kullanılmaktadır.

Anahtar Kelimeler: Primer hiperoksalüri,böbrek taşı,nefrokalsinozis,böbrek transplantasyonu

DIFFERENT CLINICAL SYMPTOMS AND FINDINGS OF FAMILY MEMBERS WITH THE SAME GENOTYPE DIAGNOSED WITH TYPE 1 PRIMARY HYPEROXALURIA

ABSTRACT

Hyperoxaluria originates from hereditary glyoxylate metabolic disorders, which lead to excessive hepatic oxalate production (primary hyperoxaluria) or from increasing intestinal oxalate absorption (secondary hyperoxaluria). Hyperoxaluria, induces urinary supersaturation of calcium oxalate and crystal formation, and contributes to urolithiasis, and deposition of calcium oxalate crystals in the kidney parenchyma and thus, it may lead to a condition named oxalate nephropathy. Two brothers who were tracked with primary hyperoxaluria diagnosis and whose genetic diagnoses were made were 16 and 8 years old, respectively, and were retrospectively examined in our clinic. Their other two sisters were healthy. There was no blood kinship between the mother and father. In both brothers, two missense mutations of the AGXT gene, a compound heterozygote for (c, .121G>A;p.Gly41Arg) and (c.779A>G; p. Tyr260Cys), were established. Those mutations were identified as pathogenic mutations. Also, the mother heterozygous (carrier) of c.779A>G; p.Tyr260Cys mutation and the father heterozygous (carrier) of c.121G>A; p.Gly41Arg mutation was detected. The elder of two brothers, who has multiple kidney stones in his bilateral kidney, was operated on, and was found to have calcium oxalate calculi in his stone analysis, whose oxalate excretion was high, is receiving chronic hemodialysis treatment, bone marrow involvement has been found in him and he is waiting for combined liver/kidney transplantation. The younger sibling is receiving treatment with vitamin b6 and Urocit-K and kidney function tests are normal throughout his observation period. In this presentation, it has been wanted to be highlighted that the possibility of primary hyperoxaluria must be thought for children with kidney stone disease and patients having recurrent oxalate stone formation and rapid diagnosis of primary hyperoxaluria is essential in order to prevent later complications. PH1 is a disease endowed with considerable heterogeneity and we observe that it arises with different clinical symptoms and findings even within family members having the same genotype. In the conclusive diagnosis, mutation analyses have been frequently used in recent years.

Keywords: Primary hyperoxaluria, kidney stone, nephrocalcinosis, kidney transplantation

NAZOPALATİN KANAL MORFOLOJİSİNİN KONİK IŞINLI BİLGİSAYARLI TOMOGRAFİ İLE RETROSPEKTİF OLARAK DEĞERLENDİRİLMESİ

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ÖZET

Nazopalatin kanalın (NPK) özelliklerini iyi bilmek, bu bölgede meydana gelen lezyonların morfolojisi ve patogenezini anlamak ve dental implant uygulamaları veya kemik augmentasyonu gibi cerrahi prosedürlerden önce anterior maksillayı değerlendirmek için gereklidir. Bu çalışmanın amacı, konik ışınlı bilgisayarlı tomografi (KIBT) kullanarak NPK'nin boyutlarını ve anatomik özelliklerini analiz etmektir.Çalışmaya 100 KIBT görüntüsü dahil edildi. NPK'nin boyutları ve anatomik özellikleri sagital, koronal ve aksiyal kesitlerde analiz edildi. NPK ölçümleri ile NPK'nin şeklini, palatal düzlemle yaptığı açıyı, insisiv foramen ve stenson foraminaların çapını, NPK uzunluğunu değerlendirmek için sagittal kesitler, Stenson forameni ve İnsiziv foramen sayısını değerlendirmek, foramenlerin şekillerini sınıflamak için aksiyal kesitler kullanıldı. Koronal planda NPK şekilleri sınıflandırıldı , foramen sayıları tespit edildi. Yaş ve cinsiyetin tüm değişkenler ile ilişkisi değerlendirildi. Ortalama NPK uzunluğu 12,56 mm olup , ortalama NPK açısı 75,52° olarak tespit edildi ve her iki parametrede de cinsiyetler arasında istatistiksel olarak anlamlı bir fark bulundu ($p < 0,05$). Sagittal kesitte en yaygın NPK şekli huni (%22) olarak tespit edilirken ; aksiyel kesitte nazopalatin kanalın insiziv foramen seviyesindeki en yaygın şekli kalp (%19) olarak tespit edildi. İncelenen tüm parametrelerde yaşa göre farklılıklar bulunsa da istatistiksel olarak anlamlı değildi($p > 0,05$). NPK, hem morfoloji hem de boyutları açısından önemli anatomik farklılıklar gösterebilir. Dentoalveolar cerrahi sırasında olası komplikasyonları önlemek için dikkatli bir preoperatif değerlendirme gereklidir. Anterior maksillaya uygulanacak cerrahi prosedürler öncesi NPK topografisi ve boyutlarını belirlemek için 3 boyutlu görüntüleme önerilmektedir.

Anahtar Kelimeler: Anterior Maksilla, Konik-Işınlı Bilgisayarlı Tomografi, Nazopalatin Kanal, İnsiziv Foramen

RETROSPECTİVE EVALUATİON OF NASOPALATİNE CANAL MORPHOLOGY BY CONE-BEAM COMPUTED TOMOGRAPHY

ABSTRACT

It is necessary to know the characteristics of the nasopalatine canal (NPC), to understand the morphology and pathogenesis of lesions occurring in this region, and to evaluate the anterior maxilla before surgical procedures such as dental implant applications or bone augmentation. The aim of this study is to analyze the dimensions and anatomical features of NPC using cone beam computed tomography (CBCT).100 CBCT images were included in the study. The dimensions and anatomical features of the NPC were analyzed in sagittal, coronal and axial slices. Sagittal and axial sections were used to evaluate the shape of the NPC, its angle with the palatal plane, the diameter and number of incisive foramen and Stenson foramina, and the length of the NPC with NPC measurements. In the coronal plane, the NPC shapes were classified and the foramen numbers were determined. The correlation of age and gender with all the variables were evaluated.The mean NPC length was 12.56 mm, the mean NPC angle was 75.52°, and there was a statistically significant difference between the genders in both parameters($p < 0,05$). In sagittal section, the most common NPC shape was found to be funnel (22%); In the axial section, the most common form of the nasopalatine duct was found to be the heart (19%). Although there were differences according to age in all parameters examined, they were not statistically significant ($p > 0,05$). NPC may show significant anatomical differences in terms of both morphology and dimensions. A careful preoperative evaluation is necessary to prevent possible complications during dentoalveolar surgery. 3D imaging is recommended to determine the NPC topography and dimensions before surgical procedures to the anterior maxilla.

Keywords: Anterior Maxilla, Cone-Beam Computed Tomography, Nasopalatine Canal, İncisive Foramen

ENTITLED: FOR A REINTEGRATION OF THE FORGOTTEN ANCIENT HERITAGE IN THE URBAN LANDSCAPE OF PRESENT-DAY CITIES: THE CASE OF THE ROMAN THEATRE OF SKIKDA, ALGERIA

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ABSTRACT
The heritage is the carrier of our identity, and it is the witness of our history, it must be taken care of, safeguarded and valorized, so that it can be transmitted to future generations. Algeria is a country that possesses a rich cultural and natural heritage over its two million square kilometers, including the city of Skikda, a historic city that has seen the passage of several civilizations, with two main periods that have marked its history: the Roman period and the French colonial period. A rich heritage was built during these two periods, including the great Roman theatre in the center of Skikda, dating from Hadrian. Today, this theatre is devalued and marginalized, but also removed from the city's urban landscape, despite its location in the center of the city, and this is due to the construction, during the colonial period, of the Emile Maupas College, now the Lycée EL Nahda, on the scene of the theatre. This action caused a visual as well as a spatial rupture between the theatre and the city center. The purpose of this work is to highlight the possibilities of restoring the Roman theatre of Skikda to its true heritage value and to reintegrate it into the urban landscape of the city center of Skikda. Historical and analytical research was carried out in order to meet the above objectives, and as a result we have proposed interventions on a double scale, architectural and urban, in order to reintegrate this forgotten heritage into the urban landscape of the city of today, but also to give it its true historical value. These interventions will be developed through this contribution.

Keywords: Roman theatre- Ancient heritage- Reintegration- Historical value- Urban landscape - Skikda

FREEZE DRYİNG TECHNİQUE FOR MİCROENCAPSULATİON OF GOUMİ BERRY EXTRACT

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ABSTRACT
The Goumi berry are good source of polyphenolic compounds especially flavonols, which are thermally sensitive. Therefore, the objective of this study was to examine the effect of carrier material applied and their concentration during freeze drying of Elaeagnus multiflora Thunb. on the content of polyphenolic compounds by UPLC-PDA-ESI-TQD-MS/MS and antioxidant activity (ABTS, FRAP, DPPH) of powders obtained. Goumi berry extract was microencapsulated using three different carrier materials such as inulin, maltodextrin and whey protein isolate as well as combination of inulin and maltodextrin, inulin and whey protein isolate, maltodextrin and whey protein isolate (in 1:1 ratio) by freeze drying at 10, 20 and 30% concentrations. Thirty-five bioactive compounds were detected in Goumi berry, including thirty-four flavonols, and one phenolic acid. This indicated that inulin (10% of carrier concentration; 2% loss of polyphenols in relation to fruit without carriers) and inulin:maltodextrin (in 1:1 ratio; 20% carrier concentration; 28% loss of polyphenols in relation to fruit) has the best encapsulation efficiency than other two carrier materials and their combination during microencapsulation. While, the highest degradation of phenolic acid and flavonols was found in the powders with 20% added of whey protein isolate (75% loss of polyphenols in relation to fruit) and 30% of inulin: whey protein isolate (in 1:1 ratio; 78% loss of polyphenols in relation to fruit). Properly designed high-quality Goumi berry powders may be used as nutraceutical additives to designing novel food with health benefits for populations.
This research was funded in whole by National Science Centre, Poland [grant no. 2020/39/D/NZ9/01810].

GSM SMART TANK MANAGEMENT SYSTEM

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ABSTRACT
The water tank is a vital part of every household. But unfortunately, it can also be a major source of wastage. This paper introduces an IoT (Internet of Things) system which help people deal with such problems. This system helps users to know when their tanks are about to overflow so that they can take action before it happens. There are two dimension of our proposed system smart level detector (Ultrasonic sensor) and second one is an android app. Firstly, smart level detector detects the water level and sends the signal to GSM/GPRS module to ON or OFF the motor at the specified time. For controlling the water pump Relay is connected with a motor get off/on automatically. These two devices are configured with Arduino UNO and GSM to receive the signal and perform action. Second one is android app; we will be able to monitor the water usage through app and also perform some specific action. Thus, we control and monitor the water wastage and water usage simultaneously. According to the level of water system will perform action. This system expects to control and monitor approximately 5 -20 water storage.

Keywords: GSM/GPRS 900a, Ultrasonic Sensor, Relay board, Arduino, Water Tank, Android App, Wi-Fi, Think Speak Cloud

INTERNATIONAL URBAN RESEARCH CONFERENCE PRODUCTION OF BIOGAS USING WASTE PRODUCTS(WATER HYACINTH AND COW DUNG)

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ABSTRACT
This research was carried out to make use of water hyacinth to produce biogas which may solve the problem of water hyacinth management as well as provide solution to the energy and power shortages. Samples of water-hyacinth were identified and collected and the cow dung was obtained from an abattoir. One (1) single 120 litres of improvised rubber cylinder can was used as an anaerobic digester. Three (3) litres of water was added for the 30 days retention time. The cow dung was mixed with water at a ratio of 3 : 1. The slurry of cow dung and water hyacinth substrates was then fed to the digester for the fermentation process to begin. Experiments were carried out during the cool season and dry season (20– 40◦ C). The gas was collected and stored in the gas bag. The volume of biogas was measured using an EL- STER HANDEL GMBH MAINZ volumetric meter, which has a limit of detection of less than 0.0010 m3. The products obtained from the anaerobic digestion of water hyacinth were biogas and the compost that is removed from the digester at the end of the digestion process. The study's evaluation of production potential over a 30 days period revealed marked seasonal variations in biogas outflow. The study revealed that it is possible to produce biogas from a mixture of water hyacinth and cow dung. The facility's yield of 1 kg of gas was collected. The study thereof revealed that the higher the dilution level and presence of cow-dung, the higher the biogas production yields.

Keywords: Biogas, Combustion, Digester, Fermentation, Substrates

INTERNATIONAL URBAN RESEARCH CONFERENCE TRANSDISCIPLINARY APPROACHES OF DATA SCIENCE IN MARINE SCIENCES

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ABSTRACT
This paper interrogates the concept of transdisciplinarity, theoretically and from a perspective of a marine scientist. In this article, I consider the current needs for data analysis in marine sciences and propose a way to address them. The existing literature on cross-disciplinary applications of data analysis tools in response to pressing marine environmental problems is vast, particularly in conservation biology. Marine data hold abundant information and insights that Data Science techniques can reveal. As more of the ocean is measured and mapped, and modeling increases in complexity, the need for innovative tools and methods will increase. There is high demand and potential to combine skills and knowledge from Marine and Data Sciences to best take advantage of the vast amount of marine data. Arguing that it is time to integrate the fields of Earth System Sciences and Data Science. Data Science should be established as a fourth paradigm in Earth System Sciences beyond observations, theory and modeling, requiring its own experts and specialists.

Keywords: Data science, Paradigm, Transdisciplinary

WASTE MODIFICATION BY ALKALI ACTIVATED METHODS FOR OBTAINING SUSTAINABLE BUILDING MATERIALS

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ABSTRACT
Significant environmental effects are caused by the ashes produced by thermal power plants and the desulfurization of exhaust gases. A variety of uses for these byproducts have been identified in recent literature, including modification to create new building materials. One of the criteria developed for the manufacture of alkali activated materials, with superior workability, high durability, and improved mechanical properties, is waste containing alumino-silicates. This experimental study intends to determine the effect of the following parameters on the modification of the locally accessible waste: Solid/Liquid ratio, NaOH concentration, temperature, and time. Because of their chemical and physical characteristics, which vary greatly depending on the source, ashes are not generally regarded as acceptable by-products. As a result, further research is being done to comprehend how fly ash-based alkali activated material reacts. Waste from the thermal power plant was employed in this investigation. According to an experimental design matrix that contains the previously specified alkali activation parameters, various alkali activated materials were created. Chemical and microstructural analyses (XRD, SEM, EDX, TGA, etc.) are

used to examine the synthesized materials in order to understand the changes that occurred to the raw materials throughout the synthesis process. Accompanying the research were mechanical tests of compressive and flexural strength. The modification process, which will affect the durability and strength of the resulting material, generated the most attention in this research investigation. This study served as a crucial first step in implementing the use of fly ash as an alternative construction material.

Keywords: alkali activation, building material, fly ash, properties

ACKNOWLEDGMENTS
This work was supported by POC/163/1/3/Innovative Technology Project, project number 399/390075/17.11.2021, Cod SMIS 2014: 120951

MAGNESIUM HYDROXIDE ADSORBENT FOR ORGANIC DYE SORPTION FROM POLLUTED WATERS

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ABSTRACT
Organic compounds (drugs or dyes) are widely used in many industries and when released as effluents cause serious environmental problems. Therefore, finding strategies to remove them from contaminated streams is essential. The most often utilized techniques include coagulation, adsorption, and photocatalysis. Adsorption is the most practical method for treating contaminated waters because to its ease of use, low operating costs, great efficiency, and minimal energy usage. The creation of effective adsorbents is therefore necessary for improving the adsorption process. Activated carbon, clays, zeolites, and metal oxides/hydroxides can all be employed as absorbents; however, some of these adsorbents have disadvantages such low adsorption capacity, high cost, or ineffective recycling. The most attractive of the class are the adsorbents based on magnesium since they are reasonably priced, stable, non-toxic, and environmentally benign. This study suggests using magnesium adsorbent in hydroxide form since it is feasible to synthesize a variety of Mg(OH)2 types depending on the precursors or synthesis conditions. Magnesium hydroxide was created chemically through the precipitation of potassium hydroxide at concentrations of 0.5, 1, and 2 M together with 0.5 M solutions of magnesium nitrate and magnesium sulphate. As a function of molarity and alkali excess, the properties of the produced materials were examined using SEM, XRD, EDAX, particle size distribution, and BET. Utilizing Mg(OH)2 nanoparticles, organic compounds are removed (Congo red - CR). The adsorption removal achieved 95% at 20 °C. The Langmuir adsorption model was used for Congo Red adsorption. The adsorbent was regenerated using calcination, and the regeneration effectiveness was maintained for up to six cycles.

Keywords: Adsorbent; Congo Red; Magnesium hydroxide, Removal efficiency

MAGNETIC PROPERTIES AND MAGNETOCALORIC EFFECT IN AMORPHOUS (FE35ER65)100-XBX (X=0 AND 10)

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ABSTRACT
We report on the magnetic properties, magnetocaloric effect (MCE) and critical exponents in amorphous (Fe35Er65)100-xBx (x=0 and 10), prepared by liquid quenching technique. The transition temperature from ferromagnetic to paramagnetic state has been evaluated according to M (T) measurements, and it is found to be 40 and 29.4 K for Fe35Er65 and (Fe35Er65)90B10 compounds, respectively. The magnetization dependence M (H,T) on the temperature T and magnetic field H was measured carefully in the critical region. Magnetic entropy change (–ΔSM) allowing estimation of the MCE was determined based on thermodynamic Maxwell's relation. The magnetocaloric study exposes a quite large value of the magnetic entropy change, which decreases when increasing B concentration. For an applied magnetic field of 5 T, the values of (–ΔSMax) peak are about 14 and 6 J.kg−1.K−1 for Fe35Er65 and (Fe35Er65)90B10, respectively. From the field dependence of the magnetic entropy ΔSM (ΔSM α Hn) and the relative cooling power (RCP) (RCP α H1+1/δ), it was possible to evaluate the critical exponents of the magnetic phase transitions.

Keywords: Liquid quenching technique; Maxwell's relation; Magnetocaloric Effect; the relative cooling power; Critical exponents

STRUCTURAL AND MECHANICAL CHARACTERIZATION OF METAKAOLIN'S BASED GEOPOLYMER REINFORCED WITH TREATED NATURAL FIBERS

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ABSTRACT
Due to a combination of ecological, financial, and inner properties, geopolymers are one of the hot topics in nowadays research. In this perspective, the main study of this work was devoted to the structural and mechanical characterization of Metakaolin's based geopolymer and the reinforcing effect of treated natural fibers. In the experimental part, two additives were compared: sand and blast furnace slag on the geopolymer mortar. We covered the effects of natural fiber type, length, and duration on structural and mechanical properties. Spectral analysis (X-ray diffraction) showed that the geopolymer gel exhibits an amorphous structure. It led to a more homogeneous system in the metakaolin and sand samples. The raw sample based on metakaolin and blast furnace slag had the best compression result with 35MPa. It's noticeable that the insertion of a 4% tenure of short palm fibers in this geopolymer improved the flexural strength up to 6.8 MPa, improving the mechanical properties of geopolymer-based mortars

Keywords: Geopolymer, Metakaolin, Blast furnace slag, Alkaline activation, Natural fiber, Structural properties, Mechanical properties.

THE NEXUS OF EMPLOYEE HAPPİNESS AND EMPLOYEE ENGAGEMENT: A SPECİAL REFERENCE TO APPAREL INDUSTRY WORKERS İN SRİ LANKA

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ABSTRACT
Engaging employees is the current thought of every organization, since the concern has increased towards the possible ways to engage employees. However, there is still a puzzle that to what extent employees engage into their works. Thus, the present study investigates the nexus of employee happiness and employee engagement. Further, having engaged employees in the workplace is more vital to for organizational efficiency and organizational success. Since the little attention was paid on employee happiness for apparel workers, this study sheds the new light in Sri Lankan context with the association between employee happiness and employee engagement with the moderating effect of gender through the lens of social exchange theory. A survey strategy was used for this study and data were collected from conveniently chosen 287 apparel industry workers. Smart PLS 3.0 was utilized to analyze the data. The results unveil that individuals with a high workplace happiness are more likely to have high employee engagement. At the same time, no moderating effect was found on gender on this relationship. This is the first study to incorporate happiness and engagement in Sri Lankan apparel sector workers. Future studies can incorporate several employee outcomes with employee happiness and other industries could be taken into consideration.

Keywords: Employee happiness, Employee engagement and Gender

STRUCTURAL EXPERTISE OF THE MOSQUE EL ABBASSI EL KABIR IN THE OLD MEDINA OF MARRAKECH, MOROCCO, IN THE CONTEXT OF HISTORICAL BUILDING EVALUATION AND REHABILITATION

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ABSTRACT
The objective of this article is to make a visualization of inspection at the level of the old traditional buildings of Derb-sultan damaged as well as a morphological and mechanical analysis about the samples based on reinforced concrete slabs. Observations and field examinations have shown that among the major manufacturing defects identified is that the dimensions of the reinforcements have been ignored. This resulted in a significant reduction in the strength of the sections, as well as an insufficient anchorage length in the longitudinal and transverse reinforcement. In addition, poor placement of concrete, walls made of rubble stones of different grain sizes and non-standard aggregates reinforced with red clay and cement can be considered as another manufacturing defect. The morphological study by SEM clearly shows that the Ca/si ratio is too low for all the samples, which may be the major problem of the reduction in the compressive strength of the concrete slabs studied. With regard to the mechanical properties by the test of the resistance to compression and bending, the values obtained are too low compared to the adolescent building. Several effects such as the porosity, the hardening, the age, the type of aggregate and the water-cement ratio as well as the Ca/Si ratio of the samples studied, can interpret these results.

Keywords: Traditional building, Concrete slab, Morphologic, Mechanical properties, Porosity, Ca/Si ratio

EVALUATİON AND ASSESSMENT OF FLOW DİSCHARGE FOR DİFFERENT RETURN PERİODS: CASE STUDY OF HODNA BASİN (ALGERİA)

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ABSTRACT
Wadis of Algeria are subjected to a very irregular hydrological regime. The present study attempts to assess the peak flows in El-Ham wadi study area in the Hodna basin of Algeria by applying empirical (Giandotti, Possenti, Turazza, and Temez) and statistical techniques (Gradex). These methods are the most suitable for El-Ham valley due to the availability and accessibility of precipitation data. The annual maximum daily precipitation (Pmax,d) records are chosen for the applications. This leads, firstly, the estimation of the concentration time Tc using ANRH-Sogreah, Basso, and Giandotti formulas. The results can provide us with many insights. One can easily observe the rise in flood discharges over the different chosen return periods (10-year, 20-year, 50-year, 100-year, and 1000-year). The estimated concentration period equals to 21.5 h. The short-term precipitations at stations 050101, 050301, and 050703 are 91.2 mm, 121.7 mm, and 51.2 mm, respectively for a 100-year return period. Centennial return period density shows high values at stations 050301 (5.67 mm/h), 2.43 mm/h at station 050703, and 4.25 mm/h at station F050101. Empirical analysis of flood discharges still repeats the same observations regarding flows with return periods with different flow rates (5581.86 m3/s for a 100-year, also shown at Ain El Hadjel station). One should point out that these outcomes enhance the future research in the Hodna study area, particularly in study of flash floods which implies the knowledge of peak flow of several return periods.

Keywords: Peak flow, Hodna, El-Ham wadi, Empirical formulas, Gradex, precipitation

STUDY ON DETECTION AND CLASSIFICATION OF CERVICAL CANCER IN PAP SMEAR IMAGES USING FEATURE EXTRACTION TECHNIQUES

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ABSTRACT
Cancer of cervix is the condition in which the cervix, which in usual state is covered by thin layers of tissue containing of normal cells changes into malicious cells which have an inclination to produce and divide more quickly than usual, thus developing into a cancer cell. By medical image processing and texture analysis methods, cervical cancer screening at initial stage becomes feasible and cancer can be controlled in the dysplasia themselves, before it steps into chronic stage. The system approach for analysis of malignant cells is more economical and originates to have an edge over the routine revealing methods like Pap smear and Liquid cytology based (LCB) test or Colposcopy or Cervicography etc. in terms of accurateness and time.

Keywords: Image Processing, Pap Smear, Segmentation, Classification, Feature Extraction

EDUCATİON, REFORMATİON, AND WOMEN EMPOWERMENT: READİNG PERİYAR'S VİEWS ON THE EMANCİPATİON OF WOMEN

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ABSTRACT
This paper is an attempt to understand Periyar and his approach to liberating women from age-old customs and practices and his viewpoints to liberate women. Thanthai Periyar who was very unique in his approach towards a liberation theory has influenced all walks of society and has formulated his approach based on rationalism and humanitarian theories. He has vehemently criticized religious institutions and shown light how the institution called religion became a tool to exploit the ignorant masses. He has from the beginning written extensively for the emancipation of women. In this paper, we would like to study the importance of Periarist feminism in the contemporary world. Periarist feminism has based on rationalism and he liberated the womenfolk from the clutches of religion. Here our attempt is not to look at the exploitation meted out by the religious, but how Periyar has been successful in liberating the women in Tamil Nadu who were under the suppression of many institutions among this religion was one of the prominent tools. We have formulated our theories from the writings of Periyar and his many speeches. We have also looked at the Self Respect Movement and its various resolutions. We have outlined a few areas such as Marriage System, Gender Equality, Women's Education and Employment, Property Rights to Women Widow Remarriage, Pregnancy, Childbirth, and Family Planning, and others to critically study the thoughts of Periyar on women's liberation.

TANGIBLE FAILURES OF URBANISM IN 500 METRES INFRASTRUCTURE ACCESSIBLE FUTURISTIC CITY MODEL

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ABSTRACT
The Evolution of human race is dynamic and we have multiple civilization, events, traditions, culture, custom, technology, war, region which catalyzed the evolution. In that way Human settlement pattern has its own Urbanism (the way of life characteristic of cities and towns) from the olden civilized cities like Athens to contemporary cities like Singapore. But now Urban Planning is mostly towards sustainability which makes the users to forget their evolution where they had religious spaces for social interaction has now changed into Urban Parks. Though the planners and architects achieve sustainability and ecological conservation in Parks, we force users to adapt with that and making them forgot their evolution. And we had good landscape and ponds in our monumental and religious spaces as well which conserved Ecology and reduced Urban Heat island. And this 500 meter infrastructure accessible cities may encourage the users to walk and enhance the environmental quality but intangibly it is making a boundary for users and they mostly don't engage themselves in exploring their city. And also its affecting their mental perception towards classification of spaces(Public, Semi Public, Private).This Boundaries may someday leads to strict rules and regulation, And there the social Imbalance takes place. The City should be more APPROACHABLE rather than more ACCESSIBLE. So we need Users participation and their review in Urban Planning, Also the Users study is important while studying the context. The Mixed Use High Rise may solve the accommodation and accessibility but it is creating the complexity in structure, services, security, Surveillance and Social Interaction etc. Imagine the underground water consumption of HIGHRISE buildings and in the other hand we're seeking the solution for the problem we created like water recycling and energy conservation. The Solutions may not be permanent but it should be alterable.

Keywords: Urbanism, Human Settlement Planning, Land Use, Sustainability and Urban Ecology

THE PERİOD OF TRANSİTİON İN TRADİTİONAL TO MODERN URBAN PLANNİNG İN THE CONTEXT OF HİSTORİCAL CİTİES OF IRAN- CASE STUDY OF ARDABİL CİTY

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ABSTRACT
After the extinction of the Qajar dynasty, a series of planned reforms were carried out by Reza Khan with the aim of consolidating the Pahlavi rule and modernizing Iran. Modernization and adherence to the West was one of the most important approaches to compensate for the backwardness and achieve progress in underdeveloped countries at that time. It started from the capital in Tehran and spread to other cities. The result of these changes was population growth and an increase in urbanization. The fabric of Iranian cities was not immune from these transformations and underwent fundamental changes. Iranian antiquarian nationalism directed the government's view to the past and modernism to the future, and the Pahlavi government tried to express its political-social views such as religionism, antiquarianism and modernism, etc. through architecture and urban planning. This research deals with the impact of Reza Khan's thoughts on the context of Ardabil city in a historical-adaptive way and with a qualitative approach with the help of documentary studies. He has used the historical-interpretive method in the part of gathering theoretical foundations and the descriptive-analytical method in the field of analyzing and comparing the changes in the physical-spatial structure of Ardabil city during the Pahlavi rule.

Key word: Pahlavi rule, transition period urbanism, archaism, national style , Ardabil

INVESTİGATİONS OF SUBSOİ SURFACE CONDİTİONS İN THE SOUTHERN REGİON OF ILAJE-ESEODO USİNG GEOPHYSİCAL METHODS

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ABSTRACT
An integrated geophysical investigations survey was carried out at a site in the south-western part of Nigeria. The aim of the study is to evaluate the sub-soil conditions, chemical and electrical properties of the soil which may have effect on the proposed structural building and facilities system. The geophysical investigation involved the Vertical Electrical Sounding (VES) technique using the Schlumberger configuration and a geotechnical investigation. Four subsurface layers were delineated within the study area which include: the topsoil (mixture of sand, silt and clay), coarse sand, clayey sand and sand. This correlated with the sub-soil investigation. The study area is underlain by a stratum of medium stiff to stiff lateritic clayey/silty sand. The choice of foundation construction for the proposed structure must take care of the settlement characteristics of the clayey material, and it may not serve as a good electric earthing material, therefore there is a need to improve the subsurface conductivity of this layer most especially within the area where the electrode for the earthling system will be buried.

Keywords: Geophysical, Investigations, Vertical electrical sounding, Subsoil Surface and settlement characteristics

DETERMINATION OF ALCOHOL CONTENT PRESENT IN PALM WINE (TADI) USING CONVENTIONAL TECHNIQUE OF SPECIFIC GRAVITY

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ABSTRACT

Aim: The primary aim of this study was to find out the alcohol content present in palm wine collected from the local market.

Objective: The main objective of this work was the direct determination of alcohol content and other impurities in palm wine collected from nearby areas.

Methodology: The alcohol content present in palm wine was determined using a conventional method of simple distillation and distillate was obtained. The specific gravity was determined and it was compared with the AOAC chart to find out the alcohol content.

Results: The four samples were taken, and alcohol content was determined through specific gravity. It was obtained as follows: Sample A: 0.9842 (11–12%), Sample B: 0.988 (8.06%), Sample C: 0.988 (8.06%), and Sample D: 0.992 (5.02%).

Conclusion: The research has shown varying results for the alcohol content present in palm wine. The normal alcohol content present in palm wine is around 6%. The alcohol content found in the tested samples collected from the local market did not match the standard value. Due to the lack of quality, many impurities may be present in the samples and this may cause severe health problems. An evaluation was done to make the public and healthcare professionals aware of the excess amount of alcohol and adulterants present in the samples collected from the local market.

Keywords: Alcohol content, palm wine, AOAC and specific gravity.

CHARACTERIZATION OF OLIVE OIL FROM OLIVE GROVES (OLEA EUROPAEA VAR. EUROUPAEA L.) IN SEMI-ARID CONTINENTAL REGIONS: CASE OF THE BENI MELLAL-KHENIFRA REGION IN CENTRAL MOROCCO

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ABSTRACT
The characterization of olive oils from orchards (Olea Europaea var. Europaea L.) during the period 2017-2019 in a continental environment with a semi-arid climate, the lands of Beni Mellal-Khenifra, located in central Morocco, revealed territorial specifications. Four homogeneous agricultural territorial units were identified. The result showed the plain with great hydraulic

irrigation, the pluviometry plain with private irrigation pumping, the piedmont zone (alias "Dir" zone), and the medium mountain zone. These spatial units showed significant differences in the values of the essential parameters of the quality of the olive oil. The percentage free acidity content was 0.96, 1.76, 1.19, and 1.31, peroxide index (with meq/O2/kg) were 7.38, 6.34, 10.00, 7. 09, the two specific extinctions under ultraviolet radiation at wavelength 232 nm showed 0.94, 1.34, 0.79 and 0.74, respectively. The wavelength at 270 nm showed non-significant differences in the values of 0.08, 0.09, 0.15, and 0.08. It was found that the agricultural territorial unit "the plain of great hydraulic irrigation" presented significantly the best quality of olive oil. It was the nearly equal frequency of the class of extra virgin oil (50.02%) and the class of virgin oil (49.48 %). The performance of the area is explained by the fertility of the soils, the judicious choice of the plant material, the relatively young age of the olive orchards, the suitable levels of technicality of the local olive growers, and the respect of the good practices of hygiene by the crushing units with improved modes within the studied area.

Keywords: Beni Mellal -Khenifra Morocco region’s, Olive oil quality, Olive orchard, Physical-chemical, Semi-arid climate.

CAUSES AND CONSEQUENCES OF BRAİN DRAİN İN PAKİSTAN: A CASE STUDY

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ABSTARCT
The migration of highly educated individuals to industrialised countries around the world is known as brain drain, and as a result of this transfer, developing countries are experiencing a scarcity of human talent and experience in a variety of disciplines. In the recent decade, Pakistan has seen an increase in brain drain among highly skilled individuals, with little data available to explain the issue, particularly in the Medical and information technology sectors. The major goal of this research was to learn about current trends in graduate brain drain in Medical and IT disciplines, as well as the variables that contribute to it. This study randomly selected 60 respondents from the IT and Medical sectors to analyse the reasons of brain drain among Pakistani graduate professionals. The data on numerous variables of economic, political, and social causes influencing brain drain in Pakistan was collected using a structured questionnaire. Survey done via Email survey method. Snowball sampling method used for data collection. The findings suggest that some socioeconomic, societal, and political variables are to blame for Pakistan's brain drain. Graduates' perceptions of large pay packages, a high standard of life, peace, and a brighter future for their children are the elements that drive people to leave their home country. This groundbreaking research has contributed to a better understanding of Pakistan's Doctors and IT graduate shortage. The findings of the study can help the government and policymakers uncover the true causes of high-skilled graduate mobility and develop measures to keep the country's human resource.

Keywords: Medical Professional, IT Graduate, Migration, Pakistan

ANALYSIS OF URBAN EXPERIMENTS REPLICABILITY AND KNOWLEDGE TRANSFER IN TRANSPORTATION

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ABSTRACT
Given the challenges of mobility in today's cities and the complexity of transportation systems, urban experiments can be an alternative to traditional planning in addressing these challenges, by changing the users behaviors and community practices. Indeed, the use of urban experiments has many merits on urban investigation, planning and management, in terms of apprehending the complexity of urban systems, and empowering citizens and experts to reshape their spaces into more livable, enjoyable and sustainable places. However, these co-created experimental projects are, by their very nature, temporary, limited in scale and tailored solutions to local problems, while this is a requirement to achieve better results and minimize the risk of failure of these experiments, it can also be an obstacle to their scalability, replicability and endurability. This study aims to identify the forms of replicability of relevant urban experiments in order to improve the transportation in the New City of Sidi Abdellah in Algeria. Being a satellite, and rather dormitory, city linked to the capital Algiers, it relies on the latter's various infrastructures to meet the daily needs of 78% of its own inhabitants. Our research begins by understanding the issues and constraints of transportation in Sidi Abdellah, through the analysis of cartographic data and leading surveys with concerned citizens, then analysing examples of relevant urban experiments, to end up identifying the possible forms and criteria of knowledge transfer from these experiments.

Keywords: Replicability, Sidi Abdellah, Transportation, Urban experiments.

THE PROMOTION OF ARCHAEOLOGICAL AND HISTORICAL SITES USING THE DIGITAL MARKETING. BITAM REGION IN ALGERIA AS A MODEL

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ABSTRACT
This research aims to study the reality of archaeological and historical sites in the Bitam region of Algeria. Digital marketing has an important role in advertising valuable sites to the public inside and outside the country, which in return contribute to enhancing the historical tourism potential in Algeria. Algeria has huge historical tourism potentials in view of the rich culture and history of this country. The diversity can be distinguished in the number of monuments that are still witness to previous civilizations distributed in various regions of the vast country area. This research aims to study the possibility of marketing worldwide these archaeological sites in the Bitam region, highlighting the historical value of each site, and making it a touristic destination and allowing its economic exploitation. One of the most important results obtained is the possibility of marketing the historical tourist monuments in this region and highlighting the characteristics of each archaeological site through specific digital platforms, and how the tourism promotion of these sites would contribute to raising the tourism income for the Bitam region in particular and for Algeria in general at a high rate. The archaeological site helps to include these monuments, define and classify them within the national and international network, and make them one of the most considerable historical tourist destinations in the world.

Keywords: Archaeological and historical sites; Digital marketing; Tourism; Bitam region.

THE RELATİON BETWEEN AİR POLLUTİON AND MENTAL WELL-BEİNG

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ABSTRACT
Studies show that air pollution has a great impact on the mental and psychological makeup of the humans. It has been found that air pollution causes a decrease in happiness and an increase in depression among the people. It has also been found to impact cognitive skills by impairing logical thinking and decision-making. It has a profound negative impact on the work productivity of people. It has also been found to exacerbate criminal behaviour among the people especially in the youth. Several researches on the impact of air pollution show that air pollution hampers the satisfaction of people in their lives and is highly negative for their well-being. Air pollution is also seen have a very association with the heightened anxiety levels and frequent occurrences of mental disorders, such as depression, schizophrenia, and autism. It has also been identified to be a major risk factor in developing the habit of substance abuse, self-harming behaviors and suicidal tendency. People who experience continual and intense air pollution develop existential anxiety about their health and future prospects. Air pollution in way of leading to cognitive disorders is also responsible for dementia in adults and attention deficit hyperactivity disorder among children. This paper aims to bring out the impact of air pollution on mental health and well-being of the people with help of supporting research findings and try to identify ways and means to reduce both air pollution and the negative impacts caused by it.

INFLUENCE OF SCRAP METALS RECYCLİNG ON HEAVY METALS LOAD AND FLORA DİVERSİTY

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ABSTARCT
The surge in the number of scrap metals recycling factories across the globe is a cause for concern as their activities is a source for heavy metals introduction to soils. A study was carried out around a scrap metal recycling factory in Osun, state, Nigeria to determine the levels heavy metals in the soils and its impact on the composition/diversity of flora. Soil samples were collected at varying direction and distances from the factory and analyzed for Fe, Pb, Ni, Cu and Cd using standard procedures. The species composition at the different points where the soil was sampled was also assessed. The results of heavy metals concentration for Fe, Pd, Ni, Cu and Cd was in range of 0.3-0.6, 0-0.01, 0-0.01, 0.001-0.28 and 0-0.28 mg kg-1. Iron (Fe) had the highest concentration around the factory and pollution load decreased with distances from the factory. There was significant variation in the species composition across the four cardinal directions from the factory. The study concluded that high concentration of Fe in the soil was the result of the high proportion of metal in the scraps brought to the factory. The smelting process and erosion effect possibly assisted in distributing the metals around the factory. Scrap metals smelting pose a great threat to the diversity of plants in an area.

Keywords: Heavy metals, metals recycling, pollution load index, species diversity.

A CRITICAL APPRAISAL OF ISSUES SURROUNDING GENDER RELATION IN AFRICAN URBAN CENTERS

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ABSTRACT
The increasing growth of urban areas around the world has seen an increasing number of people moving to cities and urban areas for a better life. This is particularly true for developing countries where a lot of factors conspire to bring all forms of conditions that are not conducive for dwelling in rural area. This situation makes a movement from rural areas to even the most deplorable part of the urban areas a much more desirable option. Just as movement to urban areas increase, so do issues about human relation in the urban area. Issues surrounding gender inequality and general issues on gender relations are one of those affected by increase in urban dwellers. My presentation seeks to explore some of these issues surrounding gender relation in African urban centers. My method will be that of analysis and exposition.

Keywords; Gender inequality, Gender relation, Urbanization, City, Social relation.

THE ROLE OF MICRO-ENTERPRISES FOR TRADITIONAL INDUSTRIES IN RURAL DEVELOPMENT, THE CITY OF KANTARA (ALGERIA) AS A MODEL

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ABSTRACT
This research aims to study the role of traditional industries through micro-enterprises in creating jobs, achieving sustainable development at the local rural level, and preserving the cultural heritage and identity of the rural population and fragile areas with limited income. The establishment of these institutions depends on state support as a major source and may extend to self-financing For some institutions, through the contributions of some residents in the same family environment, the main role of these micro-enterprises is to produce various types of products for traditional industries (spinning, weaving, clothing, carpets, mats, pottery...etc) and marketing them to obtain an added value for individual and local incomes, evaluating the effectiveness of these institutions in Algeria remains subject to the development of other complementary sectors, such as the promotion of the tourism sector and the modernization of marketing mechanisms, which allows the good definition and promotion of the products of these micro-enterprises, and thus achieving the economic and social goals of this type of enterprise..

Keywords: Traditional industries, Mini enterprises, Reducing unemployment, Qantara city

EVALUATİON OF THE ANTİMİCROBİC EFFİCACY OF TULSİ (OCİMUM SANCTUM), NEEM (AZADİRACHTA İNDİCA) EXTRACTS AGAİNST STAPHYLOCOCCUS AUREUS & E. COLİ

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ABSTRACT
Ocimum Sanctum (Tulsi) has numerous advantageous qualities, including antioxidative, antibacterial, antiviral, and many more. The most significant aromatic herb is O. sanctum. It prevents germs like E. coli and Staphylococcus aureus from growing. Neem is one of the most adaptable medicinal plants, Azadirachta indica. In Ayurveda, Unani, and homeopathic medicine, neem has been used extensively. It has been proven that neem leaf and its components have antibacterial, antifungal, antiviral, and antioxidant effects. This investigation compared tulsi and neem's antibacterial capacities. Ocimum Sanctum and Azadirachta indica were our two choices because of their antibacterial effects on both gram-positive and gram-negative bacteria. Agar dilution or broth microdilution is used to measure the outcomes after incubation of the solutions with various batches of grown bacteria at increasing concentrations to determine the MIC. distributing the leaf extraction in the nutrition agar plate. The highest zone of inhibition against E. coli was reported to be 18 mm and 9 mm, while against Staphylococcus aureus, it was 15 mm and 10 mm. Both leaves can be extracted and tested for antibacterial activity against E. coli and Staphylococcus aureus. This study proposed a more effective impact on the two bacteria.

Keywords: MIC (minimum inhibitory concentration), Tulsi (Ocimum sanctum) extract, Neem (Azadirachta indica) extract, Staphylococcus Aureus, E. coli.

STUDYİNG EFFECT OF LECA ON STRUCTURAL LİGHTWEİGHT CONCRETE

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ABSTRACT
Self-weight plays a key role in the overall load applied to concrete structures during design, which is crucial in circumstances like weak soils and towering structures. Reducing concrete density, which affects production costs, has substantial benefits as well. The efficiency of lightweight concrete has significantly improved as a result of widespread developments in the field of concrete materials. Although the benefits of employing lightweight concrete in infrastructure construction are obvious, long-standing performance misconceptions continue to create obstacles that prevent the concrete from being used more widely. Additional impediments to the usage of lightweight concrete have persisted as a result of the outdated structural design criteria for this material. This study compares the densities of lightweight concrete and the strength characteristics of traditional concrete when glass foam aggregates and LECA are used in place of natural aggregates. The first phase variable was the replacement % of sand with glass foam aggregates, and the second phase variable was the replacement percentage of LECA with conventional coarse aggregate. The ideal concrete mix had an average compressive strength of 14.68 N/mm2, a density of less than 1600 kg/m3, and all natural coarse particles were totally swapped out for LECA. In conclusion, the addition of LECA to concrete decreased its density and gave it the strength to function like lightweight concrete.

Keywords: LECA, Glass Foam Aggregates, Density, Compressive Strength

MECHANICAL PROPERTIES OF FIRED CLAY BRICKS MADE BY USING ORGANIC WASTE AS PORE-FORMING

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ABSTRACT
The construction of eco-friendly and thermally insulated fired clay bricks by adding waste materials especially in the developing countries due to population growth, is a challenge of our time. This study examines the experimental substitution of clay with 0, 10, 20, and 30 wt% of organic waste. Chemical composition, phase identification and thermal behavior of the raw materials were analyzed by XRF, XRD and TGA, respectively. The brick mixtures were formed and fired at 1100 ◦C. Properties such as firing shrinkages, bulk density, porosity, water absorption, compressive strength, and microstructure of the fired brick samples were determined.

Keywords: Porous ceramic; Pore-forming agent; Waste recycling.

EFFECT ON COMPRESSIVE STRENGTH OF CONCRETE AS A PARTIAL REPLACEMENT OF CEMENT WITH SUGAR CANE ASH AT DIFFERENT CURING CONDITIONS

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ABSTRACT
Concrete is versatile building material which is used in almost all construction works. Concrete material have many modification according to culture demand. Key factor of fibrous concrete is that adds the value to concrete. It can be used in humid environments with a significant role. Consumption of concrete is increasing day by day and considered as 2nd largest building construction material. By the use of fibrous concrete, few environmental issues have been addressed. Keeping in this view, an experimental study is conducted to evaluate the strength of normal concrete made with sugar cane ash of different percentages 0%, 5%, 10% and 15%. In this connection, thirty six cylinders of four mixes are prepared. Workability of fresh concrete is

checked during the pouring of cylinders. Poured cylinder samples are left for different curing ages at 7, 14 and 28 days. After curing, compressive strength on hardened concrete cylinders are tested. Workability of four mixes lies between 40mm - 80mm. Test results show that compressive strength of concrete using waste sugar cane ash with 15% is increased as compared to other mixes of concrete with 5% and 10%. Fibrous concrete is suitable for humid environment where high strength and voids less concrete are required. Addition of waste sugar cane improves the strength parameters as well as the acoustical properties. After checking the evaluations of concrete strength and durability, we can easily modify the structure as per cultural demand.

Keywords: Sugar cane ash, Fibrous Reinforced concrete, Mechanical, properties, modifier; durability; Eco friendly

POTENTIAL DEVELOPMENT OF BIOFUELS IN INDONESIA IN RESPONSE TO ENERGY AND POLLUTION ISSUES

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ABSTRACT
In responding to the goal of becoming a developed country, one of the things that can be done is with optimal economic development. On the other hand, this will certainly require less energy consumption. It is recorded that in 2022, Indonesia's energy consumption will reach 62,263 GWh. This condition has an impact on the emission load which reaches 530,354 Tons/year. The latest facts also show that in 2022, Indonesia will experience an increase in air pollution levels in several areas in the Java region. The fact that is happening is certainly contrary to the ideals of a green and sustainable economy. Energy resources that play a major role in the economic sector in Indonesia have another effect in the form of more air pollution which results in negative health impacts on society. There needs to be a revolution in the use of new, environmentally friendly energy sources in realizing a sustainable economy in Indonesia. With this problem in mind, this study was made with the aim of analyzing the association of energy demand and pollution produced in Indonesia. The analysis also examines the role of biofuels in tackling the need for more environmentally friendly energy. With increasing demands for reducing carbon emissions, biofuels are playing an increasingly valuable role in the production of cleaner energy. The results of the study found that current energy consumption has a positive association with pollutant levels. However, there has been a downward trend from the association level which shows that Indonesia is starting to make progress in responding to energy and air pollution issues. From the research results, it is also recommended to optimize biofuel as a new energy source with high CPO potential in Indonesia.

Keywords: Energy, Air Pollution, Biofuel, Economic Activity.

SYNTHESİS OF A NEW COMPOSİTİON OF BİOACTİVE GLASS WİTH İMPROVED PROPERTİES

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ABSTRACT
With the rise of industrialization around the world, energy hunger has reached unprecedented levels. The situation get worse with the Russian war in Ukraine. The cost of gas is ten times higer than the average of the last ten years. One of the most energy-intensive industries in the world is the glass industry. This huge energy cost in this area is related to the glass manufacturing processes in which the raw materials are melted and then quenched in order to obtain the final product. One way to reduce this gigantic energy cost is to change the glass processe. The sol-gel route is an alternative to the conventional melting-quenching method with the advantage of obtaining the glass in lower temperatures. But this method has very expensive raw materials. This is why the sol-gel route is only used in highly specific materials such as bioactive glasses used in the medical field. Sol–gel processing offers a number of advantages including low-temperature processing, precise microstructural and chemical control. The sol–gel bioactive glass not only provides a good degree of biocompatibility, but also a high specific surface area. Our work consists in synthesizing a bioactive glass with outstanding properties using the sol-gel route.

EMBEDDED ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING: A COMPARATIVE STUDY

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ABSTRACT
Robots are ideal replacements for trained staff in repeatable, general, and strategically significant roles, but they are not always practicable as replacements. In spite of growth and advancement in the automation industry, several sectors historically have been robot-reluctant, because they require large or unique quantities and non-serialized properties. However, there is a scarcity of research exploring new approaches including embedded artificial intelligence and machine learning to improve the efficiency of robotics. There is need to introduce a newer approach to advanced productivity and product quality, integrating control and robotics' repeatability with human versatility. Therefore, this research aims to explore the embedded artificial intelligence and machine learning approaches to minimize the robot-reluctancy and enhance the performance of robotics in the industry. This study will focus on comparison and similarities between embedded artificial intelligence and machine learning, and provide implication for practitioners to improve efficiency and productivity. This study will employ systematic literature review methodology to conduct comparison and identify similarities between embedded artificial intelligence and machine learning in the engineering context. This study will contribute to the existing body of knowledge and provide avenues for future research in relevant domains.

Keywords: Embedded artificial intelligence, machine learning, robot, performance, comparison.

MANAGEMENT OF EDUCATİONAL POLİCİES FOR INTERNATİONALİZATİON İN COLLEGE EDUCATİON INSTİTUTİONS: THEORETİCAL APPROACHES

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ABSTRACT
The educational policies for internationalization of higher education in Brazil are a reality and a worldwide trend, and there are different views about the topic. In order to understand how these policies have been discussed, the present work carried out the State of Knowledge on the "Management of Educational Policies in Internationalization of Higher Education Institutions (HEIs)", aiming to improve their strategies, through institutionalizing and consolidating the internationalization policy guaranteeing educational practices. In Brazil, the theme of internationalization in universities became evident with the Science without Borders Brazilian Program, increasing the country's visibility abroad. The investigation used the review methodology of searches on online platforms, aiming at a literature review regarding Theses and Dissertations in the last ten years on the subject. The results demonstrate that theme Internationalization at University is a field explored by the scientific community, but that no work has been found with the theme proposed by this study, an analysis of the guarantee of educational practices.

Keywords: Educational Policies, Internationalization, Higher Education, Policies, Brazil

ISSUES, CHALLENGES & EFFECTİVENESS FOR ECONOMİCALLY WEAKER SECTİON (EWS) HOUSİNG-HOW DO SPATİAL CONFİGURATİONS AFFECT ECONOMİC SECURİTY İN EWS HOUSİNG PROJECTS İN SURAT?

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ABSTRACT

The research investigates the governing factors and spatial configurations that affect economic security in EWS housing projects in Surat, Gujarat and the challenges and potentials of its provision. But to do so, understanding the key factors that affect the rehabilitation process in urban centers forms the basis for my study. These factors include the current political environment, rapid development and demand for the prime land in the middle of the city, building codes, socio-cultural identities of the migrants, and additional financial responsibility of SRA. To give a brief background, contemporary migrant/EWS housing solutions in urban cities only cater to the provision of shelter in its bare minimum definition. Further, it exists only as individual residential towers, isolated from the traditional way of urban patterns where residential and commercial activities were forming the complex layers of the mix-use urban fabric. In terms of accessibility as well, most economically weaker sections of housing redevelopment projects in urban cities fail for various reasons including the location of the rehabilitation sites in the urban outskirts away from the commercially active city centers. With this knowledge base, the study aims to evaluate the economic security generated due to spatial conditions on sites developed by Slum Rehabilitation Agency (SRA) to rehabilitate informal housing clusters in Surat city. The study is based on the claim that providing decent, affordable, and accessible housing fosters self-sufficiency, bring stability to families and new vitality to distressed communities, and supports overall economic growth. It attempts to place housing in the context of how economic security for the entire population can be achieved and it explores the role that housing can play in fulfilling that mission. To do so, firstly the process of slum/informal housing formation is understood in a global, national, state, and city context. From this study, information is then deduced about the transformation of spatial conditions from informal to formal housing over the last 20 years in Surat. These conditions, anchored on economic stability, are then contrasted with those that exist in the informal settlements. This helps delineate the challenges and opportunities associated with the generation of economic security through spatial conditions and informal housing projects. While designing such a system for these people, which incorporates livelihood as a means of poverty eradication

and not just providing them with infrastructure, it is very much essential to pay attention to the feasibility aspect too. In most cases, the population is far below the poverty line and hence incapable of paying the minimum wage demanded by the government for providing them with housing. To substantiate these claims, the methodology followed in the study begins with Fieldwork which involves visiting SRA housing sites and also the informal sites from where families have been rehabilitated voluntarily or involuntarily. Then interviews with stakeholders - 1. Inhabitants in SRA housing and informal housing and 2. Professional/experts dealing with the issues associated with Slum Rehabilitation to derive anecdotal data. Post which is the documentation to understand the effects of spatial configurations that exist on both sites. With this base data, a spatial analysis matrix is then formed and analyzed to determine the standards that can accommodate live-work environments for informal housing settlements, and generate micro-economy while developing future rehabilitation projects.

Keywords: Spatial Configuration, Rehabilitation, Informal Settlements, Formal Housing Projects, Economic Security, Economic Stability.

THE EFFECT OF INAPPROPRIATE URBANIZATION ON THE POSSIBILITY OF FLOODING (CASE STUDY: KALAT CITY)

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ABSTRACT
In recent decades, urbanization and population growth have been important issues in urban management. Human activities, like encroachment of the river, affect the environment and the hydrological processes. These changes have caused an increase in flooding in cities. Therefore, it is important to ascertain how urban growth and land use changes affect the hydrological response in the city and it's downstream. For instance, the construction of impermeable areas, reduces permeability, speeds up runoff, and raises the danger of flooding in many parts of the city. Kalat city is located in the northeast of Iran. In the past few decades, this city has expanded inappropriately to profit the economic benefits of being next to the rivers. On the other hand, as the city has grown, the risk of floods and inundation has grown as well. As a result, numerous individuals and urban facilities sustain harm every year and numerous damages are caused to people, urban services and even historical structures (such as Sun Palace and Grand Mosque). We verified the effects of precipitation intensity and land-use change on runoff peak discharge. The findings of the research revealed that, in comparison to changes in rainfall intensity or total rainfall, the conversion of natural lands into urban area and land use change, might double the danger of floods and runoff peak discharge. The results also showed that the flood plains in some areas of the city could be significantly reduced by the implementation of management programs to control and reduce the river bed's roughness and prevent the change of the river plan (due to the construction of residential or commercial areas).

Keywords: Urbanization, Land use change, Urban flooding, Urban management

THE GIRL CHILD EDUCATION AND SUSTAINABLE DEVELOPMENT PROSPECTS AND CHALLENGES A CASE STUDY OF KATSINA STATE, NIGERIA

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ABSTRACT
Girl child education has been considered as a means to achieve sustainable development. This is because better educated women tend to be more informed about nutrition, healthcare, family planning, and their children are usually healthier when they become mothers. They also participate actively in the formal labour market and earn higher incomes. All these factors combined can help a country to achieve the sustainable development goals. This study is aimed at providing valuable insight about importance of girl child education and the causes of poor female students' enrolment in schools in Northern Nigeria. The study adopted descriptive statistics to analyze data obtained via survey of 250 respondents drawn from questionnaires administered to teachers in the selected primary and secondary schools Kankia Local government area of Katsina State. The results from the study show that poverty, inadequate infrastructures, religious misinterpretation is the main issues attributable to poor enrolment of female students in schools. The study therefore recommends women empowerment strategy to encourage them send their daughters to school. The government should provide adequate infrastructure in order to accommodate separate classes for female students.

Keywords: Girl child education, sustainable development, family planning

SIBLING RIVALRY IN FAMILY SYSTEM. A COMPARATIVE STUDY AMONG THE CHILDEN OF WORKING AND NON-WORKING WOMEN

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ABSTRACT

Sibling rivalry is a component of sibling relationship. This relationship is affected by the amount of involvement and quantity of time parents spend with their children especially mother. A family 'mother or father' is characterized as an essential social group of individuals. Family socialised the children's, give them emotional and practical support, and members develop a sense of social identity. The focus of this study is to examine difference between sibling rivalry in joint and nuclear family system in Pakistan, to examine the difference in sibling rivalry among the children of working and non-working women and the study aims to investigate the variables such as: favouritism, prioritizing the needs of children, implementation of rules according to gender and providing equal rights among children. The significance of this research is sibling relationship is the most untouched topics in most of the society. Apart from parent-child relationship/interaction and peer group, there is far less research conducted on sibling relationship, which is considerably striking because, it is the most dominant relationship of an individual's life. The research design was quantitative, and the data was collected based on survey method. A self-structured questionnaire was designed for the accumulation of data. The tool consists of 15 items. Results are measured by utilizing 5 points Likert scale (strongly agreed to strongly disagreed). The number of respondents in this study comprises of 100 women who have at least 2 children (50 working women and 50 non-working women) and they were selected by convenient sampling. The age

range of selected sample was 25 to 50 years. The results showed that there is no significant difference between sibling rivalry in joint and nuclear family system. There was no disparity found between sibling rivalry among the children of working and nonworking women and the variables have significant relationships in the generation of sibling rivalry among children. Sibling rivalry is generated due to favouritism, inequality of treatment, conflict of choices and family values. A mother who practices these variables and discriminates among children results in rivalry among them. It is recommended that we should estimate the measurable impacts that sibling rivalry has on children's mental health and that family communication should be normalised through counselling for parents and children to address disputes that have arisen between them.

Keywords: Sibling rivalry, family system, favouritism, inequality of treatment

KİDDİE-SADS-PL SCREEN INTERVİEW: URDU TRANSLATİON AND CROSS-CULTURAL ADAPTATİON

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ABSTRACT

The objective of this paper is to describe the process used for the translation and cross-cultural adaptation of Kiddie Schedule for Affective Disorders and Schizophrenia for School-Aged Children (6 to 18 years) K-SADS PL Working Draft Screen Interview and Diagnostic Supplements to Urdu language. To ensure cross-cultural equivalency, dimensions of equivalence were addressed. The study was carried out by two researchers in Rawalpindi/Islamabad, Pakistan between May and October, 2016. Translation and adaptation guidelines provided by World Health Organization were followed and steps from the Brislin model for translation of tools were incorporated to make the methodology rigorous. The steps include forward translation, committee approach, back-translation, pretesting and systematic debriefing. Expert panel consisted of bilingual individuals, who had experience in working with children. After reviewing the initial forward translations, several probes were reworded and rephrased to make them culturally relevant. The Urdu version obtained from this process was then pretested on a sample of children and parents. Participants were then systematically debriefed and cognitive interviewing was carried out. Input from these interviews was incorporated. This process resulted in an Urdu version of K-SADS-PL Screen Interview and Diagnostic Supplements which allows for acceptable cross-cultural equivalence. This is the first step in a group of layer studies that will focus on the validation of this tool.

РУЙНУВАННЯ РОСІЙСЬКИМИ ОКУПАНТАМИ ІСТОРИЧНИХ, АРХІТЕКТУРНИХ, КУЛЬТУРНИХ, РЕЛІГІЙНИХ ПАМ'ЯТОК І ОБ'ЄКТІВ В УКРАЇНІ

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ТЕЗИ

Із початку повномасштабного вторгнення в Україну 24 лютого російські солдати намагаються захопити територію нашої держави, артилерійськими та авіаобстрілами руйнують лікарні, школи, пологові, житлові будинки, мости та укриття. Крім того, уже знищено і пошкоджено багато історичних, архітектурних і культурних пам'яток, а також і релігійних. Міністерство культури України відкрило сайт, який приймає заявки про знищення росіянами культурних та історичних пам'яток. Уже протягом майже дев'яти місяців російські окупанти, мародери і терористи нищать і пошкоджують унікальні пам'ятки архітектури, мистецтва та історії України. Війська країни-агресора цілять в унікальні споруди і символи міст. Справжня їхня мета — стерти Україну та будь-які прояви української ідентичності із лиця землі, тому українські пам'ятки культури зараз під особливим прицілом окупантів. За даними Міністерства культури та інформаційної політики, від початку повномасштабної війни російські окупанти зруйнували чи пошкодили більше 400 культурних пам'яток. Серед них 142 релігійні споруди, 51 із них перебувають на обліку як пам'ятки історії, архітектури та містобудування. Також росіяни пошкодили та зруйнували 119 об'єктів культурної спадщини: 21 – національного значення; 91 – місцевого значення; 7 – щойно виявлених об'єктів культурної спадщини. На додачу до цього війська російських загарбників зруйнували 42 меморіальних пам'ятники на честь історичних особистостей та подій XIX – початку XXI ст. А також під час бойових дій постраждали 30 будівель музеїв та заповідників, 75 будинків культури, театри та бібліотеки. Громадяни України активно допомагають Міністерство культури України у фіксації злочинів окупантів і повідомляють про руйнування пам'яток.

Ключові слова: повномасштабне вторгнення в Україну, знищено і пошкоджено багато історичних, релігійних, архітектурних і культурних пам'яток.

DESTRUCTION OF HISTORICAL, ARCHITECTURAL, CULTURAL, RELIGIOUS MONUMENTS AND OBJECTS IN UKRAINE BY RUSSIAN OCCUPANTS

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ABSTRACT
Since the beginning of the full-scale invasion of Ukraine on February 24, Russian soldiers have been trying to seize the territory of our country, destroying hospitals, schools, maternity hospitals, residential buildings, bridges and shelters with artillery and airstrikes. In addition, many historical, architectural and cultural monuments, as well as religious ones, have already been destroyed and damaged. The Ministry of Culture of Ukraine has opened a website that accepts applications for the destruction of cultural and historical monuments by the Russians. For almost nine months now, Russian occupiers, marauders and terrorists have been destroying and damaging unique monuments of architecture, art and history of Ukraine. The troops of the aggressor country aim at unique buildings and symbols of cities. Their real goal is to erase Ukraine and any manifestations of Ukrainian identity from the face of the earth, which is why Ukrainian cultural monuments are now under the special sights of the occupiers. According to the Ministry of Culture and Information Policy, since the beginning of the full-scale war, the Russian occupiers have destroyed or damaged more than 400 cultural monuments. Among them are 142 religious buildings, 51 of them are listed as monuments of history, architecture and urban planning. The Russians also damaged and destroyed 119 objects of cultural heritage: 21 – of national importance; 91 – of local importance; 7 - newly discovered objects of cultural heritage. In addition to this, the troops of the Russian invaders destroyed 42 memorial monuments in honor of historical figures and events of the 19th - early 21st centuries. Also, during the hostilities, 30 buildings of museums and nature reserves, 75 houses of culture, theaters and libraries were damaged. Citizens of Ukraine actively help the Ministry of Culture of Ukraine in recording the crimes of the occupiers and report the destruction of monuments.

Keywords: full-scale invasion of Ukraine, many historical, religious, architectural and cultural monuments were destroyed and damaged.

THE CURRENT SITUATION WITH THE CULTURAL HERITAGE OF UKRAINE AS A RESULT OF THE FULL-SCALE INVASION OF RUSSIA INTO UKRAINE

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ABSTRACT

Ukraine is highly rich for archaeological, ethnological and culture heritage sites. More than 130,000 monuments on the state register and more than 5,000 different museums you can find in the territory of Ukraine. But unfortunately, as a result of russia's full-scale invasion war against Ukraine, a large amount of cultural heritage and museum exhibits is losing. There is important to talk about all the atrocities of the russians in Ukraine, but my sentiments are on par of the decision to focus on russian cultural crimes on the example of the following museums. The Mariupol Museum of Local Lore was the largest in the Azov region. Since its foundation in 1920, the museum has unique rarities and valuable finds of the Azov region. There are over 53,000 artifacts in its collection, including material, visual, written (printed and handwritten), numismatic, archeological, photo-documentary, natural, and other objects. But unfortunately, in 2022 the fire after one of the russian missiles was the first stage of the destruction of the Museum. All survived artifacts at first were taken to the russians controlled territories in the Donetsk region. Also, important to mention Kuindzhi Art Museum. This is a fairly new museum that was opened in Mariupol in 2010. The museum's collection included original paintings, graphic works, sculptures, and examples of decorative art by Arkhip Kuindzhi and Ivan Aivazovsky; ancient icons and unique handwritten books. But in March 2022, the museum was by an airstrike of Russian military forces. All collection of the museum was stolen by them. Now already confirmed export to Donetsk more than 2,000 unique exhibits from the Mariupol museums. Presumably, further unique exhibits from Ukrainian museums will go on the territory of Russia. A similar situation is in Melitopol. The city is under temporary occupation since 1st of March 2022. We know that lot of artifacts from Melitopol Museum of Local History is removed. According to preliminary estimates, 198 gold objects were stolen, including gold Scythian artifacts (women's and men's jewelry, elements of headdresses and horse harness) from the famous Melitopol barrow, and a 5th century Hunnic diadem. The location of the artifacts is not known for certain. Ukrainian museums suffered great losses after recent attacks on Kyiv in 10th of October 2022. Several historical buildings were damaged. Among them – the main building of Taras Shevchenko National University of Kyiv; The Bohdan and Varvara Khanenko National Museum of Arts; National Museum of Taras Shevchenko and the National Science and Natural History Museum. All buildings were badly damaged, almost all windows and doors were broken. However, this is only a small part of the crimes of the russian army against Ukrainian culture. And this is not only a great loss for our country, but also a war crime under The 1954 Hague Convention for the Protection of Cultural Property. In the near future, if there is no intervention and lack of assistance to Ukrainian culture.

LEGAL STUDY OF THE WORLD

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ABSTARCT
The history of law's relation with the social sciences causes a dissection of the various meanings at play on both sides of the relationship. The term 'law' is used to refer to the two distinct decision-making processes of adjudication and legislation. 'Social science' refers to a wide spectrum of epistemic endeavors, ranging from extremely positivist to highly interpretive. These social scientific endeavours have gradually cleansed themselves of the various legalisms that originally framed them in varied ways. Simultaneously, as they establish themselves as autonomous epistemic practices or sources of scientific, legislative, and adjudicative practice broaden the frontiers of relevant knowledge from which to draw for legal purposes. The oldest written set of laws known to us is the Code of Hammurabi. He was the king of Babylon between 1792 BC and 1758 BC. Hammurabi is said to have been handed these laws by Shamash, the God of Justice. They carved the laws on huge stone slabs and placed them all over the city so that people would know about them. Ruled over an empire with only about 282 laws. The code's rules were elementary, and its punishments were straightforward. Since the 1990s, attempts to augment the traditional, primarily national historiographical traditions by introducing a global component have been on the increase. Meanwhile, the term 'global' has become increasingly popular in legal historical publications, papers, and even institutions. Legal historiography is being influenced by the transnationalisation of law, as well as the emergence of global history and global studies. The necessity for fundamental reflections on law and legal study, as well as a fresh appeal for long-term perspectives on a global scale, has become obvious as the world's legal systems undergo enormous upheavals. As a result, there is an increasing demand for legal history from around the world. However, there is no agreement on what global legal history is, what goals this type of legal historiography aims to achieve, or even where it should be placed in relation to other disciplines. The following article tries to paint a broad picture and highlight some of the major challenges that global legal history faces.

Keywords: Global History, Legal History, Legal Method, Translation, Multi-normatively

POLİETİLEN GLİKOL KÖPRÜLERİYLE ÇAPRAZ BAĞLANMIŞ POLİEPİKLORHİDRİNİN FARKLI POLARİTEDEKİ ÇÖZÜCÜLERDE ŞİŞME DAVRANIŞLARININ İNCELENMESİ

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ÖZET

Poliepiklorohidrin, düşük yoğunluklu (1.33 – 1.36 g/mL), üç üyeli epoksi halka bileşiği olan epiklorohidrinin hem anyonik hem de katyonik halka açma polimerizasyonu ile hazırlanabilen [1] elastomeerik bir polimerdir. Renksiz, biyobozunur ve biyouyumlu bir polimerdir [2]. Çeşitli uygulamalarda performansını değerlendirilmesi için kimyasal modifikasyonu ve kopolimerlerinin hazırlanması yol olarak seçilmiştir [3-5]. Ticari olarak mevcut poliepiklorhidrin (PECH) kimyasal olarak modifiye edildikten sonra "Klik Kimyası" reaksiyonu ile çapraz bağlanmıştır. Bu amaçla, öncelikle PECH yapısındaki asılı klor atomlarının bir kısmının azid ile yer değiştirilmesi sağlanmıştır. Üç farklı oranda azidleme yapılarak üç farklı çapraz bağlanma potansiyeli taşıyan modifiye PECH polimerleri (PECH-Az1, PECH-Az2 ve PECH-Az3) hazırlanmıştır. Bu yapıların karakterizasyonu FTIR ve elementel analizle yapılarak, daha sonra çapraz bağlayıcı ajan (köprü) olarak kullanılacak 2 farklı PEG makromonomerinin (PEG-1 ve PEG-2) uç-grupları ile propargillenmiştir. Bu amaçla, diol uçlu 2 farklı uzunluktaki PEGlerin (PEG-1 ve PEG-2) propargil bromür ile reaksiyonu sağlanmış, Propargillenmiş PEGlerin (PEG-1p ve PEG-2p) yapı aydınlatılması FTIR ve 1H-NMR ile sağlanmıştır. İkinci aşamada ise 3 farklı oranda azidlenmiş PECHler (PECH-Az1, PECH-Az2 ve PECH-Az3) ile uçları propargillenmiş iki farklı uzunluktaki PEG (PEG-1p ve PEG-2p) "Klik Kimyası" reaksiyonu ile çapraz bağlı 6 farklı PECH (PECH-Az1x1p, PECH-Az1x2p, PECH-Az2x1p, PECH-Az2x2p, PECH-Az3x1p, PECH-Az3x2p) elde edilerek. FTIR ile yapı karakterizasyonu teyit edilmiş, Propargil ve azid pikleirinin kaybolması ve triazol pikinin gözlenmesi Klik reaksiyonunun olduğunun göstergesi olmuştur. Elde ettiğimiz çapraz bağlı polimerlerin TGA ve DSC analizleri ile karakterizasyonu yapılmıştır. Bu çapraz bağlı polimerin 4 farklı polaritedeki çözücüde (THF, DMF, Metanol ve Aseton) 2 farklı sıcaklıkta (25 oC ve 37 oC) şişme davranışları zamanın fonksiyonu olarak incelenmiştir.

Anahtar Kelimeler: Poli(epiklorohidrin), Klik Kimyası, Çapraz Bağlama, Şişme Derecesi.

INVESTIGATION OF THE SWELLING BEHAVIOR OF POLYEPICHLORHYDRINE CROSS-LINKED WITH POLYETHYLENE GLYCOL BRIDGES IN SOLVENTS OF DIFFERENT POLARITY

ABSTRACT

Polyepichlorohydrin is an elastomeric polymer with low density (1.33 – 1.36 g/mL), which can be prepared by both anionic and cationic ring-opening polymerization of epichlorohydrin, a three-membered epoxy ring compound [1]. It is a colorless, biodegradable and biocompatible polymer [2]. Chemical modification and preparation of copolymers have been chosen as a way to evaluate its performance in various applications [3-5]. Commercially available polyepichlorohydrin (PECH) was chemically modified and then cross-linked by the "Click Chemistry" reaction. For this purpose, first of all, some of the pendant chlorine atoms in the PECH structure were replaced with azide. Modified PECH polymers (PECH-Az1, PECH-Az2 and PECH-Az3) with three different crosslinking potentials were prepared by azidation at three different rates. The characterization of these structures was made by FTIR and elemental analysis, and they were propargylated with the end-groups of 2 different PEG macromonomers (PEG-1 and PEG-2) that would later be used as crosslinking agents (bridges). For this purpose, the reaction of diol-terminated PEGs of 2 different lengths (PEG-1 and PEG-2) with propargyl bromide was provided, and the structure elucidation of propargylated PEGs (PEG-1p and PEG-2p) was provided by FTIR and 1H-NMR. In the second step, 3 different azidized PECHs (PECH-Az1, PECH-Az2 and PECH-Az3) and two different lengths of PEG (PEG-1p and PEG-2p) propargylated at the ends, cross-linked 6 different PECHs (PECHs) with the "Click Chemistry" reaction. -Az1x1p, PECH-Az1x2p, PECH-Az2x1p, PECH-Az2x2p, PECH-Az3x1p, PECH-Az3x2p). Structure characterization was confirmed by FTIR, the disappearance of Propargyl and azide peaks and the observation of triazole peak were indicative of a Click reaction. The cross-linked polymers we obtained were characterized by TGA and DSC analysis. The swelling behavior of this cross-linked polymer in 4 different polarity solvents (THF, DMF, methanol and acetone) at 2 different temperatures (25 oC and 37 oC) was investigated as a function of time.

Keywords: Poli(epichlorohydrin), Click Chemistry, Cross-linking, Swelling Degree.

ÇEVRİMİÇİ OLDUĞUNDA AKADEMİK YAZMA DERSİ: GERÇEKTEN EĞLENCELİ Mİ?

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ÖZET
Mevcut çalışma çevrimiçi eğitimin yerini yabancı dil öğretimi ve kaygı bağlamında akademik yazım öğrencilerinin algıları açısından keşfetmeyi deneyen niceliksel bir çalışmadır. Çevrimiçi eğitim, ilk bakışta COVID-19 gibi kısıtlı etkileşim dönemleri için faydalı bir çözüm olarak yorumlanabilir. Bununla beraber salgın döneminde bu tür araçlar bir taraftan her ne kadar eğitimin devam etmesi açısından acil çözüm olarak görülseler de örgün eğitimin yerini hakkıyla alıp alamayacakları konusunda test edilmişlerdir. Yine de can havliyle sarlınmış olan araçların verimliliği hakkında somut sonuçlara ulaşmak için bu acı tecrübenin getidikleri deneysel çalışmalarla analiz edilmelidir. Böylelikle geriye dönüp bakıldığında salgın öncesinde gerçekleştirlmiş olan sınırlı ve bölgesel önceki çalışmaların aksine saldının ardından yayınlanmış olan vaka çalışmaları bu türden bir çözümün gerçek fayada ve zararları açısından daha güvenilir bir vizyon sağlayacaktır. Mevcut çalışma böylelikle Türkiye'de yer alan Selçuk Üniversitesi İngiliz Dili ve Edebiyatı Bölümü'nde çevrimiçi yabancı dil eğtimine maruz kaldıklarında öğrencilerde kaygıyı tetikleyen faktörleri belirleyebilmek için gerçekleştirilmiştir. Çalımanın bulguları yabancı dil eğtimi alanının gelecekteki ilgi alanları açısından faydalı olacak sonuçlar ortaya koymuştur.

Anahtar Kelimeler: Niceliksel çalışma, çevrimiçi yabancı dil eğitimi, kaygı, ölçek geliştirme.

ACADEMIC WRITING COURSE WHEN ONLINE: IS IT REALLY FUN?

ABSTRACT

The current study is a quantitative research that attempts to explore the place of online teaching in view of academic writing students' perceptions as far as foreign language teaching and anxiety is concerned. Online teaching could be interpreted as a beneficial solution for restricted interaction periods such as COVID-19 at first. Nevertheless, during the pandemic period such instruments despite being an imminent solution for the continuation of education on the one hand, were tested whether they would succeed to substitute face-to-face education duly. Anyway, the outcome of this bitter experience is to be analyzed through empirical studies to reach tangible results concerning the efficiency of the instruments resorted to. Thus, contrary to the limited and regional previous studies carried out prior to the pandemic, the case studies published following the pandemic will provide a more reliable vision regarding the real benefits or harms of such solutions in retrospect. The current study as such was implemented at the English Language Literature Department of Selcuk university in Turkey to find out the exact factors that trigger anxiety when students are exposed to online foreign language teaching. The findings of the study revealed beneficial results for the upcoming interests of foreign language teaching field.

Keywords: Quantitative Research, Online Foreign Language Teaching, Anxiety, Scale Development.

A REPORT ON PRINCIPAL COMPONENT ANALYSIS

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ABSTRACT
The work is on Artificial Neural Network concept Principal Component Analysis. The work gives a mathematical Explanation as to how operation on PCA is done. The application of PCA is because when we come across learning problems the model that is trained sometimes suffer from the problem of overfitting. In the current work what overfitting is the question is being raised and also answered. In the work PCA which came as a solution to the overfitting problem is being discussed. We will see in a step by step way how the implementation of PCA could be done on a given data set. PCA is a very nice way to overcome the problem of overfitting. We in the current work taking some data points will try to understand the Solution via Principal Component Analysis. We in the current work will also observe the concept of overfitting and under fitting. In the current work we will have a brief go through on the Artificial Neural Network Landscape. We will have a brief discussion on the various ANN models.

Keywords: ANN, PCA, Overfitting, Under-fitting, Data Points.

BACKPROPAGATION ALGORITHM OF ANN

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ABSTRACT
In the Current Time People they are using a Technology that is Called Artificial Intelligence. There are three basic parts in the AI System that which are Representation of Knowledge, Reasoning and Learning. Another very important field of the current Research in the field of Computer Science and Engineering is ANN that is Artificial Neural network. In the Current work we will have a discussion on a very popular ANN Learning Approach Called the Backpropagation Approach. We will try to discuss this in detail in the Current Discussion from all Perspectives. Current Work in the Field of ANN is largely done taking Backpropagation as the Base. In the Current work we will Discuss the Mathematical Approach Carried Out During the Learning Procedure. We will discuss the Concepts of Local Gradient etc. also in Our Derivation.

Keywords: -AI, ANN, Backpropagation.

FUZZY ASSOCIATIVE MEMORY FOR TRUCK BACKER SYSTEM

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ABSTRACT
The paper comprises of the System that is meant for solving the Truck Backer Problem. The Problem is a Standard Fuzzy Controller Problem. In the current work we will be having a discussion as to how we can make an implementation of a System that can back a Truck in a Loading Dock in such a way that loading and unloading could be done in a convenient way. The Framework is of a FAM which comprises of 35 set of rules which are the foundation for finding the steering angle which will be the input to the automated truck. The parameters which are input fundamental are rear position of the truck and the angle that the truck makes with the horizontal. In the current work we will discuss the overall implementation done by means of Fuzzy Associative Memory Concept. The work make a discussion on the Fuzzy Set Theory and the Crisp Set Theory. The work also makes a discussion on its comparison with the Artificial Neural Network implementation of the Truck Backer Control System. The positives of the Fuzzy Associative Memory are discussed in the work. Fuzzy Logic is a term coined by LAZ and LAZ is also named for Soft Computing. We will be having a discussion on the notion of Soft Computing as well.

Keywords: ANN, Soft Computing, Fuzzy Set Theory, Crisp Set Theory, Fuzzy Logic.

YENİ BİR PARADİGMA OLARAK POST- KAPİTALİZM EKSENİNDE DÖNÜŞEN GRAFİK TASARIM ANLAYIŞI

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ÖZET

Kapitalizm kavramı, modernizm sonrası endüstriyel bir devrim olarak ortaya çıkmış ve toplum içerisinde bireyleri hızla tüketme eğilimine itmiştir. Bununla birlikte, metalar – nesneler üzerinden markaların ve modanın popüler kültürü oluşturduğu, bu doğrultuda tasarımın hızla yaygınlaştığı bir sürece dönüşmüştür. Grafik tasarım alanında, özellikle reklamlar ve tanıtımlar üzerinden tüketiciyi satın almaya ve hızla tüketmeye yönelten bu sürecin, kapitalizm sonrasında farklı bir yöne doğru evirildiği görülmektedir. Araştırma, bu kapitalizm sonrası süreci kapsayan post - kapitalist yapıyı / anlayışı, grafik tasarıma yansımaları üzerinden ele almayı amaçlamaktadır. Post - kapitalizm, literatürde yeni söylemlerle kendini göstermekte olup; kapitalizmin hızla tüketime ittiği toplumun bilinçli ve seçici bir eğilime yöneldiği bir yapıyı tanımlamaktadır. Post - kapitalizm kavramı, enformasyon çağının getirisi bilgi teknolojileri ve kitle iletişim araçları üzerinden, bireyin ulaşılabilirliğinin / erişilebilirliğinin kolaylaştığı bir sistemi içerisine alarak, tüketicinin çevreye ve doğaya daha az zarar verme, özüne ve doğaya tekrar dönme isteğinden oluşumunu sağlamaktadır. Günümüzde, genç bireyler başta olmak üzere hemen hemen herkes tüketim alışkanlıklarını internet teknolojileri üzerinden gerçekleştirmektedir. Mağazaya gitmeden ürünlerini seçen, alışverişini evden yapan bireyler, bu yeni toplum düzenini oluştururken; etkileşimli bir sistem üzerinden talep, ihtiyaç ve geri dönüşlerini de kolaylıkla sağlayabilmektedirler. Bu yapının grafik tasarıma yansımaları ele alındığında, dijitalleşen sistem üzerinden tasarım sürecini ve çıktılarını etkilediği açık bir şekilde görülmektedir. Bu bağlamda, markaların imajlarını yenilemesi, daha çevreye duyarlı ve geri dönüşüme yatkın bir görüntü sağlayabilmeleri, dijital görüntünün yaygınlaşması ve baskı teknolojilerinin etkilerini yitirmeleri vb. gibi bir çok örnek ile grafik tasarım disiplinini etkileyen yapısal dönüşüm gerçekleşmektedir. Araştırma, bu dönüşüm sürecini, grafik tasarımının farklı alanlarında uygulanmış tasarım örnekleri üzerinden ele alarak; post - kapitalist yapıya geçişi kapitalist ve post – kapitalist paradigmalar üzerinden karşılaştırmalı analizler ile ortaya koymayı amaçlamaktadır. Araştırmada, post - kapitalizm söyleminin, özellikle pandemi (küresel salgın / covid19 salgını) döneminde yaygınlaşan, dijitale yönelme ve çevreye daha duyarlı bir toplum anlayışı üzerinden gerçekleştiği varsayılmıştır. Ayrıca araştırma, post- kapitalizm ekseninde grafik tasarım örneklemi üzerinden sınırlandırılmıştır. Araştırma, alan yazın taraması ile gerçekleştirilmiş olup; elde edilen verilerin analizi betimsel analiz yöntemi üzerinden gerçekleştirilmektedir. Araştırmanın, güncel bir konuyu yeni bir paradigmanın oluşumu üzerinden ele alarak, özellikle grafik tasarımda gerçekleşen dönüşüm sürecini ortaya koyması bakımından özgün ve alan yazına katkı sağlayacak nitelikte olduğu düşünülmektedir.

Anahtar Kelimeler: Post – Kapitalizm, Grafik Tasarım, Dijitalleşme.

TRANSFORMING GRAPHIC DESIGN CONCEPT ON THE AXIS OF POST-CAPITALISM AS A NEW PARADIGM

ABSTRACT

The concept of capitalism emerged as a post-modern industrial revolution and pushed individuals to consume rapidly in society. However, it has turned into a process in which brands and fashion create popular culture through commodities and objects, and in this direction, design is rapidly becoming widespread. In the field of graphic design, it is seen that this process, which leads the consumer to buy and consume rapidly, especially through advertisements and promotions, has evolved in a different direction after capitalism. The research aims to address the post-capitalist structure/understanding, which covers this post-capitalist process, through its reflections on graphic design. Post-capitalism manifests itself with new discourses in the literature; defines a structure in which the society, which capitalism pushes towards consumption, tends towards a conscious and selective tendency. The concept of post-capitalism includes a system that facilitates the accessibility of the individual through information technologies and mass media, which is the result of the information age, and provides the consumer's desire to give less harm to the environment and nature, and to return to its essence and nature. Today, almost everyone, especially young individuals, realize their consumption habits through internet technologies. Individuals who choose their products without going to the store and do their shopping from home, while creating this new social order; They can easily provide their demands, needs and returns through an interactive system. Considering the reflections of this structure on graphic design, it is clearly seen that it affects the design process and outputs through the digitalized system. In this context, it is necessary for brands to renew their image, to provide a more environmentally friendly and recyclable image, to spread the digital image and to lose the effects of printing technologies, etc. Structural transformation is taking place that affects the graphic design discipline with many examples. The research deals with this transformation process through design examples applied in different areas of graphic design; It aims to reveal the transition to post-capitalist structure with comparative analyzes through capitalist and post-capitalist paradigms. In the research, it is assumed that the post-capitalism discourse is realized through the digital orientation and a more environmentally sensitive society understanding, which has become widespread especially during the pandemic (global epidemic / covid19 epidemic). In addition, the research is limited to the graphic design sample on the axis of post-capitalism. The research was carried out with a literature review; The analysis of the obtained data is carried out through the descriptive analysis method. It is thought that the research is original and will contribute to the literature, especially in terms of revealing the transformation process in graphic design by dealing with a current issue through the formation of a new paradigm.

Keywords: Post-capitalism, Graphic Design, Digitalization.

COUPLING EFFECT OF CONTROL OF CORRUPTION AND ECONOMIC GROWTH ON ENVIRONMENTAL QUALITY IN AFRICAN COUNTRIES: GMM-BASED QUANTILE REGRESSION.

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ABSTRACT
The literature shows that corruption and economic growth degrade the environment. Few studies have examined how corruption control affects environmental quality at different income levels. This study analyzed how economic growth and corruption control affected environmental quality in Africa from 2000 to 2021. A Method of Moments Quantile Regression (MMQR) with fixed effects showed that corruption control and economic growth improve environmental quality, whereas their interaction term decreases it. Corruption control and economic growth harm environmental quality. As economic growth rises, corruption control has a smaller impact on environmental quality. Renewable energy also harms the environment. Foreign direct investment improves environmental quality significantly, supporting the pollution haven hypothesis. Environmental quality quantiles vary these outcomes. Based on what we've found, African governments and politicians should first raise money so they can make good rules for the environment.

Keywords: African Countries, Corruption Control, Economic Growth, Environmental Quality, GMMQR, Pollution Haven Hypothesis

YABANCI OT İNHİBİTÖRÜ MATEMATİKSEL MODELLEMELİ MİKRODALGA TARIM CİHAZININ TASARIMI VE GELİŞTİRİLMESİE

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ÖZET

Çiftçiler, özellikle organik tarım uygulamak ve kimyasal herbisitleri ortadan kaldırmak için yabani otları kontrol etmenin alternatif yollarını arıyorlar. Çevresel olarak kimyasal etkilerin ve kimyasal kalıntıların olumsuz etkilerinin olmaması nedeniyle yabancı ot kontrol yöntemi olarak mikrodalga radyasyonunun kullanılması uygun bir alternatif yöntem olarak görünmektedir. Bu araştırmada toprak özellikleri, iklim koşulları ve yabancı ot tipine göre yabancı ot kontrolünde mikrodalga radyasyonunun kullanımı araştırılmıştır. Tilkikuyruğu otu ve horozibiği, dar yapraklı ve geniş yapraklı iki yabancı ot olarak seçilmiştir. Toprak nemi ve iklim koşulları eş zamanlı olarak incelenerek yabancı otların büyümesini ve çimlenmesini önlemek için gerekli enerji hesaplanmış, bu sayede fazla enerji üretimi ve yüksek maliyetler önlenmiştir. Artan toprak nemi ve küçük yabancı ot tohumu boyutu ile yabancı ot büyümesi ve çimlenmesi %85 oranında azalmıştır. Ayrıca, yabancı ot büyümesi ne kadar yüksek olursa, mikrodalga radyasyonu o kadar az etkili olur. Örneğin 3 haftalık yabancı otlarda radyasyonun yabancı ot kontrolünde etkisi 2 haftalık yabancı otlara göre daha az olmuştur. Mikrodalga radyasyonunun verimini artırmak için radyasyon şiddeti ve radyasyon süresi önemli faktörlerdir. Ayrıca organik madde eklemek ve toprağı sulamak faydalı toprak mikroorganizmalarını korur ve radyasyonun yan etkilerini en aza indirir.

Anahtar Kelimeler: Mikro dalga, Yabancı Ot, Organik tarım.

WEEDS INHİBİTOR MATHEMATİCAL MODELİNG MİCROWAVE AGRİCULTURAL DEVİCE DESİGN AND DEVELOPMENT

ABSTRACT

Farmers are looking for alternative ways to control weeds, especially to implement organic farming and eliminate chemical herbicides. Due to the absence of chemical effects and chemical residues and negative effects in the environment, the use of microwave radiation as a weed control method seems to be a suitable alternative. In this research, according to soil characteristics, climatic conditions and weed type, the use of microwave radiation was investigated for weed control. Alopecurus myosuroides Huds L. and Amaranthus albus L. were selected as two narrow-leaved and broad-leaved weeds. By simultaneously examining the soil moisture and climatic conditions, the necessary energy to prevent the growth and germination of weeds was calculated. In this way, were avoided the production of excess energy and high costs. By increasing soil moisture and decreasing weed seed size, weed growth and germination decreased as 85%. Also, the higher the weed growth, the less effective the microwave radiation. For example, in 3-week-old weeds, the effect of radiation in weed control was less than in 2-week-old weeds. In order to increase the efficiency of microwave radiation, radiation intensity and radiation duration are important factors. Also, adding organic matter and irrigation the soil preserves beneficial soil microorganisms and minimizes the side effects of radiation.

Keywords: Microwave, Weeds, Organic Agriculture.

ON SINGULARITION IN THREE-DIMENSIONAL ECLIDEAN SPACE

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ABSTRACT
Singularity theory, being a direct descendant of differential calculus, is certain to have a great deal of interest to say about geometry and therefore about all the branches of mathematics, physics and other disciplines where the geometrical spirit is a guiding light. Several geometers were interested in studying the singularities and generic differential geometry in three-dimensional Euclidean space. The main point of studying singularity is defining real-valued functions such as Euclidean squared- distance function and Euclidean height function defined on a curve or on a surface. The classical invariants of extrinsic differential geometry can be treated as singularities of these two functions. Also, some good approximations related to singularity theory in Euclidean Geometry, affine geometry, Galilean Geometry and Minkowski Geometry can be found. We will introduce the notion of distance functions on space curves in three-dimensional Euclidean space. This function is quite useful for the study of singularities of the rectifying developable of space curves in three-dimensional Euclidean space. We also introduce the notion of height functions on space curves in three-dimensional Euclidean space, which induce the notion of rectifying Gaussian surface and spherical Darboux images and these singularities are deeply related to the geometry of Euclidean spherical tangential images of curves in three-dimensional Euclidean space. As a consequence, we establish the relationships between the singularities of the above three subjects and differential geometric invariants of the curve under the action of Euclidean group as applications of ordinary techniques of singularity theory for the above functions.

Keywords: Euclidean Space, Curves, Singularity Theory.

LEARNING VECTOR QUANTIZATION ALGORITHM OF ANN

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ABSTRACT
In the Current Time People they are using a Technology that is Called Artificial Intelligence. There are three basic parts in the AI System that which are Representation of Knowledge, Reasoning and Learning. Another very important field of the current Research in the field of Computer Science and Engineering is ANN that is Artificial Neural network. In the Current work we will have a discussion on a very popular ANN Learning Approach Called the LEARNING VECTOR QUANTIZATION Approach. We will try to discuss this in detail in the Current Discussion from all Perspectives. Current Work in the Field of ANN is largely done taking LEARNING VECTOR QUANTIZATION as the Base. In the Current work we will Discuss the Mathematical Approach Carried Out During the Learning Procedure. We will discuss the Concepts of Local Gradient etc. also in Our Derivation.

Keywords: -Aı, Ann, Learnıng Vector Quantızatıon.

MODELING THE CONNECTION BETWEEN ELECTRICAL ENERGY SECURITY INSTRUMENTS AND GDP GROWTH IN NIGERIA: A LINEAR AUTOREGRESSIVE DISTRIBUTED LAGS APPROACH

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ABSTRACT
Electricity accessibility, production, and consumption, which determine a nation's ideal production capacity and long-term economic growth, are the finest ways to explain electrical energy security. This study's main goal is to examine the connection between electrical energy security instruments and Nigeria's GDP growth. For the examination of this research project, secondary data were gathered from World Bank publications spanning the years 1990 to 2020. For the analysis of this study, econometric models including the unit root test and the autoregressive distributed lags (ARDL) model were used. The unit root test demonstrates that after the first difference, all variables, including GDP growth and electrical energy security tools, become stationary, indicating that the ARDL model was selected and used. When compared to the other tentative models, the ARDL (1,1,3,1) was estimated to have the best fit, and the bound test indicates cointegration, which indicates that there is a short- and long-term relationship between GDP growth and the security of electrical energy, including access to electricity, electricity production, and electricity consumption. The correlation analysis was applied, and it demonstrated a very strong negative correlation between electricity production and consumption, indicating that the amount of electricity being produced declines as the demand for electricity increases. This means that the electricity demand is currently greater than the amount of electricity produced or generated in the nation. To increase electrical energy security standards that would lead to sustainable economic growth and development and lower Nigeria's high poverty rate, the government of Nigeria must implement renewable energy options in addition to its major source of electricity.

Keywords: Electrical energy security, GDP growth, Unit root test, ARDL (1,1,3,1), Correlation analysis.

PROBLEMS OF LEGAL REGULATION OF ARTIFICIAL INTELLIGENCE IN KAZAKHSTAN

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ABSTRACT
Despite the fact that the term "artificial intelligence" was introduced into modern scientific terminology back in 1956 to this day there are certain problems in developing a universal definition of this concept. At the same time, there is a rapid growth in the practical application of technologies and various tools based on elements of artificial intelligence in almost all areas of modern life: from the use of facial recognition technologies in the banking sector to the creation of unique images based on text queries in the field of design. However, the vagueness and uncertainty of the clear conceptual apparatus in the field of artificial intelligence, in turn, becomes a serious barrier to the development of this concept in the legal sphere. According to experts, scientific research in the field of artificial intelligence and attempts of its legal justification have been conducted for more than one decade, but only at the moment the primary bases of formation of its complex legal regulation began to appear. In 2020 in the Law of the Republic of Kazakhstan dated November 24, 2015 "On Informatization" a new legal definition of the concept "intelligent robot" was introduced. An intelligent robot in the amendment is described as "an automated device that performs a certain action or fails to act in response to a perceived and recognized external environment. Experts in the fields of law and artificial intelligence have criticized this definition extensively. Some analysts noted that the definition is "extremely broad and vague, and is unlikely to bring any clarity in the emergence of real legal relations related to the use of AI". It should be noted that general concepts and definitions in the legislation are clearly insufficient to form an effective base of legal regulation of social relations related to artificial intelligence.

Keywords: artificial intelligence, legislative system, terminology

FACİLE SYNTHESİS, HEMOLYTİC, THROMBOLYTİC AND ANTİ-CANCER POTENTİAL OF BENZOFURAN-OXADİAZOLE AND TRİAZOLE SCAFFOLDS

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ABSTRACT
Ultrasound- and microwave-assisted green synthetic strategies were applied to furnish benzofuran–oxadiazole 5a–g and benzofuran–triazole 7a–h derivatives respectively. These banzofuran structural hybrids were achieved in good to excellent yields (60–96%) with the help of microwave approach in comparison with conventional methods (36–80% yield). These synthesized derivatives were screened for hemolysis, thrombolysis and anticancer therapeutic

potential against an A549 lung cancer cell line using an MTT assay. The benzofuran-triazole structural motif 7f showed excellent thrombolysis activity (61.4%) when compared against reference ABTS. The highest anticancer activity was displayed by the bezofuran-oxdiazole derivative 5d cell viability 27.49 ± 1.90 and IC50 6.3 ± 0.7 μM values, which were considerably lower than the reference drug crizotinib (IC50 8.54 ± 0.84 μM). Benzofuran derivatives 7b (0.1%) and 5e (0.5%) showed the least toxicity against RBCs. Conformational analysis revealed the spatial arrangement of compound 5d, which depicted its significant efficacy in comparison with crizotinib; therefore, scaffold 5d would be a promising anticancer agent on the basis of cytotoxicity studies, as well as in silico modeling studies.

Keywords: benzofuran–oxadiazole; benzofuran–triazole; computational modeling; hemolytic activities; thrombolytic activities; anticancer activities

CHINA PAKISTAN ECONOMIC CORRIDOR(CPEC) AND ITS IMPACT ON INDIA: A STUDY

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ABSTRACT
China Pakistan Economic Corridor (CPEC),is a 3000km long route of infrastructure projects which connects China's northwest Xinjiang Uygur Autonomous region and the gwadar port in the western province of Balochistan in Pakistan. CPEC is a part of Belt and road initiative which aims to link Southeast Asia, Central Asia, the Gulf region Africa and Europe with a network of land and sea routes. With this CPEC project China can access Middle east and Africa from gwadar port enabling china to access the Indian Ocean and in return china supports development projects in Pakistan to overcome the latter's energy crisis and stabilising it's economy. This paper will check whether the CPEC affects India ‘s Sovereignty. The paper also studies the economic aspects, trade aspects, security issues in connection with CPEC.

Keywords: CPEC, OBOR, LOC, Panama Canal, String of Pearls, Blue Dot Network.

PSYCHOLOGICAL DISTRESS AND SUICIDAL IDEATION AMONG ADOLESCENTS: THE MODERATING ROLE OF SOCIAL SUPPORT

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ABSTRACT

Concern is mounting over the rising suicide rate among Adolescents. Development of effective preventative treatments to lower suicidal behaviour and the suicide rate has been spurred by the worrisome rise in the number of suicide and attempted suicides among Adolescents. This study was conducted to assess the impact of psychological distress on suicidal ideation among adolescents. Mental health disorders among adolescents have emerged as a major public health issue in many low and middle-income countries, including India. There is a paucity of research on the determinants of psychological distress, particularly among the adolescents. The role of social support in mitigating the effect of psychological distress on suicidal ideation, if any, was analyzed. Standardized questionnaires for assessment of study variables were used. The data was collected from 182 adolescent boys and girls. The data was analyzed using SPSS 20. The results of the study revealed that psychological distress has positive relationship with suicidal ideation and leads to suicidal tendencies among adolescents. However, this relationship was moderated by social support available to the participants. This implies that adolescents with social support are less likely to have suicidal ideation when they experience psychological distress while those with low social support are less vulnerable to suicidal tendencies under psychological distress. The findings of the study project the importance of social groups and support available in this transitional phase of adolescence.

Keywords: Psychological distress, suicidal ideation, adolescents, support

STRESS MANAGEMENT STRATEGİES AND ADMİNİSTRATİVE JOB PERFORMANCE OF SECONDARY SCHOOL PRİNCİPALS İN CROSS RİVER STATE, NİGERİA.

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ABSTRACT
This study examined stress management strategies and administrative job performance of secondary school principals in Cross River State, Nigeria. Expos facto research design was used for the study. Two research questions and two null hypotheses were formulated to guide the study. The population for this study was all the two hundred and seventy-eight (278) principals of public secondary schools in Cross River State. Consequently, census method was adopted for the study. Researchers' designed questionnaire entitled "Stress Management Strategies and Administrative Job Performance of Secondary School Principals' Questionnaire (SMSAJPSSPO) was used to collect data from the respondents. The reliability coefficients obtained ranged from 0.81 - 0.88. All the data collected were analyzed using Pearson Product Moment Correlation analysis. The results of the analysis indicated positive significant relationship between stress management strategies with respect to delegation of responsibilities (.831) and time management (.751) and administrative job performance of secondary school principals. One of the recommendations was that, to improve upon job performance, school principals should ensure that there is effective delegation of responsibilities to teachers who are skilled and well versed with knowledge and ideas in the implementation and performance of certain administrative functions. It was concluded that, stress management strategies in terms of delegation of responsibilities and time management significantly related to administrative job performance by secondary school principals in Cross River State, Nigeria.

Keywords: Administrative, Job Performance, Strategies, Stress Management.

MODELLİNG CORPORATE GOVERNANCE AND LOCAL CONTENT DİSCLOSURE İN THE NİGERİAN OİL AND GAS SECTOR: A CONCEPTUAL REVİEW

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ABSTRACT
Purpose – local content is a socio-economic sustainability policy that ensures the flow of benefits from the industry to compensate for the oil and gas extraction's severe social, economic and environmental effects. Where many governments around the world have passed laws requiring and encouraging extractive companies to use local products, indigenous businesses, resources, and labour. The purpose of this paper is to examine the effect of corporate governance on local content disclosure by the international oil and gas companies (IOCs) in Nigeria. Being that the sector has been dominated by the powerful International Oil and Gas Companies. Design/methodology/approach – To achieve the study objective, a mixed method design is to be used. Using convergent parallel approach. The intent is to provide deeper understanding by examining the problem from different perspectives, and to explore other issues that may not covered by the questionnaire. The study's population are divided into two groups all the IOCs engaged in the Nigerian oil and gas industry, as well as other players such as government

regulatory agencies, indigenous oil firms, as well as other civil society organisations/groups. Data collection would be achieved through the use of structured questionnaire as a tool for obtaining the needed data for analysis (Rowold, 2008), as well as interview. The data in this research wouldbe analyzed using descriptive statistics and inferential statistics (SPSS version 22.0). The Descriptive statistics would be employed for the questionnaire of the data. While, thematic analysis technique is to be used for the interview.

Key words: Corporate governance, Local content, International oil and gas companies

CHALLENGES ENCOUNTERED BY DEVELOPING COUNTRY'S DURING Covid-19 PANDEMIC: MEASURES AND ESTIMATES

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ABSTRACT
COVID-19 pandemic is considered as threatening and widespread disease around the globe. It has not affected the public health Paradigm but also created significant impact on cultural and social practices. Ethics, values, emotions and social and personal wellbeing levels are badly affected during this outbreak. Around 637,581,073 cases 6605217 cases of deaths has transformed the life cycle pattern a significance concern. In Pakistan like other countries major initiatives to combat this battle were to implement precautionary measures in early stages like safe distance, no unnecessary movement, lockdown and then vaccination, SOPs during day to day affairs, another concept of smart lockdown in highly affected areas, public awareness campaigns and many more. However majority developing countries are still facing even greater difficulties in handling this crisis in term of socio-economic stability and challenge. In this study we evaluated different sources of literature related to the COVID-19 pandemic and to develop a contrast between develop and under developing nations. Major vocabulary included Covid-19, healthcare settings, Pakistan, psychological impact, educational reforms and challenges were assessed as key search parameters. More then 35 articles were included using various databases. Current study covers the major impact of COVID-19 pandemic on societal norms and burden of implementing SOPs on physical well-being and mental health crises.

Keywords: COVID-19 pandemic, Pakistan, challenges, developing countries, SOPs, education, healthcare, well-being

SAĞLIK YÖNETİMİ BAKIŞ AÇISIYLA AKILLI HİZMET EKİPMANI KULLANIMI

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ÖZET

Bu araştırmada, teknolojik ve çevresel faktörlerin etkisiyle sağlık kurum ve kuruluşlarının bünyesinde yoğun bir şekilde ortaya çıkan akıllı hizmet ekipmanı kullanımı ihtiyacı sağlık yönetimi bakış açısıyla ele alınmıştır. Bu kapsamda, tele-radyoloji, tele-konsültasyon, tele-patoloji, tele-dermatoloji, tele-psikiyatri, tele-cerrahi, tele-evde bakım gibi alanları kapsayan ve online konferans, web tabanlı uygulamalar, e-mail ile telefon tabanlı uygulamalar gibi arayüzler vasıtasıyla hayata geçirilen tele tıp uygulamaları, akıllı randevu ve kayıt ekipmanları, mobil hizmet uygulamaları, bireysel onaylama kioskları, bireysel ödeme kioskları, durumu özellik arz eden hastalar için oluşturulan kiosklar gibi çeşitli akıllı hizmet ekipmanlarının halihazırda kullanımının sağlık yöneticilerinin planlama, organize etme, yöneltme, uygulama, koordine etme ve denetleme faaliyetleri açısından değerlendirilmesi gerçekleştirilmiştir. Literatürden elde edilen bulgular ışığında hastaların sağlık alanında kullanılan akıllı hizmet ekipmanlarının sunduğu hizmetlere olan talebinin hızla artış gösterdiği, farklı sektörlerde uygulamaya konularak başarılı olan birçok akıllı hizmet ekipmanının sağlık sektöründe de kullanılmaya başlandığı, halihazırda sağlık sektöründe kullanılmayan ancak kullanılması yönünde önemli gereksinimlerin ortaya çıktığı çeşitli akıllı hizmet ekipmanlarının bulunduğu tespit edilmiştir. Bu durumun hem sağlık kurum ve kuruluşlarının fiziksel yapısı ile işleyişini hem de yönetsel fonksiyonlarını etkilediği belirlenmiştir. Akıllı hizmet ekipmanlarına duyulan ihtiyaç nedeniyle sağlık kurum ve kuruluşları tarafından gelecekte ulaşılmak istenilen konum ile bu konuma nasıl ulaşılması gerektiği sorusunun yanıtının yanı sıra bu konuma ulaşmak için gerçekleştirilmesi gereken tüm faaliyetler, bazılarında önemli derecede bazılarında ise köklü bir değişime uğramıştır. Planlara dahil edilmesi gereken maliyetler de bu doğrultıuda değişim göstermiştir. Akıllı hizmet ekipmanı kullanımı bir risk unsuru olmaktan çıkıp artık akıllı hizmet ekipmanının kullanılması gereken alanlarda kullanılmaması bir risk unsuru haline gelmiştir. Akıllı hizmet ekipmanlarının teknolojik gelişmelere bağlı olacak şekilde çeşitlenmesi ise sağlık yöneticilerini alternatifler arasından seçim yapma konusunda daha zorlanıcı hale getirmiştir. Sağlık kurum ve kuruluşlarının misyonunu ifade eden unusurlar arasında yer alan kullanılan teknolojilere ilişkin ifadelere akıllı hizmet ekipmanları da dahil edilir hale gelmiştir. Akıllı hizmet ekipmanları sağlık kurumları içerisinde yapılan işlerin tasarımını, kişi iş uyumunu ve kişi örgüt uyumunu ifade eden organize etme fonksiyonunu da etkilemektedir. Akıllı hizmet

ekipmanının kullanımını gerektiren bir iş sekteye uğradığında diğer örgüt içi unsurlar da bu durumdan olumsuz bir şekilde etkilenmektedir. Bu durumun sağlık yöneticilerini zor durumda bırakan yönünün ise akıllı hizmet ekipmanlarının yer aldığı işlerdeki aksaklıkların giderilmesinin ve koordinasyonunun sıradan işlere oranla çok daha yüksek düzeyde ilgi ve çaba gerektirmesinden kaynaklandığı değerlendirilmektedir. Akıllı hizmet ekipmanının kullanımını, bakımını ve onarımını sağlayacak nitelikte bilgi, beceri ve yeteneğe sahip çalışanlara duyulan gereksinim de farklı bir zorluk olarak sağlık yöneticilerinin karşısına çıkmaktadır. Akıllı hizmet ekipmanı kullanılan işlerde çalışanlar arasındaki ilişkilerin de olağan işlere göre daha karmaşık nitelikte olduğu belirlenmiştir. Yoğun akıllı hizmet teknolojileri kullanan sağlık kurum ve kuruluşlarının ise organizasyon yapısında önemli değişiklikler (yeni departmanların ortaya çıkması, çapraşıklık (komplekslik) derecesinin artması, iletişim kanallarının teknoloji tabanlı hale gelmesi, kontrol alanının farklılaşması gibi) meydana geldiği belirlenmiştir. Akıllı hizmet ekipmanı kullanımı işlerin fiilen gerçekleştirildiği uygulama safhası bakımından da sağlık kurum ve kuruluşlarında bazı farklılıklar yaratmaktadır. Liderlik becerileri doğru akıllı hizmet ekipmanının seçiminden, hastaların hizmetine sunulmasına ve elde edilen tecrübeler ışığında geliştirilmesine kadar çeşitli safhalarda önemli hale gelmiştir. Akıllı hizmet ekipmanı kullanımından kaynaklanan hatalar ya da neye işaret ettiği tespit edilemeyen çıktılar yöneticileri geleneksel uygulamalardan farklı kontrol ve koordinasyon çabalarına yönlendirmektedir. Bu durum özellikle üst kademelerde yer alan yöneticileri teknik bilgilerini geliştirme ve ön plana çıkarma doğrultusunda alışılagelmişin dışında bir eğilime sokarken aynı zamanda da akıllı hizmet ekipmaları ve bilişim teknolojileri konusunda uzman niteliğe sahip dış kaynaklarlara her zamankinden daha fazla bağımlı hale getirmiştir.

Anahtar Kelimeler: Akıllı Hizmet Ekipmanı, Sağlık Yönetimi, Teknoloji.

USE OF SMART SERVICE EQUIPMENT FROM HEALTHCARE MANAGEMENT PERSPECTIVE

ABSTRACT

In this research, the need for the use of smart service equipment, which has emerged intensively within the health institutions and organizations with the effect of technological and environmental factors, has been discussed from the perspective of healthcare management. In this context, the current use of various smart service equipment, such as online conferencing, tele-medicine applications, smart appointment and registration equipment, mobile service applications, self check-in kiosks, self payment kiosks, self-service kiosks for patients with special conditions, covering areas such as tele-radiology, tele-consultation, tele-pathology, tele-dermatology, tele-psychiatry, tele-surgery, tele-home care was evaluated in terms of planning, organizing -staffing-, leading, directing, co-ordinating and controlling activities of healthcare managers. In the light of the findings obtained from the literature, it has been determined that the demand of patients for the services provided by the smart service equipment used in the health field has increased rapidly, many smart service equipment -which has been successfully implemented in different sectors- has started to be used in the health sector as well, and there are various smart service equipment that are not currently used in the health sector, but there are important requirements for their use. It has been determined that this situation affects both the physical structure and functioning of health institutions and organizations and their administrative functions. Due to the need for smart service equipment, in addition to the answer to the question of the position that health institutions and organizations want to reach in the future and how to reach this position, all the activities that need to be carried out to reach this position have undergone significant changes in some and radical changes in others. The costs that should be included in the plans have also changed in this direction. The use of smart service equipment has ceased to be a risk factor and not using smart service equipment in areas where it should be used has become a risk factor. The diversification of smart service equipment depending on technological developments has made it more difficult for healthcare managers to choose among alternatives. Smart service equipment has also been included in the expressions regarding the technologies used, which are among the elements expressing the mission of health institutions and organizations. Smart service equipment also affects the organizing function, which expresses the job design, person-job fit, and person-organization fit in health institutions. When an activity that requires the use of smart service equipment is interrupted, other organizational activities are also negatively affected by this situation. It is considered that the aspect of this situation that puts healthcare managers in a difficult situation is due to the fact that the elimination and coordination of the problems in the activities involving smart service equipment requires a much higher level of attention and effort compared to ordinary works. The need for employees with the knowledge, skills and abilities to ensure the use, maintenance and repair of smart service equipment is a different challenge for healthcare managers. It has been determined that the relations between the employees in the jobs where smart service equipment is used are more complex than the ordinary jobs. It has also been determined

that there are significant changes in the organizational structure of health institutions and organizations that use intensive smart service technologies (such as the emergence of new departments, the increase in the degree of complexity, transformation of communication channels into technology-based, the differentiation of the control area). The use of smart service equipment also creates some differences in health institutions and organizations in terms of the directing function where the activities are actually carried out. Leadership skills have become important at various stages, from choosing the right smart service equipment to putting it at the service of patients and developing it in the light of experience. Errors caused by the use of smart service equipment or undetected outputs lead managers to different control and coordination efforts from traditional applications. While this situation puts the executives at the top levels in an unconventional tendency to develop and bring their technical knowledge to the fore, at the same time, it has made them more dependent than ever on external resources that are experts in smart service equipment and information technologies.

Keywords: Smart Service Equipment, Healthcare Management, Technology.

NEED FOR MENSTRUAL LEAVES IN AN URBANISED WORLD

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ABSTRACT
The movement for leave for the working women during their menstrual cycle dates back to the 1920s. After a century, the same movement has reemerged. A World Bank study conducted in September 2019 reports that 40% of the world's labor force constitutes women. Roughly half of this population experience a condition called dysmenorrhoea (painful periods). Apart from that, some also suffer from back pain, diarrhea, fatigue, nausea, and vomiting when menstruating. This is the rationale for claiming leave during the periods when a woman may not be physically and mentally feeling fit. The Japanese Labour Standards enacted favorable legislation in 1947. Working women in Zambia can avail menstrual leave, known as Mother's Day, as mentioned in the country's labor laws. Indonesia (two days of menstrual leave per month), Philippines, Taiwan (three menstrual leaves a year), South Korea, and some provinces in China, have arrangements as well. Bills for providing paid menstrual leave have been also debated in 2013 in the Russian Duma and in Italy in 2017. In 2018, the Menstruation Benefit Bill was tabled in the Indian Parliament. The Indian state of Bihar has already been offering its women workers two 'Special Casual Leave(s)' since 1992. Many Multi-National Corporations have started granting menstrual leaves recently. It is a positive step in equality. Physically, the bodies of men and women are not alike. So equality can only be achieved by granting women such rights to bring them at par with their counterparts including reservation of seats in public transport, menstrual leave, etc. The present study undertakes the evolution of the movement of menstrual leaves. It further discusses the points for and against it. The doctrinal method of study has been adopted. The study concludes that many countries across the globe are gradually enacting legislative provisions for granting menstrual leaves.

Keywords – Leave, menstrual, women.

CHEMICAL COMPOSITION OF SOME TROPICAL KITCHEN WASTE MATERIALS AS POTENTIAL FEEDSTUFF FOR ANIMAL DIET

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ABSTRACT
Introductıon: The shortfall in supply and sustainable pasture and conventional feedstuffs all year round coupled with low nutritive value of grass especially in dry season poses a great challenge to livestock production and food security in Africa. Agricultural wastes, either from farm, industry or domestic (kitchen) are all forms of plant-derived or animal-derived material that are considered as waste either because they have no known positive economic importance or because they are not grown/raised for any specific purpose. Some of these wastes includes seed hulls, peels, herbaceous plants, crops residues, animal wastes etc. In Nigeria, large quantities of these wastes are produced annually and are never or vastly under utilized. However the potential application of tuber peel in feed supplement depends strongly on their chemical composition.
Aım: The aim of this research was to analyze the chemical composition of African breadfruit locally called Ukwa seed hull, cowpea hull and potato peel as potential feedstuff for animal diet.
Materıals And Method : Three different waste materials (African Breadfruit seed hull, cowpea hull and potato peels) discarded as kitchen wastes were sourced, processed and analyzed for their chemical composition of Moisture content, Dry Matter (DM), Crude Protein(CP), Crude Fibre, Crude fat and Ash. Data obtained were subjected to Analysis of Variance (ANOVA) as described by (SAS, 2002). Means was separated by using Duncan Multiple Range Test (DMRT) at 5%
Results: The following results (%) were obtained: AFRICAN BREADFRUIT SEED HULL :
(Moisture content: 1.85a; Dry matter: 98.35a; Ash: 2.50b; Crude fat: 0.65b; Crude fibre: 13.35b;

Crude protein: 31.85b. COWPEA HULL : (Moisture content: 6.90a; Dry matter: 93.10b; Ash: 3.45a; Crude fat: 6.60a; Crude fibre: 15.80a; Crude protein: 380a. SWEET POTATO: (Moisture content: 0.35c; Dry matter: 99.65a; Ash: 3.10ab; Crude fat: 7.20a; Crude fibre: 1.65c; Crude protein: 11.65b. The results were all significantly different (P<0.05) among the three waste materials analyzed.
Conclusıon: Results obtained at the end of the analysis showed that the African breadfruit seed hull cowpea hull and sweet potato peels are cheap but excellent feed stuff materials as they are rich in basic chemical nutrients necessary for livestock growth and development. This experiment also has the potential advantage to recycle waste materials for wealth generation and thereby reducing environmental pollution.

Keywords: Kitchen waste, African breadfruit seed hull, cowpea hull, sweet potato peels, feedstuff, Livestock.

SMART CITIES: THE CITIES OF THE FUTURE

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ABSTRACT
A city is considered smart whenever investments are made in its people and social capital, traditional transport, and modern ICT infrastructure to enable sustainable economic growth, high quality of life, and responsible resource management through participatory government. Globally, there are 88 smart cities, a four-fold rise from 21. By 2017, 178 towns, from Melbourne to Copenhagen to San Francisco, had launched 250 smart-city initiatives. The paper covered areas like history of smart city, characteristics and features of a Smart City, the pivotal components of a smart city, the level of implementation of some world's smart cities like Singapore, Dubai, Moscow and Milan among others was also discussed. challenges smart of cities and ways to overcome them were also highlighted. Although there are many different ways to conceptualize a "smart city," any project that succeeds will center on five essential areas in a thorough and integrated manner: the supporting infrastructure, city and community leadership structures, sustainable delivery of services, innovative and technological advancements, and civic amenities within the community.

Keywords: ICT, Smart cities, Urban development

EFFECTS OF LİPİD BASED MULTİPLE MİCRONUTRİENTS SUPPLEMENT ON THE BİRTH OUTCOME OF UNDERWEİGHT PRE-ECLAMPTİC WOMEN: A RANDOMİZED CLİNİCAL TRİAL

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ABSTARCT
Background and Objective: Maternal under nutrition and low birth weight babies are among the common tragedies of developing countries like Pakistan. Preeclampsia and its significant association with fetal growth restriction due to spiral arteries remodeling and trophoblastic invasion decreases nutritional supply to growing fetus added by maternal under nutrition. This study was designed to see the effects of lipid based nutritional supplements for pregnant and lactating women LNS-PLW on maternal and fetal outcome of pre-eclampsia. Methods: Sixty underweight pre-eclamptic women were randomly assigned into two study Groups from April 2018 to December 2019 at the antenatal units of the tertiary Health care facilities of Lady Reading Hospital, Hayatabad Medical Complex Peshawar and Civil Hospital Matta Swat, KPK Pakistan in a randomized clinical trial. Participants were on routine drugs for pre-eclampsia and Iron and Folic Acid (60mg, 400 µg) daily, while participant of Group-2 (n=30) received one sachet of Lipid based nutritional supplement for pregnant and lactating women LNS-PLW in addition daily till delivery. The birth weight, gestational age, head-circumference, and birth length of babies were measured.

Results: The significant improvement found in the birth weight (p-value 0.003), gestational age (p-value 0.006), head circumference (P-value of 0.0006) and birth length (P-value of 0.0017) of babies of Group-2 women. We observed that addition of Lipid based nutritional supplement for pregnant and lactating women LNS-LPW improved the birth outcome in underweight women of pre-eclampsia. Conclusion: The Prenatal supplementation of Lipid based nutritional supplement for pregnant and lactating women LNS-PLW can improve birth weight, gestational age, length and head circumference of babies of underweight preeclamptic women.

Keywords: Pre-eclampsia, Lipid based Nutritional supplements, Neonatal outcome, Khyber Pakhtun Khwa province Pakistan.

Trial Registration: ISRCTN15485068, April 2018:https://doi.org/10.1186/ISRCTN15485068.

AN EXTENDED COPRAS METHOD FOR MULTİATTRİBUTE DECİSİON MAKİNG BASED ON COMPLEX DUAL HESİTANT FUZZY MACLAURİN SYMMETRİC MEAN

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ABSTRACT
For smooth approximation, the renowned maclaurin symmetric mean (MSM) and dual MSM (DMSM) are preferable tools. Additionally, complex dual hesitant fuzzy set performs better when dealing with two-phase information. In this study, we develop some new operators inspired by the complex dual hesitant fuzzy set (CDMSM) and the maclaurin symmetric mean (MSM), including the complex dual hesitant fuzzy maclaurin symmetric mean (CDHFMSM), the complex weighted dual hesitant fuzzy maclaurin symmetric mean (CWDHFMSM) and the complex dual hesitant fuzzy dual maclaurin symmetric mean (CWDHFDMSM). We continue by talking about some developed operator characteristics. Moreover, we developed the COPRAS method to address MCDM problems using CDHFS information. However, a numerical example is used to show how the suggested method can be applied and is beneficial. The validity and efficacy of the suggested approach are compared with those of current methods in the final analysis.

Keywords: complex dual hesitant fuzzy set, complex maclaurin symmetric mean, Health managment system, multiattribute group decision making.

L-TRYPTOPHANİUM PİCRATE AS NOVEL AND GREEN CORROSİON İNHİBİTORS OF CARBON STEEL İN 5%HCL

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ABSTRACT
This study investigated effect of L-tryptophanium picrate in temperatures i.e., 30, 40, 50, and 60 °C, and immersion time upto 1 week on the corrosion inhibition behaviour of has been studied by weight loss measurement, potentiodynamic polarization measurement and SEM studies. Weight loss analysis showed that inhibition efficiencies of L-tryptophanium picrate (LTP) increases with their concentrations. The functional groups of LTP responsible for the adsorption on metal surface were confirmed by FT-IR spectroscopy. Electrochemical analyses data provide good support to the weight loss study and showed that LTP behaved as interfacial and mixed type corrosion inhibitors. The adsorption of LTP at mild steel/ 5 % HCl (electrolyte) interfaces obeyed the langmuir adsorption isotherm. The adsorption of studied LTP on the metallic surface was further supported by SEM-EDX methods.

Keywords: Metal corrosion, Inhibition techniques, green inhibitors, additives, synergistic effect

ADÖLESANLARDA DENTAL MATURASYON TESPİTİ: BİR RETROSPEKTİF ÇALIŞMA

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ÖZET

Amaç: Bu çalışmanın amacı 8-19 yaş arası bireylerin üçüncü büyük azı dişlerinin olgunlaşma düzeylerini belirlemek, diş olgunlaşması, kronolojik yaş (KY) ve cinsiyet arasındaki ilişkiyi değerlendirmek ve bu formülün güvenilirliğini regresyon geliştirerek test etmektir. Gereç ve Yöntemler: Bu retrospektif çalışmada, 8-19 yaş arası 61 kadın ve 62 erkek olmak üzere toplam 123 hastanın dijital panoramik radyografileri kullanıldı. Panoramik radyografilerde üçüncü büyük azı dişlerinin diş olgunlaşması, modifiye Demirjian'ın sınıflandırma sistemi ile değerlendirildi. İstatistiksel analiz için tanımlayıcı istatistikler, Kolmogorov-Smirnov, Kruskal Wallis, Ki-Kare, Mann-Whitney U, Wilcoxon ve Lineer regresyon testleri kullanıldı. Bulgular: Ortalama KY 13,14 yıl, ortanca yaş 13,00 yıl idi. Mann-Whitney U testi, kadınlar ve erkekler için ortalama KY arasında istatistiksel olarak anlamlı bir fark bulunmadığını gösterdi ($p = 0,104$). Kadınlar ve erkekler için tahmini diş yaşı (DY) ve KY arasındaki ortalama yaş farkı sırasıyla – 0.375 ve 0,369 yıldı. Wilcoxon-signed ranks testine göre bu istatistiksel olarak anlamlı bulunmadı ($p = 0,577$). Sonuç: Bu çalışmanın sonuçlarına göre gelişimsel belirteç olarak üçüncü büyük azı dişlerinin kullanılması uygundur. Üçüncü molar diş gelişimi cinsiyete göre fark göstermese de, olgunlaşma düzeylerinin kadınlarda daha erken olduğu göz önünde bulundurulmalıdır. Dental maturasyonun güvenilirliğini netleştirmek için ortodontik hastalarda ve diğer dental alanlarda tanı ve tedavi planlamasında bir gösterge olarak ek olgunluk göstergelerinin dahil edileceği ileri çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Panoramik Radyografi, Maturasyon

DETECTİON OF DENTAL MATURATİON İN ADOLESCENTS: A RETROSPECTİVE STUDY

ABSTRACT

Objective: The aim of this study is to determine the maturation level of the third molars of individuals aged 8-19 years, to evaluate the relationship between tooth maturation, chronological age (CA) and gender, and to test the reliability of this formula by developing a regression. Material and Methods: Digital panoramic radiographs of 123 patients, 61 females and 62 males, aged 8-19 years, were used in this retrospective study. Tooth maturation of third molars on panoramic radiographs was evaluated with the modified Demirjian's classification system. Descriptive statistics, Kolmogorov-Smirnov, Kruskal Wallis, Chi-Square, Mann-Whitney U, Wilcoxon and Linear regression tests were used for statistical analysis. Results: The mean CA was 13.14 years, and the median age was 13.00 years. The Mann-Whitney U test showed no statistically significant difference between mean HF for females and males ($p = 0.104$). The mean age difference between estimated dental age (D) and CA for women and men was –0.375 and 0.369 years, respectively. According to Wilcoxon-signed ranks test, this was not statistically significant ($p = 0.577$). Conclusion: According to the results of this study, it is appropriate to use third molars as developmental markers. Although the development of the third molar tooth does not differ according to gender, it should be considered that the maturation levels are earlier in females. Further studies are needed to include additional maturity indicators as an indicator in diagnosis and treatment planning in orthodontic patients and other dental areas to clarify the reliability of dental maturation.

Keywords: Panoramic Radiography, Maturation

BİR TÜRK POPÜLASYONUNDAKİ ADÖLESAN BİREYLERİN DAİMİ BİRİNCİ MOLAR DİŞLERİNDEKİ PULPA TAŞLARININ DEĞERLENDİRLMESİ

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ÖZET
Giriş: Mandibular birinci molar dişler en erken süren daimi dişlerdir. Bu yüzden de dejenerasyonlara ya da irritanlara daha fazla maruz kalırlar. Bu dişlerde yaşla birlikte çürük prevelansının artış göstermesinden dolayı, bu dişlerde pulpa taşı oranın bilinmesi önem arz etmektedir. Bu çalışmanın amacı, dijital panoramik radyograflarda, bir Türk popülasyonundaki bireylerin daimi birinci molarlarındaki pulpa taşlarının prevalansını belirlemek ve pulpa taşlarının cinsiyet, taraf ve yaş ile ilişkisini değerlendirmektir. Materyal ve Metot: Bu çalışmada, 10-18 yaş arasındaki 325 hastanın panoramik radyograflarında toplam 650 diş retrospektif olarak incelendi. Yaş 10-14 yıl ve 15-18 yıl olmak üzere ikiye ayrıldı. İstatistiksel analizde tanımlayıcı ve Ki-kare testleri kullanıldı. 0,05'en küçük p değerleri anlamlı kabul edildi. Bulgular: 325 hastanın 195'i kadın, 130'u erkekti. İncelenen toplam 650 dişin 63'ünde (%9,7) pulpa taşı tespit edildi. 63 dişin 33'ü sağ tarafta iken, 30'u sol tarafta idi. Sağ ve sol taraflar ile yaşa göre pulpa taşı oranı istatistiksel olarak farklılık gösterirken ($p<0,05$), cinsiyete göre fark göstermemekteydi ($p>0,05$). Sağ birinci molar için, 15-18 yaş arasındaki bireylerde pulpa taşı oranı daha fazla idi.
Sonuç: İncelenen bir Türk popülasyonunda adölesan bireylerin birinci molarlarındaki pulpa taşlarının prevalansı %9,7 idi. Pulpa taşları taraf ve yaşa göre fark göstermekteydi. Pulpa taşlarının dağılımı bilgisi diş hekimlerine klinik endodontik tedavide yardımcı olabilir.

Anahtar kelimeler: pulpa taşı, panoramik radyografi, adölesan

EVALUATION OF PULP STONES IN PERMANENT FIRST MOLARS OF ADOLESCENTS IN A TURKISH POPULATION

ABSTRACT

Introduction: Mandibular first molars are the earliest permanent teeth. Therefore, they are more exposed to degenerations or irritants. Since the prevalence of caries increases with age in these teeth, it is important to know the rate of pulp stones in these teeth. The aim of this study was to determine the prevalence of pulp stones in permanent first molars of individuals in a Turkish population on digital panoramic radiographs and to evaluate the relationship of pulp stones with gender, side, and age. Material and Method: In this study, a total of 650 teeth were retrospectively analyzed on panoramic radiographs of 325 patients aged 10-18 years. Age was divided into two as 10-14 years and 15-18 years. Descriptive and Chi-square tests were used for statistical analysis. P values less than 0.05 were considered significant. Results: Of 325 patients, 195 were female and 130 were male. Pulp stones were detected in 63 (9.7%) of 650 teeth examined. While 33 of the 63 teeth were on the right, 30 were on the left. While the ratio of pulp stones according to the right and left sides and age differed statistically ($p<0.05$), it did not differ according to gender ($p>0.05$). For the right first molar, the rate of pulp stones was higher in individuals aged 15-18 years. Conclusion: In a Turkish population studied, the prevalence of pulp stones in the first molars of adolescent individuals was 9.7%. Pulp stones differed according to the side and age. Knowledge of the distribution of pulp stones can assist dentists in clinical endodontic treatment.

Keywords: pulp stone, panoramic radiography, adolescent

PREVENTİVE EDUCATİON ON DRUG ABUSE: NEED OF THE DAY FOR HUMAN RİGHTS

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Abstract
Education is a tool for social reform which includes various steps starting from knowledge to empowerment and evaluation. Providing knowledge about the adverse consequences of consumption of illicit drugs and substances could be a strong tool against the evil of drug abuse. drug trafficking, trade and consumption are eating in to vitals of society. Drug consumption paralyses the mind, cripples the body and retards the intellect and ultimately affecting the growth of the nation. Many folds it degrades and plays with human rights like Right to health, Privacy, social security, food, dignified life and Freedom from arbitrary arrest, confinement, inhuman punishment, torture etc. Education in our country is a fundamental right and supported by the legal mechanism. This is the time when the same can be used as a preventive tool for the prevention of drug and substance abuse and protection of various human rights in India. At the school level this will be more suitable to introduce in the country and with the help of legal mechanisms. Therefore, in view of this, the present research work analyses the present system and also works for the required system. It also focuses on the adoption of preventive education as a tool and by way of law at school level.
Risk of bias: There is no risk of bias because the quality of data is repetitively back checked physically and telephonic.
Results: Results came as 92% respondents have admitted that preventive education could be an effective tool to combat the problem of drug abuse. Due care, guidance etc. could be panacea for difficult disease of drug abuse and protect the human rights better.
Objectives: The main objectives of the study are as following:
Assessment of problem of drug abuse. To evaluate the availability, importance, scope of preventive education at School level. Research Methodology
Location; The study is confined to the various Upper Primary schools, Anand Path De addiction center, Barabanki of Uttar Pradesh India. Sample Size Randomly 25 teachers at higher secondary schools' level, Barabanki district, Uttar Pradesh and 25 drug users were interviewed for facilitating the purpose after the consent. The convenient method of sampling was used for the purpose of collection of data. Tool An interview schedule was used for conducting the interviews.
Keywords: Drug and Substance abuse, Education, Legal Mechanism, Society, Schools.

ON THE COMMUTATİVİTY DEGREE OF FİNİTE GROUP G=HM FOR G*E*G

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ABSTRACT
Let be a finite group. The commutativity degree of, written, is defined as the ratio Pournaki et al. have studied and generalized this concept for the group and as follows: In this paper, we consider the following finitely presented group Then, by using the numerical solutions of the equation, we derive formula for calculating the probability of where G is a two generated group of nilpotency class 2.
Keywords: Commutativity degree, finite group

DETECTION AND CLASSIFICATION OF SKIN LESION IMAGES USING DEEP LEARNING: A REVIEW

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ABSTRACT

An increasing number of genetic and metabolic anomalies have been found to lead to cancer, generally fatal, Cancer cells can spread to any part of the body where they can be life-threatening .skin cancer is one of the most common types of cancer and its incidence is increasing worldwide. the main subtypes of skin cancer are squamous cells and basal cell carcinomas and melanomas, which are clinically aggressive and responsible for the majority of deaths. therefore, screening for skin cancer is necessary. one of the best methods to accurately and quickly identify skin cancer is using deep learning. The Convolution Neural Network (CNN) deep learning method was used in this research to detect the two main tumor types, malignant and benign, from the dataset. Photos of skin lesions could be classified according to a CNN method based on a summary of the results obtained after many repetitions. several transfer learning models such as Resnet50, InceptionV3, and Inception Resnet were then used for fine-tuning. In addition to experimenting with several models (the designed CNN, Resnet50, InceptionV3, and Inception Resnet), this study's innovation and contribution are using ESRGAN as a pre-processing step.

Keywords: deep learning, machine learning, convolutional neural network, ISIC 2018, skin lesion, computer vision

DISCOVERIES AT LIVIAS NEAR SITE OF JESUS BAPTISM-JORDAN SOUTHERN LEVANT

(A Station for Incense Route in Jordan Valley)

Mohammed Waheeb & Firas Alawneh

ABSTRACT

The Jordanian experts and private sector are implementing a development plan of the area so called historically Livia's near Wadi al-Kufrayn and Wadi Rama to the northern part of the Dead Sea in the lowest spot-on earth. This requires a cultural resources impact assessment during the project phases to avoid any expected threats to the existed and limited archaeological sites found during previous investigations conducted in the area during the past years. In addition, the Ministry of Tourism and Antiquities (MOTA) is about to finish the rehabilitation process of the Christian pilgrim's road to link Site of Jesus Baptism with Mount Nebo on the eastern side of Jordan River. The pilgrim's road passing through several historical and cultural heritage sites such as Tell Hammam, Tell Kufrayn, Tell Rama and Khirbet Kufrayn sites. A series of assessment operations was organized by the team of the study to prepare a more precise assessment about the presence of previously unrecognized archaeological remains in the area, to coordinate with the stakeholders several solutions to protect the discovered sites. The surveys, test soundings and excavations conducted in the Wadi al-Kufrayn since 1997 till nowadays have revealed a long sequence of occupation in Livia's and along the wadi. While more work is needed to fully understand human and environmental relationships during different periods, the results of the field work in Livia's and Wadi al-Kufrayn fill some gaps in the archaeological record of the area. The presence of a Hellenistic sites in Wadi al-Kufrayn are new additions to the early history of Jordan Valley and the the whole southern al-Ghor.

Keywords: Archaeology, Development, Route, Heritage

VOCABULARY KNOWLEDGE AS CORRELATE OF READING COMPREHENSION ACHIEVEMENT AMONG STUDENTS WITH LEARNING DISABILITIES IN IBADAN, NIGERIA

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ABSTRACT

The knowledge of words in a text makes reading comprehension easier and faster for students to achieve brilliantly in reading activities. However, reverse is the case with students with learning disabilities because of their imperfect vocabulary knowledge. Previous studies focused more on interventions to enhance reading comprehension achievement of students with learning disabilities than the nexus vocabulary knowledge has with reading comprehension achievement of students with learning disabilities. This study, therefore, investigated the influence of vocabulary knowledge on reading comprehension achievement among students with learning disabilities in Ibadan, Nigeria. The study adopted a descriptive research design. A sample of 90 students with learning disabilities was purposively selected from six Senior Secondary schools in Ibadan, Nigeria. The research instruments used were Academic Records, Slosson Intelligence Test-Revised, Learning Disability Evaluation Scale Renormed, English Language Achievement Test, Vocabulary Knowledge Test and the Reading Comprehension Test. Data collected were analyzed using the Pearson product moment correlation and multiple regression analysis at 0.05 level of significance. Vocabulary knowledge ($r = 0.56$) had a positive significant relationship with reading comprehension achievement of students with learning disabilities. The relative contribution of vocabulary knowledge to the reading comprehension achievement among students with learning disabilities was also significant. The study concludes that vocabulary knowledge is closely related to students' reading comprehension achievement. Hence, it is recommended that the development of vocabulary knowledge should be incorporated into the reading activities of students with learning disabilities so as to improve their achievement in reading comprehension.

Keywords: Learning Disabilities, Vocabulary Knowledge, Reading Comprehension Achievement

FULL TEXTS

REVITALIZATION OF RELIGIOUS MODERATION EDUCATION IN RESILIENT AND SUSTAINABLE URBAN DEVELOPMENT

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ABSTRACT
Development is a continuous multidimensional process that demands an increase in quality and quantity in all areas of human life. Especially in urban development, there is a supportive relationship in the wider area at the national, regional and global levels. Strong cities will determine the resilience of a country, even the world. Therefore, urban development really needs support from various factors, such as: qualified and productive human resources, a balanced ecosystem, ideology, and adaptive technology. Resilient and sustainable urban development must be carried out in a stable and conducive situation. However, currently the issues of terrorism, radicalism, and intolerance in the name of religion often pose a threat to urban development. There are many cities in this world which were built with great expense and great artistic and cultural value which have been destroyed by these negative forces. Therefore, religious moderation education is absolutely necessary. Therefore, the purpose of this research is to generate ideas about revitalization of religious moderation education in resilient and sustainable urban development. The research method used is qualitative research through literature study. There are three thoughts of this research, namely: first, religious moderation education that fosters awareness and responsibility of the society to maintain the city as a gift from God. Second, religious moderation education which emphasizes the active participation of the society in urban development; and third, religious moderation education that promotes religious and cultural values in urban development.

Keywords: religious moderation, urban resilience

1. INTRODUCTION

In the era of globalization with the development of science and technology that is growing very rapidly demands changes and developments in all fields in every country. An era filled with intense competition has resulted in all countries moving to adjust themselves. Development is carried out in all fields ranging from human resource development, economic development, politics, culture, religion, and science. One of the focuses in economic development is the development of a strong city considering its vital function for the community and the nation. According to the latest information from UN-Habitat, a UN organization concerned with the development of sustainable cities, by 2030, 60 percent of the world's population will live in cities. In today's globalized world, the local and the global are increasingly interconnected and many urban developments are part of global trends. A proper understanding of the causes and consequences of urbanization is essential to ensure an appropriate response to current global issues and to prepare for the future. Cities have become critical to humanity as they have become a force for sustainable economic growth, prosperity, innovation, consumption, productivity. Cities link economy, energy, environment, science, technology, and society which are interconnected in formulating sustainable development policies (*What Is a City?*, 2020; ESPAS, 2020).

There are 6 key trends shaping the future of cities, namely:

a. Connectivity. Connectivity is the catalyst for all change, but environmental degradation, economic instability, social exclusion and security threats will also be drivers and inhibitors of change, and will determine the future of cities.

b. Digitalization. This will strengthen connectivity in producing global cities.

c. Demographic changes. Urbanization where urban people (homo urbanus) will shape their cities, and cities will shape them. This means that their behavior and values will greatly influence their lives, and vice versa. Future challenges will be largely determined by the values, behaviors, choices and designs of future societies.

d. Growing disparities. Cities lead to poverty reduction, but they also reinforce disparities (inequality, discrimination, polarization, privatization, segmentation, segregation) that lead to unpredictable urban conflicts.

e. Global values

f. Climate change (ESPAS, 2020)

Urban development is not easy. Despite the many excellent opportunities provided by cities, they do not always guarantee sustainable success because cities also have many challenges. Cities do not always perform well and do not always deliver the desired results. However, city builders must build strong and sustainable cities for their residents. There are many enabling factors needed. One of them is the support of the community so that the city becomes strong and its existence can be sustainable. Cities must be resilient and protected from threats that could potentially destroy them. This is very important because cities have many functions, namely: economic function, social function, and physical function. Cities that have an economic function emphasize the existence of cities as commercial areas characterized by high rates of change, high levels of investment, and regional buffers. The social function of the city is shown by the city as a place where various diverse activities take place supported by supporting facilities used to communicate and interact. The physical function means that the city has experienced a massive increase in the physical development of city facilities and infrastructure (Noor Hamidah dan Mahdi Santoso, 2022). Other functions can be added, namely religious functions, educational functions, political functions, cultural functions. In these functions, the city is the center of religious activities, the center of various educational activities, the center of political and government activities, and the center of artistic and cultural development. There are also those who divide it into two parts, namely: internal functions (center of social interaction, center of business, economy, industry, cooperation, service center, political center, etc.) and external functions (center of wider interaction, center of export economy, and various other activities related to the wider region) (Noor Hamidah and Mahdi Santoso, 2022). Cities are convenient places to live, but they also have the potential to cause discomfort and harm to their inhabitants if they are not resilient. Therefore, cities must be built with resilience. If they are not resilient, the country and society will easily suffer tremendous loss, damage, and destruction. Cities may even be destroyed and never have a chance to be rebuilt. There are many threats to cities, for example, natural disasters, economic, political, and cultural shocks, crime, violent behavior, and terrorism. One that needs to be watched out for in urban development is the disruption and threat from communities that embrace extremism, radicalism, intolerance, exclusivism, and terrorism. They strive to spread their influence to all levels of society in a slow and organized manner. They often demonstrate their existence, influence, and power by using deadly and devastating violence. Their target is not just a small group of people, but also the people of a country, even the world. This is certainly not easy to deal with. Cities should be

built with resilience and sustainability in mind. Urban resilience means the ability to activate protective qualities and processes at the individual, community, institutional, and system levels in the face of hazards or stresses and work together to maintain or restore well-being while adapting to new equilibria and minimizing the accumulation of pre-existing risks and vulnerabilities (Ronak Patel and Leah Nosal, 2016).

It requires anticipatory and participatory vigilance from all elements of society. The form of such vigilance is to revitalize religious moderation education in every city to ensure urban resilience. In the context of Indonesia, the Indonesian government has thought of a way to overcome it, namely through education that develops the intellectual aspects, character, and skills of the community, specifically through religious moderation education. A moderate or balanced society will automatically produce stable, conducive, and dynamic situations and conditions. In such situations and conditions, urban development can be implemented and produce prosperity and welfare for the people and the country. Policymakers and city developers should consider the importance of supporting the revitalization of religious moderation education when building and developing cities. City developers should have a clear vision, mission, and goals when developing cities so that they can build strong and sustainable cities.

2. RESEARCH AND FINDINGS

There are three findings that will be discussed in this section, namely: first, religious moderation education that fosters people's awareness and responsibility to protect the city as a gift from God. Second, religious moderation education emphasizes active community participation in urban development; and third, religious moderation education promotes religious and cultural values in urban development. All three will be discussed in the framework of revitalizing religious moderation education in the development of a strong and sustainable city.

3.1 Robust and Sustainable City Development

In this discussion, there are two terms that are very important to understand, namely a strong or resilient city (resiliency of city) and sustainable urban development. The term sustainable development was coined in 1984 by the International Union for Conservation of Nature and Natural Resources, which presented a global conservation strategy that was still limited to ecological sustainability, but did not link it to economic and social issues. It wasn't until the 1987 World Conference on Environment and Development that the Brundtland Commission Report gave the term a generally accepted definition. Sustainable development is defined as

development that meets the needs of present generations without compromising the ability of future generations to meet their needs and aspirations. There are five principles in sustainable development contained in the report, namely: 1) changing patterns of economic growth, management and technological production that negatively affect the environment and people; 2) Ensure energy saving food, water and sanitation services for all people; 3) Control global population growth; 4) Protect natural resources for future generations; 5) Integrate the economic environment and population in decision-making and planning policies. From the notion of sustainable development comes the notion of sustainable urban development, which is an effort to balance urban development and protection aimed at equitable distribution of jobs, housing, basic services, social infrastructure, and transportation in urban areas (Sarbani Bera, 2020). City developers should promote support for religious moderation education in every city they build.

3.2 Religious Moderation Education

Diversity is a necessity. All societies in any nation are pluralistic. It is evidenced by different backgrounds in terms of education, economy, culture, ideology, religious beliefs, and various other differences. There is no community environment that is completely uniform in all respects. So the difference or diversity is something that must be accepted. However, similarities in society also form identities and systems that bind everyone together so that they can live together in peace and harmony. However, the negative side of diversity can cause division. The word moderation comes from the Latin moderatio, which denotes "moderation" (neither excessive nor deficient). As the word "moderate" is also interpreted as self-control from excessive and deficient attitudes. If traced in the Big Indonesian Dictionary (KBBI), the word moderation gets two meanings, namely reducing violence and avoiding extremes (Kementerian Agama RI, 2019). Religious moderation is a perspective, attitude, and behavior that positions itself in the middle. If it is associated in a religious context, it can be formulated, religious moderation is a person's perspective, attitude, and religious practice that results in loyalty to the basic national consensus in society, which is implemented and applied to maintain and respect human dignity and build noble, fair deeds, maintain balance, and obey the constitution as a nation and state agreement. In this case, the context of religion is not moderated because religion has implemented these principles, but the attitude of religious adherents regarding how to practice religion is moderated because religion does not teach violence. However, in practice, many people practice religion to the extreme. Therefore, tolerance is the result of moderation in religion (Kementerian Agama RI, 2019). The importance of religious moderation still

requires serious attention is the occurrence of community groupings based on the religion adhered to; the diversity of the education level of religious believers, the diversity of the socio-economic level of religious believers, the diversity of cultural backgrounds, and the diversity of ethnicities and regions of origin. Whereas diversity in religion should be the main idea in moderation, which is to find similarities and not sharpen or sharpen the differences between religions. There are three main reasons why religious moderation is so important. First, religion teaches about balance in various aspects of life, upholding human values. Gaps due to differences in human life often result in attempts to exploit religious teachings for their own interests, and politics. Second, the growing religious narrative produces multiple interpretations so that religious adherents no longer cling to the essence and nature of their religious teachings, but are fanatical about certain interpretations that are considered the truth of their preferred version, and sometimes interpretations that are in accordance with their political interests. This is what causes conflict between religions (Kementerian Agama RI, 2019). Religious moderation is a way of looking at religious attitudes and practices in common life, by actualizing the nature of religious teachings that protect human dignity and build mutual benefit based on the principles of fairness, and balance, One of the scholars who describe a lot about moderation is Yusuf al-Qaradhawi. He revealed the signs of moderation, among others: (1) a comprehensive understanding of Islam, (2) a balance between sharia provisions and changing times, (3) support for peace and respect for human values, (4) recognition of religious values, cultural and political plurality, and (5) recognition of minority rights (Mahyuddin (ed.), 2020).

3.2.1 Understanding the City as a Gift from God

Every religion has a theology of creation that emphasizes the city as God's gift to all creatures. All believers are taught to care for the city and seek its welfare. Diverse moderation education in every educational institution should emphasize the importance of students being involved in reflecting and acting according to their respective parts to maintain the welfare of the city.

3.2.2 Involving Active Community Participation in City Development

Moderate city development is not only the responsibility of the government and city developers, but all members of society are responsible for actively participating in city development. Some of the things that religious educators can do is to synergize with the government and city developers to advance the city by first transforming the people's paradigm of a moderate city and inviting them to jointly build the city they live in with love and loyalty between fellow humans of different religions and beliefs. In the midst of a multicultural society, city developers must be moderate in religion so as to build a multicultural, harmonious, cooperative, and

collaborative city so that the people who live in it can live in harmony and peace. City developers should not create segregated communities by building housing or cities that favor certain religions, such as building housing or cities that can only be inhabited by members of certain religions; building places of worship that are only available to members of certain religions; or building certain religious symbols in an urban location. City developers, in cooperation with the government, should not create regulations that tend to discriminate.

3.2.3 Promoting Religious and Cultural Values in Urban Development

To promote religious moderation, city developers collaborate with cultural and religious leaders to promote pluralist values of harmony and togetherness that are drawn from religious values and local wisdom values that exist in each ethnic or community group. For example, in Indonesia, there is the culture of mutual cooperation, Pela Gandong culture in Maluku, Okomama Culture in East Nusa Tenggara, Tepung Tawar culture in South Sumatra. City developers can decorate the city with symbols of religious moderation so that people can live a moderate life. It is also a way for people to get to know each other. They can also open a dialogue space with the community to ask for input or to socialize the vision of religious moderation through the city they built so that people have religious literacy.

4. CONCLUSION

Urban development requires security so that cities can be sustainable and resilient. One of the things that can guarantee it is a society that has religious moderation. Urban developers need to have the insight, knowledge and spirit of religious moderation. They must play a role in the success of religious moderation education by creating urban development concepts that engage in religious moderation education. Some of the things they can do are: fostering awareness and responsibility of the society to maintain the city as a gift from God; emphasizing the active participation of the society in urban development; and promoting religious and cultural values in urban development.

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EVALUATION OF SYNTHETIC HEXAPLOID BREAD WHEAT GENOTYPES FOR SOME ABIOTIC STRESS CHARACTERS

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ABSTRACT
In the study, 58 synthetic wheat lines and 6 bread wheat varieties were used as material. Synthetic bread wheat lines were supplied from CIMMT (ZFSN was obtained from the elite 2 synthetic lines of CIMMYT, and HRSN was obtained from CIMMYT 14SYNT). Selimiye, Flamura 85, Pehlivan, Aldane, Bereket and Gelibolu were used as standard cultivars in the experiment. Among the investigated genotypes, the lowest canopy temperature was obtained with 12.33 ºC in ZFSN 14, ZFSN 8, ZFSN 24 and HRSN 11-4. With 12.67 ºC, HRSN 1-6 and HRSN 11-11 followed these lines. In addition, ZFSN 26 with 13.33 ºC, HRSN 10-9, HRSN 1-14 and HRSN 9-7 lines with 14.00 ºC were listed later. Chlorophyll ratio in the genotypes included in the experiment varied between 28.90-59.30 (mg g-1 plant). The highest chlorophyll ratio was found in HRSN 9-15 with 59.30, followed by ZFSN 3 with 58.60, HRSN 15-11 with 56.90, Gallipoli with 55.60, ZFSN 28 with 55.00, HRSN 4-10 with 54.50 and HRSN 1-16 with 54.00, HRSN Lines 2-16 and ZFSN 14 followed. There was a significant variation in terms of stomatal characteristics such as the number of stomata, length and width in synthetic wheats. It can be said that ZFSN 22, ZFSN 12 and HRSN 15-17 synthetic wheat lines are the most superior lines in terms of resistance to abiotic stress factors.

INTRODUCTION

Synthetic wheat is a useful genetic resource that should be used to transfer agronomically important genes from a wide range of tetraploid or diploid species, including wild species, to improve the performance of bread wheat. Genomic and functional genomic studies can help us better understand the molecular basis for synthetic genotypes, growth viability. A set of reference genomes has recently been made available for both bread wheat and its progenitors. Draft genome sequences of the A and D donor genomes were obtained several years ago (Jia et al. 2013; Ling et al. 2013) while several hexaploid wheat genome versions were under development (Mayer et al. 2014).

Although significant yield increases have been achieved with combination breeding in wheat breeding studies, the increase in yield has slowed down due to the decrease in genetic diversity in the wheat gene pool in recent years (Dreisigacker, et al. 2008). Bread wheat (Triticum aestivum L.) obtained from natural hybridization between durum wheat (Triticum. Turgidum L. subsp. durum) and Aegilops tauschii (Coss.) was produced by one or several backcrossings. In conclusion, the genetic potential in durum wheat and Aegilops tauschii was represented in the bread wheat germplasm (Dreisigacker et al. 2008; Li et al. 2014). Synthetic hexaploid wheat is being developed and used for superior results in wheat breeding in order to add new genetic diversity to the bread wheat gene pool (Mujeeb-Kazi et al. 1996)

As a result of intensive breeding studies for the development of high-yielding wheat varieties with higher nutritional value, the genetic diversity of culture forms has gradually decreased, and their susceptibility to pests, environmental stresses and various diseases has increased (Baloch et al., 2017). One of the wild relatives of wheat, Aeg. After crossing between squarrossa (2n=14 DD) and T. dicoccum (2n=28, AABB) or T. durum (2n=28, AABB) strains, primary synthetic hexaploid bread wheats (2n=42, AABBDD) were grown using embryo rescue technique. is being developed. Agronomically suitable genotypes (such as easy blending and suitable plant height) can be obtained by crossing these genotypes with modern hexaploid wheats twice, and the genotypes obtained in this way are called synthetic hexaploid wheats.

The aim of this study is to reveal the abiotic stress breeding potential of hexaploid synthetic wheat advanced lines by examining 58 synthetic bread wheat genotypes in terms of canopy temperature, chlorophyll ratio, winter resistance, stomata number, width, length and characteristics.

MATERIAL AND METHOD

Material

In the study, 58 synthetic wheat lines and 6 bread wheat varieties were used as material. Synthetic bread wheat lines were obtained from CIMMT (ZFSN: from CIMMYT elite 2, HRSN: from CIMMYT 14SYNT). Selimiye, Flamura 85, Pehlivan, Aldane, Bereket and Gelibolu bread wheat varieties were used as standard in the experiment.

Method

Synthetic lines and bread wheat varieties used in the experiment were sowing according to 8x8 partially triple lattice trial design. Each genotype in the experiment was established as 3 replications with 500 seeds per square meter in 4 rows in 2-meter rows. In the evaluation of synthetic bread wheat lines, 6 bread wheat varieties that are widely sowed in the region were sowed as standard. Synthetic bread wheat lines and varieties were fertilized with 5 kg of pure phosphorus and nitrogen at sowing time, 6 kg of pure nitrogen at the starting of tillers, and 5 kg of pure nitrogen before heading time. In the experiment, pesticides were applied against the weeds growing in the field, and no chemical pesticides were applied against diseases and pests in the trial area. Winter resistance, number of stomata, stomatal width, stomatal length, vegetation temperature and chlorophyll ratio values were determined in the plots in the experimental area.

RESULTS AND DICCUSSION

Winter hardiness, canopy temperature and stomata number

In the results of the variance analysis of the data on winter resistance, canopy temperature and stomata number in synthetic and bread wheat genotypes, the difference between varieties was found to be statistically significant. The results of the Turkey test performed to reveal the difference between the averages are given in Table 1.

When the temperature drops below -15 ^{o}C (without snow cover), winter cold causes significant damage on the wheat. The winter hardiness ratio of genotypes varied between 1-3. While the highest cold damage rate was obtained in ZFSN 5 line with 3 scale values, it was followed by ZFSN 32, HRSN 4-2, ZFSN 16, and ZFSN 30 synthetic wheat lines in the same statistical group. The lowest cold damage with a value of 1 was obtained in HRSN 4-11, HRSN 14-10, ZFSN 18, HRSN 8-6, Selimiye, ZFSN 2, ZFSN 28 and Gelibolu . According to the data obtained in terms of being affected by winter cold damage, winter cold damage was observed in more than half of the genotypes, although not at a high level.

Table 1. Results of the significance test for winter resistance, canopy temperature and stoma number

Winter resistance			Canopy Temperature			Number of stomata		
Genotypes	Aver.	Sig.	Genotypes	Aver.	Sig.	Genotypes	Aver.	Sig.
ZFSN 5	3.00	a	ZFSN 33	21.67	a	ZFSN 16	13.00	a
ZFSN 32	2.33	ab	HRSN 8-6	21.00	ab	ZFSN 24	12.00	ab
HRSN 4-2	2.33	ab	HRSN 11-14	20.00	abc	ZFSN 21	11.67	abc
ZFSN 16	2.33	ab	ZFSN 30	19.67	a-d	HRSN 15-13	10.67	bcd
ZFSN 30	2.33	ab	HRSN 11-4	19.00	b-e	Selimiye	10.67	bcd
ZFSN 31	2.00	bc	HRSN 13-9	19.00	b-e	Gelibolu	10.33	b-e
HRSN 13-17	2.00	bc	ZFSN 3	19.00	b-e	ZFSN 31	10.33	b-e
HRSN 7-6	2.00	bc	ZFSN 16	19.00	b-e	HRSN 13-17	10.33	b-e
ZFSN 26	2.00	bc	ZFSN 10	19.00	b-e	HRSN 12-9	10.00	b-f
HRSN 14-18	2.00	bc	HRSN 4-11	18.67	b-f	HRSN 11-14	9.67	c-g
ZFSN 22	2.00	bc	HRSN 6-8	18.67	b-f	ZFSN 22	9.67	c-g
HRSN 11-4	2.00	bc	HRSN 1-6	18.33	c-g	ZFSN 28	9.00	d-h
ZFSN 15	2.00	bc	HRSN 1-14	18.33	c-g	Aldane	9.00	d-h
HRSN 1-11	2.00	bc	Flamura 85	18.00	c-h	HRSN 2-16	9.00	d-h
HRSN 13-2	2.00	bc	HRSN 11-11	18.00	c-h	ZFSN 2	9.00	d-ı
HRSN 13-9	2.00	bc	ZFSN 21	18.00	c-h	HRSN 8-6	7.00	h-n
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HRSN 2-14	1.00	c	ZFSN 23	15.33	ı-l	HRSN 14-18	6.33	j-o
HRSN 15-2	1.00	c	Gelibolu	15.33	ı-l	ZFSN 33	6.33	j-o
ZFSN 30	1.00	c	HRSN 13-17	15.33	ı-l	HRSN 1-16	6.00	k-o
ZFSN 2	1.00	c	HRSN 12-11	15.00	jkl	ZFSN 5	6.00	k-o
HRSN 4-10	1.00	c	HRSN 14-18	15.00	jkl	HRSN 15-6	6.00	k-o
Bereket	1.00	c	HRSN 15-11	14.67	klm	HRSN 1-6	5.67	l-o
HRSN 14-17	1.00	c	HRSN 15-2	14.67	klm	HRSN 7-12	5.33	mno
HRSN 7-12	1.00	c	HRSN 15-13	14.33	lm	HRSN 7-6	5.00	no
Selimiye	1.00	c	ZFSN 22	14.33	m	ZFSN 15	5.00	no
HRSN 10-9	1.00	c	ZFSN 4	14.33	m	HRSN 11-4	4.64	o

Among the examined wheat genotypes, the highest canopy temperature was obtained in ZFSN 33 line with 21.67 ºC. HRSN 8-6 at 21.00 ºC, HRSN 11-14 at 20.00 ºC, ZFSN 30 at 19.67 ºC, HRSN 11-4 at 19.00 ºC, HRSN 13-9, ZFSN 3, ZFSN 16 and ZFSN 10 followed this line. Photosynthetic product losses of these genotypes with high vegetation temperature are also high. Photosynthesis is severely affected by drought stress. The decrease in photosynthesis rate and chlorophyll content in dry conditions is considered as a typical manifestation of oxidative stress, leading to pigment photooxidation and chlorophyll degradation (Anjum et al. 2011; Marcińska et al. 2013). Decreased leaf growth or increased leaf senescence in arid conditions also negatively affects photosynthesis. Decreases in water content and turgor are accompanied by a decrease in relative moisture content (Grant, 2011).

Among the genotypes, the lowest canopy temperature was determined with 14.33 ºC in ZFSN 4, ZFSN 22 and HRSN 15-13. HRSN 15-2 and HRSN 15-11 lines with 14.67 ºC, HRSN 14-18 and HRSN 12-11 with 15.00 ºC, HRSN 13-17 with 15.33 ºC, Gelibolu and ZFSN 23 genotypes, ZFSN 12, HRSN 9- with 15.67 ºC Genotypes 7, Aldane and HRSN 15-17 were further ranked for canopy temperature. It is expected that these 14 genotypes, whose lowest canopy

temperature is determined, will have low losses in photosynthesis products. In other words, these genotypes are less affected by the stress factor. Therefore, they should be considered primarily for areas with higher stress factors. While the highest number of stomata was obtained in ZFSN 16 with 13 out of 64 wheat genotypes examined, it was followed by ZFSN 24 with 12, ZFSN 21 with 11.67, HRSN 15-13 and Selimiye genotypes with 10.67. Gelibolu with 10.33 stoma numbers, ZFSN 31 and HRSN 13-17, HRSN 12-9 with 10 stoma numbers, HRSN 11-14 and ZFSN 22 with 9.67 stoma numbers, ZFSN 28 with 9 stoma numbers, Aldane, HRSN 2 The -16 and ZFSN 2 genotypes are ranked later in terms of stomata number. In the study, while the ZFSN 16 line had the highest number of stomata, the width of the stoma was the least. This shows that the number of stomata is low in genotypes with high stoma width and length. Among the genotypes, the lowest number of stomata was obtained in HRSN 11-4 with 4.64. ZFSN 15 and HRSN 7-6 with 5 stoma numbers, HRSN 7-12 with 5.33 and HRSN 1-6 lines with 5.67 were ranked later in terms of stoma number. HRSN 15-6, ZFSN 5 and HRSN 1-16 with six stoma numbers, ZFSN 33, HRSN 14-18, ZFSN 6 and HRSN 4-2 lines with 6.33 stoma numbers, and ZFSN 8 lines with 6.67 stoma numbers. were identified as genotypes with a low number.

Stoma width, length and chlorophyll ratio

In the results of variance analysis of the stomatal width, length and chlorophyll ratio in bread wheat genotypes, the difference between varieties was found to be statistically significant. The averages and significance groups obtained in the experiment are given in Table 2. When stomatal characteristics of 58 synthetic bread wheat lines and 6 standard bread wheat cultivars were examined, it was observed that there was a significant variation. In bread wheat genotypes, stoma width ranged between 0.63-1.77 millimicrons and stoma lengths ranged between 1.37-2.97 millimicrons.

When plants are grown under different stress conditions, their responses to stress factors are different. The responses of plants to the stress factors are closely related to their morphological, physiological and biochemical properties. A high net photosynthesis rate, which shows the difference between photosynthesis and respiration, is a desirable feature of plants under stress conditions. The stomatal characteristics in plants have a significant effect on the photosynthesis and respiration of the genotype and directly affect the net photosynthesis rate. Plants may show superior characteristics in genotypes with low stomatal characteristics in terms of resistance to abiotic stress factors. Water is an abiotic factor and an important limiter affecting plant growth, development and yield. The response of plants to water stress depends on plant type, plant age, growth and development period, drought level and persistence, and physical factors. In 64

wheat genotypes examined, stomatal width ranged between 0.63-1.77 millimicrons.

Table 2. Significance test results in stomatal length, width and chlorophyll values in bread wheat genotypes

Stoma length			Stoma width			Chlorophyll ratio		
Genotypes	Aver.	Sig.	Genotypes	Aver.	Sig.	Genotypes	Aver.	Sig.
ZFSN 14	2.97	a	HRSN 6-2	1.77	a	HRSN 9-15	59.30	a
Flamura 85	2.80	ab	HRSN 12-14	1.60	ab	ZFSN 3	58.60	b
HRSN 9-7	2.80	ab	ZFSN 14	1.60	ab	HRSN 15-11	56.90	c
ZFSN 8	2.80	ab	HRSN 9-7	1.57	ab	Gelibolu	55.60	d
ZFSN 32	2.77	abc	HRSN 13-17	1.53	abc	ZFSN 28	55.00	de
HRSN 14-2	2.77	abd	HRSN 14-2	1.50	a-d	HRSN 4-10	54.50	de
HRSN 2-16	2.70	a-d	HRSN 15-11	1.43	b-e	HRSN 1-16	54.00	e
HRSN 13-17	2.67	a-e	HRSN 2-16	1.43	b-e	HRSN 2-16	54.00	e
ZFSN 4	2.67	a-e	Flamura 85	1.43	b-e	ZFSN 14	54.00	e
HRSN 15-11	2.57	b-f	HRSN 14-17	1.43	b-e	ZFSN 7	53.00	f
HRSN 1-16	2.57	b-f	ZFSN 8	1.37	b-f	ZFSN 18	52.90	f
HRSN 2-14	2.50	b-g	HRSN 6-8	1.37	b-f	HRSN 1-11	52.80	f
HRSN 14-17	2.47	b-h	HRSN 10-9	1.33	b-g	Pehlivan	52.50	f
HRSN 11-4	2.43	c-ı	HRSN 2-14	1.33	b-g	HRSN 15-13	52.20	f
Gelibolu	2.43	c-ı	HRSN 15-17	1.30	b-h	HRSN 1-14	52.00	fg
HRSN 1-6	2.10	ı-n	ZFSN 30	1.00	h-n	HRSN 2-14	52.00	fg
ZFSN 2	2.07	j-n	HRSN 1-6	0.93	ı-p	ZFSN 26	41.30	rs
ZFSN 24	2.00	k-n	Gelibolu	0.87	j-p	HRSN 12-11	41.20	rs
HRSN 11-14	2.00	k-n	ZFSN 3	0.87	j-p	HRSN 7-12	40.90	st
ZFSN 21	2.00	k-n	ZFSN 4	0.87	j-p	HRSN 4-11	40.10	tu
ZFSN 15	1.97	lmn	HRSN 15-2	0.83	k-p	ZFSN 16	40.00	tu
HRSN 7-12	1.97	lmn	HRSN 11-4	0.80	l-p	ZFSN 23	40.00	tu
HRSN 7-6	1.97	lmn	HRSN 14-10	0.80	l-p	ZFSN 33	40.00	tu
Selimiye	1.93	mn	ZFSN 10	0.77	m-p	ZFSN 4	39.90	u
HRSN 15-17	1.93	mn	HRSN 13-2	0.77	m-p	ZFSN 32	38.70	v
HRSN 11-11	1.90	n	ZFSN 18	0.70	nop	HRSN 14-10	36.00	yz
HRSN 10-9	1.90	n	ZFSN 22	0.67	op	Bereket	35.60	z
ZFSN 16	1.37	o	HRSN 8-6	0.63	p	HRSN 9-7	28.90	w

Plants have developed different morphological, physiological and biochemical responses to prevent or get rid of the negative effects of stress (Marcińska et al. 2013). Among the genotypes, the highest stomatal width was obtained in the HRSN 6-2 line with 1.77 millimicrons, HRSN 12-14 and ZFSN 14 lines with 1.60 millimicrons, HRSN 9-7 lines with 1.57 millimicrons, HRSN 13-17 with 1.53 millimicrons, HRSN with 1.50 millimicrons. 14-2 followed this line. Only 5 wheat genotypes had stomatal width over 1.5 millimicron. Forty-four bread wheat genotypes had a stomatal width of over 1.0 millimicron. Stomatal conductivity is an important physiological formation directly affected by drought stress, and arid conditions cause a decrease in stomatal conductivity in wheat. Late drought stress significantly reduces wheat thousand-grain weight. Grain filling period is shortened, photosynthesis is stopped by producing less assimilate (Aghanejad, Mahfoozi, Sharghi 2015). The lowest stomatal width was obtained in HRSN 8-6 with 0.63 millimicron in the examined wheat genotypes. ZFSN 22 with 0.67 millimicron, ZFSN 18 with 0.70 millimicron, ZFSN 10 and HRSN 13-2 lines with 0.77

millimicron, HRSN 14-10 and HRSN 11-4 with 0.80 millimicron, HRSN 15-2 with 0.83 millimicron, ZFSN 4, ZFSN 3 and Gelibolu genotypes with 0.87 millimicron were followed.

When bread wheat genotypes were examined in terms of stomatal length, the highest stomatal length was obtained in ZFSN 14 with 2.97 millimicrons, while Flamura 85, HRSN 9-7 and ZFSN 8 lines with 2.80 millimicrons, ZFSN 32 and HRSN 14-2 lines with 2.77 millimicrons and 2.70 millimicrons. HRSN line 2-16 followed suit. Stomatal length was higher than 2.5 millimicron in 11 of the examined wheat genotypes, and higher than 2.0 millimicron in 54 of them. Only 12 genotypes had a stomatal length of 2 millimicrons and valued below. When the genotypes were examined in terms of stoma length, the genotypes with a high number of stomata generally had low stomatal lengths. The lowest stoma length was found with 1.37 millimicron in the ZFSN 16 line, which has the highest stoma count. 1.90 millimicron with HRSN 10-9 and HRSN 11-11, 1.93 millimicron with Selimiye and HRSN 15-17 genotypes, 1.97 millimicron with HRSN 7-6, HRSN 7-12 and ZFSN 15 lines, with 2.0 millimicron ZFSN 21, HRSN 11- 14 and ZFSN 24 lines are listed later. These 11 genotypes with low stomata may be suitable genetic resources for resistance to abiotic stress factors.

In plants, stomatal characteristics are closely related to respiratory losses of plants. Since the respiratory losses of genotypes with more stomatal characteristics will be high, these genotypes are expected to be affected more by arid conditions. Genotypes with such stomatal characteristics should be recommended to areas where stress factors are low. On the other hand, those who show low values in terms of stoma characteristics should be directed to areas where stress factors are more common.

Chlorophyll ratio in the wheat genotypes included in the experiment varied between 28.90-59.30 SPAD. The highest chlorophyll ratio was found in HRSN 9-15 line with 59.30 SPAD value, ZFSN 3 with 58.60 SPAD value, HRSN 15-11 with 56.90 SPAD value, Gallipoli with 55.60 SPAD value, ZFSN 28 with 55.00 SPAD value, HRSN 4- with 54.50 SPAD value. HRSN 1-16, HRSN 2-16 and ZFSN 14 lines followed this line with SPAD values of 10 and 54.00. The reason why importance is given to the selection of lines with dark green leaves within the scope of the breeding program in wheat breeding studies is due to the high yield potential of lines with high chlorophyll content (Yıldırım et al. 2009). In studies conducted by different researchers, it was determined that synthetic wheats have higher chlorophyll content and higher resistance to stress factors compared to bread wheat (Shpiler and Blum 1986; Dorion et al. 1996, Wardlaw and Willenbrink 2000; Rizhsky 2002; Wollenweber et al. 2003; Mittler 2006; Prasad et al. . 2006; Lott et al. 2011). Chlorophyll ratio was above 50 SPAD value in 29 of the genotypes

examined in the study, above 40 SPAD value in 27 of them, above 30 SPAD value in 7 of them, and below 30 SPAD value in one of them. The data obtained reveal that these 29 genotypes with a chlorophyll ratio above 50 SPAD can be considered as a priority, especially for areas where abiotic stress factors are important. In the study, the lowest chlorophyll ratio was obtained in the HRSN 9-7 line with a SPAD value of 28.90, followed by the Bereket variety with a SPAD value of 35.60. These genotypes were followed by HRSN 14-10 with 36.00 SPAD, ZFSN 32 with 38.70 SPAD, ZFSN 4 with 39.90 SPAD and ZFSN 33, ZFSN 23 and ZFSN 16 lines with 40.00 SPAD values.

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EVALUATION OF DURUM WHEAT M4 MUTANT LINES (Triticum durum L. Desf.) IN TERMS OF GRAIN YIELD AND SOME AGRONOMIC TRAITS

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ABSTRACT
In the study carried out in the experimental area of Department of Field Crops, Tekirdağ Agricultural Faculty, Tekirdağ Namık Kemal University, M_4 mutant lines obtained from 3 durum wheat cultivars with the application of 5 different gamma rays were examined in terms of grain yield and some phenological characters such as plant height, heading time, maturation time, thousand grain weight, test weight. Compared with the control cultivars, M_4 mutant lines were found to have desirable characteristics in terms of the traits examined. While 66 mutant lines in the experiment showed a lower plant height average than the trial average, 35 mutants among them had shorter plant heights than the standard Tunca 79 (85 cm) variety, which had the shortest plant height. Mutant lines with the shortest plant height were the HM-12 (60 cm), KM-37 (76 cm), 7113M-30, KM-8, KM-17, KM-19, KM-43 and KM-49 (80 cm) lines. While Sham 1, which gave the highest grain yield (780 g/1.2 m^2) among standard cultivars, took the first place, it was understood that 13 mutant lines gave higher grain yield than this cultivar. Twenty-eight mutant lines gave higher yields than the standard variety Gediz-75 (680 g/1.2 m^2), which gave good yields in the region. Application of M_4 dose resulted in significantly short genotypes among selected mutant genotypes. As a result, mutant lines with desired high performance were obtained for plant height, heading and maturating time, test and thousand grain weight characteristics.

Key Words: Durum wheat, mutant line, grain yield, plant height, heading, thousand grain weight.

INTRODUCTION

The primary goal of plant breeders is to maximize the yield and quality performance of economically important plants. Grain yield and quality of plants emerge with the combined effect of genotypic structure and environmental factors in which they live. Therefore, in the development of new genotypes through breeding studies, it is of great importance to developing varieties that are adaptable to changing climate and soil conditions, respond well to cultural practices, and have high yield and quality.

Breeders consider 3 different approaches in the development of varieties that are widely adapted to the climatic and soil conditions of the target regions. These are studies in the form of breeding new varieties, identifying suitable ones among the existing ones, or improving the deficiencies of existing commercial varieties. The most popular approach among these is the use of traditional breeding methods in the development of new varieties. For this purpose, breeders benefit from the variations found in nature and the new techniques and methods they have developed. Variations created by traditional breeding methods often require a long time, a lot of effort and money. The mutation breeding method can be used to obtain new varieties in a short time to save time for the breeder, to make a planned study and to save labour. It is stated that after mutagen application, it is possible to develop a new mutant variety within 4-6 years in annual plants (Gill et al., 1974). It has been determined that the desired wide variation can be created by a mutation in bread wheat populations (Yıldırım and Tugay, 1977). It has been reported that with the application of 15 kR gamma rays, increases in characters such as plant height, number of spikelets per spike, number of grains per spike and grain weight per spike were achieved in the M_2 generation (Karanzhi and Thackuk, 1985).

Mutations are used directly and indirectly in plant breeding. It is important to use mutations in direct plant breeding when it is desired to improve one or two missing characteristics of a commercial variety with high adaptability and accepted by the industrialist and farmer in a plant breeding program. This is because mutations cause very little change in the overall genotype of the variety without much disturbance compared to crossbreeding. The 97 of the mutant lines developed by gamma irradiation from "Yubilenaya" and "Partizanka" wheat varieties are agronomically promising and 30-35% shorter in height and 15% higher yield, disease resistant and better bread-making quality than Yubileinaya-50 (Baraban and Kertesz, 1984). It has been reported that the plants with more grains per spike and the number of fertile tillers and resistant to grain pouring were obtained in the M_2 populations applied 50-200 Gy gamma irradiation of

the "Azadi" wheat cultivar (Ahmedi and Majd, 1986). Although there was no change in the number of tillers in M_3 wheat plants treated with 32 kR gamma rays, an increase was observed for 1000 grain weight and grain number per spike (Khamankar, 1989). In the Tabassi cultivar exposed to 50-150 kR gamma irradiation, a mutant obtained from 50 kR treatment was found to be more resistant to disease than the standard (40%-100%) and gave higher yields than its parent (Nahgedi and Ahmadi, 1989). Seeds of *F. eculentum* and *F. tataricum* were irradiated with gamma-ray (0-40 kR), doses below 15 kR increased germination percentage, emergence percentage and emergence rate in M_1 and M_2, whereas doses above 15 kR decreased emergence speed and rate (Atul Mathur 1989). It has been reported that M_2 plants obtained from seeds irradiated with 40 kR showed shorter plant height and lower lodging rate than the control (Tulmann et al., 1996). Significant reductions in plant height were observed with increasing doses in populations obtained with 0-5-10-20 and 40 kR gamma rays application (Pandini et al., 1997). Germination, seedling height, number and viability of chlorophyll mutants were investigated in M_1 and M_2 generations of barley treated with 10, 20, and 30 kR gamma rays, and increasing the gamma dose showed a reducing effect on these properties (Kumar and Walia, 1998). The study was carried out to examine M_4 mutant lines obtained by gamma irradiation from 3 durum wheat cultivars for grain yield and some agronomic characteristics such as plant height, heading time, maturation time, thousand grain weight, and test weight.

MATERIAL AND METHOD

Gamma rays were applied to three durum wheat genotypes (7113, Hacımestan and Kunduru 1149) in November 2011 in the Turkish Atomic Energy Authority and were planted in the application and research area of Tekirdağ Namık Kemal University, Faculty of Agriculture, Field Crops Department. 150 mutant lines obtained as a result of selections made in the 2013-2014 growing year (M_3 generation) were used as material in this study. Selected 150 mutant durum wheat lines were planted in 2-meter rows with 30 cm row spacing and 2 rows in 3 replications during the 2014-2015 growing season. Tunca 79, Gediz-75, Bintepe and Sham-1 were used as standard cultivars in the study. Agronomically important characters such as grain yield and plant height, heading time, maturation time, thousand grain weight, and test weight were investigated in the study. Simple statistical parameters such as coefficient of variation, standard error, standard deviation, skewness, kurtosis, and variance were estimated to measure the variability of the mutant lines included in the experiment. Deviation from the normal distribution is defined in two ways: skewness and kurtosis. A positive (+) and negative (-)

skewness coefficient indicates that the frequency distribution shows a right and left distribution. Depending on whether the coefficient of kurtosis is positive and (+) or negative (-), leptokurtic and polykurtic distributions are mentioned. In the leptokurtic distribution, that is, in the case of a positive coefficient of kurtosis, it is understood that the number of genotypes close to the mean and at the ends of the curve is higher than the normal distribution with the same mean and variance. A negative coefficient of kurtosis indicates that the distribution is of polykurtic type, that is, there are proportionally more genotypes in the region between the close vicinity of the mean and the ends of the curve compared to the normal distribution with the same mean and variance. MSTAT computer package program was used in the statistical analysis of the obtained data.

RESULTS AND DISCUSSION

In this study, carried out in the field of Field Crops research and application at Tekirdağ Namık Kemal University, Faculty of Agriculture, changes in some plant characteristics were investigated in 150 mutant lines selected from M_3 populations of 3 durum wheat cultivars and 4 standard cultivars with different gamma rays. The mean values (Table 1), mean and standard deviation, minimum and maximum values, coefficient of variation, coefficient of skewness and kurtosis for the investigated traits in durum wheat genotypes were estimated from the method proposed by Sokal and Rohlf (Table 2). The highest average values obtained for the 6 characters examined and the ones in the low vowel group are given, but a group of data in the middle is not given.

Table 1. The means of mutant line and standard cultivars for the traits examined

Heading date (days)	Genotype	Plant height (cm)	Genotype	Maturating date (days)	Genotype	Test weight (kg hl^{-1})	Genotype	Thousand grain weight (g)	Genotype	Grain yield (g/1.2 m^2)	Genotype
155	7123M-50	60	HM-12	193	7113M-25	85	HM-2	61	Bintepe	980	7113M-41
158	7123M-45	76	KM-37	193	7113M-27	85	HM-4	60	7113M-37	960	7113M-49
158	7123M-49	80	7113M-30	193	7113M-30	85	HM-9	58	7113M-23	950	HM-39
158	KM-2	80	KM-8	194	7113M-3	85	HM-18	58	7113M-36	950	7113M-14
158	KM-3	80	KM-17	194	7113M-26	85	HM-22	57	7113M-38	940	7113M-23
158	KM-4	80	KM-19	194	KM-50	85	HM-24	56	7113M-26	880	7113M-45
158	KM-38	80	KM-43	195	7113M-8	85	HM-27	56	7113M-27	860	7113M-7
158	KM-47	80	KM-49	195	7113M-9	85	HM-34	56	7113M-31	850	7113M-38
159	HM-37	82	KM-20	195	7113M-19	85	HM-36	56	7113M-49	840	7113M-31
159	HM-38	82	KM-32	195	7113M-20	85	HM-39	55	7113M-25	840	7113M-47

160	HM-20	82	KM-36	195	7113M-24	85	HM-43	55	7113M-29	810	HM-24
160	HM-24	83	HM-20	195	7113M-29	85	HM-50	55	7113M-32	810	KM-27
160	HM-40	83	KM-46	195	7113M-47	85	7113M-4	55	7113M-33	800	7113M-34
160	HM-45	84	KM-30	195	7113M-49	85	7113M-9	55	7113M-50	780	Sham-1
160	7123M-26	84	KM-31	195	KM-4	85	7113M-10	54	HM-41	770	7113M-43
160	7123M-39	84	KM-35	195	KM-22	85	7113M-14	54	HM-49	770	KM-38
160	7123M-40	84	KM-39	195	KM-42	85	7113M-19	54	7113M-34	760	7113M-40
160	7123M-44	84	KM-41	195	KM-47	85	7113M-24	54	7113M-35	760	KM-11
160	KM-1	85	HM-16	196	7113M-2	85	7113M-28	54	7113M-39	750	7113M-26
160	KM-27	85	HM-32	196	7113M-4	85	7113M-33	53	HM-26	750	7113M-29
160	KM-41	85	HM-42	196	7113M-5	85	7113M-35	53	HM-31	750	KM-1
160	KM-45	85	7113M-1	196	7113M-6	85	7113M-47	53	HM-39	750	KM-3
160	KM-46	85	7113M-8	196	7113M-7	85	7113M-50	53	7113M-22	740	HM-17
160	KM-49	85	7113M-11	196	7113M-10	84	HM-26	53	7113M-24	740	HM-36
160	KM-50	85	KM-2	196	7113M-11	84	HM-28	53	7113M-28	730	HM-41
161	HM-1	85	KM-5	196	7113M-23	84	HM-38	53	7113M-40	730	KM-36
161	HM-2	85	KM-6	196	7113M-35	84	HM-45	53	7113M-43	720	KM-23
161	HM-3	85	KM-16	196	7113M-36	84	7113M-8	52	HM-9	710	KM-49
161	HM-39	85	KM-25	196	7113M-38	84	7113M-16	52	HM-21	690	KM-12
161	HM-41	85	KM-29	196	7113M-41	84	7113M-22	52	HM-34	680	7113M-28
161	7123M-1	85	KM-42	196	7113M-43	84	7113M-27	52	7113M-11	680	7113M-48
161	7123M-2	85	KM-45	196	7113M-46	84	7113M-29	52	7113M-17	680	KM-5
161	7123M-3	85	KM-47	196	7113M-50	84	7113M-31	52	7113M-45	680	KM-25
161	7123M-5	85	KM-48	196	KM-1	84	7113M-32	52	7113M-46	680	Gediz -75
161	7123M-6	85	KM-50	196	KM-24	84	7113M-36	52	7113M-47	670	7113M-10
161	7123M-9	85	Tunca -79	196	KM-30	84	7113M-40	52	7113M-48	660	HM-21
161	7123M-23	86	HM-10	196	KM-34	84	7113M-43	52	Gediz -75	660	7113M-32
161	7123M-27	86	7113M-2	196	KM-41	84	7113M-48	52	Sham-1	660	KM-21
161	7123M-28	86	7113M-3	196	KM-48	83	HM-11	51	HM-20	660	KM-40
161	7123M-29	86	7113M-6	196	Sham 1	83	HM-19	51	HM-27	650	HM-3
161	7123M-37	86	KM-4	197	7113M-1	83	HM-29	51	HM-42	650	7113M-24
161	7123M-41	86	KM-7	197	7113M-12	83	HM-44	51	7113M-14	650	KM-24
161	7123M-42	86	KM-11	197	7113M-13	83	HM-49	51	7113M-18	640	HM-20
161	7123M-46	86	KM-21	197	7113M-15	83	7113M-12	51	7113M-42	640	HM-42
161	7123M-48	86	KM-24	197	7113M-16	83	7113M-18	51	KM-9	640	HM-50
161	KM-5	86	KM-27	197	7113M-21	83	7113M-25	51	KM-10	640	7113M-16
161	KM-11	86	KM-38	197	7113M-22	83	7113M-34	50	HM-4	640	KM-29
161	KM-13	86	KM-40	197	7113M-28	83	7113M-37	50	HM-11	640	KM-50
161	KM-23	87	HM-11	197	7113M-37	83	7113M-38	50	HM-32	630	HM-34
163	HM-23	90	KM-12	199	Sham-1	77	KM-39	45	KM-41	510	7113M-36
163	HM-33	90	KM-13	200	HM-1	76	HM-47	45	KM-42	510	KM-28
163	HM-44	90	KM-15	200	HM-4	76	KM-2	44	HM-15	500	HM-9
163	7123M-7	90	KM-26	200	HM-5	76	KM-5	44	HM-24	500	HM-14
163	7123M-11	90	KM-44	200	HM-13	76	KM-32	44	HM-25	500	HM-23
163	7123M-12	90	Gediz -75	200	HM-27	76	KM-36	44	HM-45	500	HM-33
163	7123M-14	91	HM-30	200	HM-35	76	KM-38	44	7113M-1	500	7113M-25
163	7123M-16	91	7113M-10	200	HM-37	76	KM-44	44	7113M-5	500	KM-43
163	7123M-19	91	7113M-19	200	HM-38	76	KM-46	44	7113M-12	480	HM-26
163	7123M-30	91	7113M-21	200	HM-39	76	KM-49	44	KM-16	480	7113M-17
163	7123M-33	91	7113M-22	200	HM-41	75	HM-1	44	KM-26	480	7113M-19
163	7123M-47	91	7113M-38	200	HM-50	75	HM-31	44	KM-36	480	7113M-50

163	KM-9	91	7113M-42	200	7113M-34	75	HM-42	44	KM-46	480	KM-47
163	KM-10	91	7113M-44	200	KM-9	75	7113M-7	43	HM-13	470	HM-37
163	KM-12	92	HM-4	200	KM-10	75	KM-1	43	KM-15	470	7113M-33
163	KM-15	92	HM-15	200	KM-13	75	KM-7	43	KM-29	460	7113M-8
163	KM-16	92	HM-24	200	KM-14	75	KM-11	43	KM-38	460	7113M-20
163	KM-22	92	HM-27	200	KM-15	75	KM-14	42	HM-17	450	7113M-1
163	KM-33	92	HM-29	200	KM-16	75	KM-17	42	7113M-6	450	KM-6
163	KM-34	92	HM-36	200	KM-29	75	KM-19	42	7113M-13	450	KM-10
163	KM-37	92	HM-39	200	KM-33	75	KM-21	42	KM-3	440	HM-47
163	Sham 1	92	7113M-4	201	HM-3	75	KM-22	42	KM-4	440	7113M-6
163	KM-19	92	7113M-9	201	HM-6	75	KM-35	42	KM-35	440	7113M-11
164	7123M-15	92	7113M-39	201	HM-7	75	KM-37	42	KM-37	440	KM-16
165	HM-16	92	KM-28	201	HM-14	75	KM-45	42	KM-43	430	HM-25
165	HM-29	92	KM-33	201	HM-16	75	KM-47	41	KM-2	430	7113M-5
165	7123M-17	93	HM-48	201	HM-17	75	KM-50	41	KM-6	430	KM-8
165	7123M-21	93	HM-49	201	HM-20	74	KM-6	41	KM-8	430	KM-20
165	KM-30	93	7113M-14	201	HM-21	74	KM-12	41	KM-12	420	HM-16
165	Tunca 79	93	KM-22	201	HM-22	74	KM-18	41	KM-13	420	HM-38
165	Gediz	94	HM-34	201	HM-23	74	KM-24	41	KM-19	420	7113M-3
166	HM-7	94	7113M-12	201	HM-34	74	KM-25	41	KM-25	420	KM-39
166	HM-8	94	7113M-23	201	HM-42	74	KM-27	41	KM-27	420	KM-44
166	HM-10	94	KM-14	201	HM-43	74	KM-40	41	KM-40	400	KM-35
166	HM-11	95	HM-21	201	HM-45	72	KM-9	41	KM-47	370	KM-9
166	HM-17	95	HM-43	201	HM-46	72	KM-30	41	KM-49	360	7113M-2
166	HM-18	95	HM-44	201	HM-47	72	KM-43	40	7113M-2	360	KM-15
166	HM-22	95	7113M-16	201	HM-48	71	7113M-1	40	KM-7	350	HM-13
166	HM-25	95	7113M-24	201	HM-49	71	KM-8	40	KM-20	350	HM-35
166	HM-30	95	KM-18	201	KM-19	71	KM-16	40	KM-21	350	KM-37
166	HM-31	95	KM-34	201	Bintepe	71	KM-20	40	KM-24	340	HM-6
166	HM-35	95	Sham-1	202	HM-8	71	KM-23	40	KM-30	340	7113M-15
166	7123M-13	96	HM-23	202	HM-9	71	KM-26	40	KM-39	330	7113M-39
166	7123M-18	97	HM-2	202	HM-10	71	KM-28	40	KM-44	320	KM-34
166	7123M-20	97	HM-38	202	HM-18	71	KM-34	40	KM-45	310	HM-2
166	KM-17	98	HM-37	202	HM-24	71	KM-41	40	KM-48	310	KM-17
166	KM-18	98	KM-9	202	HM-25	71	KM-48	39	KM-1	240	KM-13
166	Bintepe	98	KM-10	202	HM-26	70	KM-3	39	KM-17	240	KM-48
167	HM-6	100	HM-3	203	HM-12	70	KM-15	38	KM-31	200	HM-12
167	HM-14	102	HM-6	203	HM-28	70	KM-29	38	KM-32	200	7113M-13
168	HM-12	125	7113M-7	203	HM-29	65	KM-13	36	KM-50	200	7113M-30
168	HM-13	140	Bintepe	203	HM-30	65	KM-31	32	HM-12	150	KM-31

When the genotypes were compared to each other for plant height, it was determined that the plant height was 89.44 cm on average, and it varied between 60-140 cm for the genotypes. While 66 mutant lines in the experiment had shorter plant height than the general average, 35 mutant lines had shorter plant height than Tunca 79 (85 cm), which has the shortest plant height among the standards. Mutant lines with the shortest plant height were the HM-12 (60 cm), KM-37 (76 cm), 7113M-30, KM-8, KM-17, KM-19, KM-43 and KM-49 (80 cm) lines.

When the genotypes were examined for the heading date, which indicates earliness, it was found that the mean heading time ranged between 155-168 days, the earliest genotypes were 7114M-50 (155 days), 7114M-45, 7114M-49, KM-2, KM-3, KM-4, It is understood that it is KM-38, KM-47 (158 days). Sham-1 standard variety was the earliest standard variety with 163 days, while most of the lines were found earlier for heading date. As for the maturation period, it was found that the trial average was 194.18 days and the genotypes considered had averages varying between 188-201 days in terms of this feature. Among the standard cultivars, Tunca-79 was found to be the earliest cultivar, while 67 of the mutant lines had a shorter maturation date. It is seen that the average thousand-grain weight of the mutant lines varies between 32-61 g and the average test weight varies between 65-85 kg hl^{-1} (Table 1). The great average for thousand grain weight and test weight of the genotypes were found to be 47.33 g and 79.33 kg hl^{-1}. While the standard Bintepe variety gave the highest value (61 g) among all genotypes, the standard varieties with the second and third highest thousand grain weight were Gediz -75 and Sham 1 (52 g). The 25 mutant lines gave a higher thousand-grain weight average than Gediz-75 and Sham-1 standard cultivar, while 9 mutant lines had the same value. Sham 1 standard variety (83 kg hl^{-1}) ranked first for test weight, while 7114M-46 mutant (83 kg hl^{-1}) had the same test weight. While the other standard variety Tunca-79 (81 kg hl^{-1}) took the lead in terms of test weight, 6 standard mutant lines surpassed it and 8 mutant lines had the same value. While other standards showed 80 kg hl^{-1} test weight, 27 mutant lines had the same value.

The grain yield of 150 durum wheat lines and varieties varied between 150 and 980 g/1.2 m^2, with an average of 284.84 g/1.2 m^2. As a result of previous studies in the region, Sham 1, which gave the highest grain yield (Bilgin, 1996), was in first place among the standard varieties, while 13 mutant lines gave higher yields from this variety. In the same previous study carried out in the region, the other standard Gediz-75 variety (680 g/1.2 m^2) with very good grain yield performance was at the forefront among the genotypes, while 28 mutant lines surpassed this variety in terms of yield. The 52 mutant lines gave lower grain yield than all standard cultivars. Simple statistical analysis results of the data obtained from durum wheat genotypes are given in Table 2. The coefficient of variation determined for grain yield in the examined lines and cultivars was greater than 0.1790, which was reported as the upper confidence limit (Yıldız, 1976), and it was lower for heading and maturating date, thousand grain weight and test weight. It can be said that the effect of genotype is more than the environmental effect in the phenotypic variability observed in the traits whose coefficient of variation is lower than the upper confidence limit (0.1790), whereas the effect of the environment is higher in the variability

occurring in the traits whose coefficient of variation is higher than the upper confidence limit. The highest coefficient of variation (27.889%) was estimated for grain yield. Other high coefficients of variation were estimated for test weight (11.219%), plant height (8.08%) and thousand grain weight (6.202%), respectively (Table 2).

Table 2. Estimated simple statistical values for the investigated features

	Plant height (cm)	Heading date (days)	Maturating date (days)	Thousand grain weight (g)	Test weight (kg hl^{-1})	Grain yield (g/1.2 m^2)
Minimum	61.00	155.00	188.00	65.00	32.00	150.00
Maximum	145.00	168.00	201.00	85.00	61.00	980.00
Mean	89.435	162.27	194.18	79.33	47.33	284.84
Variance	52.29	4.89	6.03	24.22	28.22	6315.82
Standard deviation	7.23	2.21	2.46	4.92	5.31	79.47
Standard error	0.58	0.18	0.20	0.40	0.43	6.40
Skewness	3.28	0.24	0.53	-0.53	0.04	0.08
Kurtosis	26.93	0.54	-0.07	-0.43	-0.39	0.29
Coefficient of variation	8.08	1.36	1.267	6.202	11.219	27.899

The lowest variability was obtained in the number of days to head (1.36) and the number of days to maturity (1.267). These results show that a wide variability that can be used in breeding studies is created in terms of grain yield and plant height with gamma ray application, but sufficient variability cannot be created in terms of the number of days to spike and the number of maturation days.

The fact that the coefficient of skewing is positive for the heading date, plant height, maturation date and grain yield, among the traits examined in the experiment, indicates that the frequency distribution of these traits is right-slanted. This value was found to be statistically significant for plant height and insignificant for other traits. The fact that the skewness coefficient is negative for a thousand grain weight indicates that the frequency distribution of this feature is left-slanted. The results show that the performances of mutant lines created by gamma ray application are lower than the general average in terms of other characteristics except for plant height. The performance of lines and cultivars was found above the general average only in terms of plant height. The positive coefficient of kurtosis for plant height, earing time and grain yield in 150 mutant durum wheat lines and 4 standard cultivars indicate that the distribution in these traits is in leptokurtic type. It was determined that the distribution of these characters was statistically significant only in terms of plant height and insignificant in other characteristics. This shows that the distribution in plant height, heading date and grain yield characteristics are proportionally higher in the close vicinity of the mean and at the ends of the curve. The fact that the coefficient of kurtosis is negative in maturating date, thousand grain weight and test weight

indicates that the distribution of these characteristics is polykurtic, that is, it is proportionally higher in the regions between the close vicinity of the mean and the ends of the curve, compared to the normal distribution with the same mean and variance.

CONCLUSION

The results obtained in this study conducted with 150 durum wheat mutant lines and 4 standard varieties are summarized as follows. In terms of grain yield, 13 mutant lines gave a higher yield than Sham 1, which gave the highest grain yield, and 28 mutant lines higher than the second highest yielding standard Gediz-75 cultivar. The 35 mutant lines were shorter than the standards. There were mutant lines that showed superior performance for test weight and thousand grain weight. Most of the mutant lines were determined earlier than Sham-1, which is the earliest heading standard cultivar, and Tunca 79, which is the earliest maturing cultivar. These results show that a wide variation can be created for properties such as plant height and grain yield, 1000 grain weight and test weight, in durum wheat breeding by mutagen application such as gamma rays.

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ÖZET

Nanoteknoloji, tarımsal üretkenliği artırmak ve sürdürülebilir tarıma hedeflerine yardımcı olmak için muazzam potansiyele sahip teknikler oluşturmaktadır. Bu sektördeki farklı uygulamalar arasında izleme cihazları, ağır metallerin atık sudan uzaklaştırılması, tuzdan arındırma, toprak erozyonunun azaltılması, besin maddelerinin hedeflenen dağıtımı ve gıda güvenliği yer almaktadır. Tarım alanlarında nanoteknolojik ürünlerin uygulanması, sensörler, gübreler, herbisitler, böcek ilaçları, emülsiyonlar ve büyüme formülasyonları kullanılarak yaygınlaşmaktadır. Bu devrim niteliğindeki ürünler sürdürülebilir gıda gelişimini sağlamak adına üretim maliyetlerini azaltmak, bitki ve tohumların kalite ve verimlerini artırmak ve olumsuz çevre faktörlerinin etkilerini azaltmak için çok çeşitli umut verici seçenekler sunmaktadır. Nano gübreler, özellikle besin maddelerini bitkilere yavaş, kontrollü ve istikrarlı bir salınım düzeyinde vererek hem toprak hem de mahsul verimliliğini artırmak adına son zamanlarda gelişmekte bitki ve toprak destekleyicileridir. Nano gübreler, küçük boyutları, şekilleri, yüzey kimyaları, elektrik yükleri ve agregasyonları gibi fizikokimyasal özellikleri ile alüminyum, gümüş, titanyum, silika, karbon, çinko, nitrojen, zeolit ve bakır gibi çeşitli malzemeler kullanılarak her mahsulün gereksinimlerine ve ihtiyaçlarına bağlı olarak sentezlenebilir. Nano gübreler sayesinde besin maddelerinin kullanılabilirliğinin artması nedeniyle bitkilerde fotosentetik kapasite artmakta, yüksek verim ve kuru madde üretimi oluşmaktadır. Nano gübrelerin kullanımı ile kimyasal gübrelerin uygulama sıklığı azalmakta ve dolayısıyla potansiyel toprak toksisitesinin de önüne geçilmektedir. Günümüzde geleneksel yöntemlerin dezavantajlarının üstesinden gelmek için önerilen nano gübrelerin en önemli alternatif çözüm önerileri arasında yer aldığı görülmektedir. Bununla birlikte, nano gübrelerin sanayileşmesinden ve ticarileşmesinden önce, sosyal güvenliği garanti etmek adına insanlarla ve çevreyle temasa geçtiklerinde oluşabilecek etkilerini değerlendirmek için daha fazla araştırma yapılmalıdır.

Anahtar Kelimeler: Nanoteknoloji, Nano gübre, Tarım, Tarla Bitkileri

USE OF NANO FERTILIZER IN AGRICULTURAL FIELDS

ABSTRACT
Nanotechnology creates techniques with enormous potential to increase agricultural productivity and help us achieve sustainable agriculture. Different applications in this industry include monitoring devices, removal of heavy metals from wastewater, desalination, soil erosion reduction, targeted distribution of nutrients, and food security. The application of nanotechnological products in agriculture is becoming widespread, using sensors, fertilizers, herbicides, pesticides, emulsions, and growth formulations. These revolutionary products offer a wide range of promising options to reduce production costs, improve the quality and yield of plants and seeds, and reduce the effects of adverse environmental factors to achieve sustainable food development. Nano-fertilizers are recently emerging plant and soil supplements to increase soil and crop productivity, especially by delivering nutrients to plants at a slow, controlled, and stable release level. Nano fertilizers can be synthesized depending on the needs and needs of each crop, using a variety of materials such as aluminum, silver, titanium, silica, carbon, zinc, nitrogen, zeolite, and copper, with their physicochemical properties such as their small size, shape, surface chemistry, electrical charges, and aggregation. Thanks to nano fertilizers, the photosynthetic capacity of plants increases due to the rise in the availability of nutrients, and high yield and dry matter production occur. With the use of nano fertilizers, the frequency of chemical fertilizers is reduced, and therefore potential soil toxicity is prevented. Today, it is seen that nano fertilizers, which are recommended to overcome the disadvantages of traditional methods, are among the essential alternative solutions. However, before the industrialization and commercialization of nano fertilizers, more research needs to be done to evaluate the effects that may occur when they encounter humans and the environment to guarantee social security.

Keywords: Nanotechnology, Nano-fertilizer, Agriculture, Field Crops

1. GİRİŞ

Yirmi birinci yüzyılda tarım, hızla artan küresel nüfus, öngörülemeyen iklim değişikliği, azalan tarımsal üretkenlik, değişken iş gücü ve artan kentleşme sorunlarını ele alarak daha fazla gıda üretme konusunda çeşitli zorluklarla karşı karşıyadır. Geleneksel gübrelerden elde edilen besin maddelerinin kullanım etkinliği son derece düşüktür (Kumar ve ark., 2021). Uygulanan gübrelerin azot içeriğinin yaklaşık %40-70'i, fosfor içeriğinin %80-90'ı ve potasyum içeriğinin yaklaşık %50-90'ının çevrede kaybolduğu ve bitkiye ulaşamadığı, bunun da önemli ekonomik kayıplara neden olduğu bildirilmiştir (Basavegowda ve Baek., 2021; Kumar ve ark., 2021). N, P ve K gibi inorganik gübrelerin aşırı kullanımı, ötrofikasyona yol açabilen, toprakta ve suda ağır metallerin birikmesine katkıda bulunabilen akışla yıkanabildiğinden, tarım için büyük bir tehditler oluşturmaktadır. Dolayısıyla çevre ve insan sağlığı için ciddi sorunlar oluşturmaktadır (Basavegowda ve Baek., 2021). Sınırlı besin kullanım etkinliği ve kimyasal gübre kullanımıyla ilgili çevresel kısıtlamalar günümüzde önemli sorunlar olmaya devam etmekte ve tarımda iyi bir sürdürülebilirliğin sağlanmasını engellemektedir (Zulfiqar ve ark., 2019). Ayrıca, kimyasal gübrelerin gereğinden fazla uygulanmasından kaynaklanan maliyet artışları, yetiştiricilerin kar marjlarını azaltmaktadır (Chhipa, 2017). Diğer taraftan düşük kaliteli ve verimsiz sentetik gübrelerin kullanılması da sadece işleri zorlaştırmakta ve pek çok olumsuz etkiye yol açmaktadır (Toksha ve ark., 2021).

Nanoteknoloji, sürdürülebilir rekabet edilebilirlik ile toplumsal ve çevresel zorlukların çözülmesine önemli ölçüde katkıda bulunması sayesinde beklenen umut verici özelliklere sahip, refah için geleceğin teknolojisi olarak tanımlanmaktadır (Toksha ve ark., 2021). Nanoteknolojinin bitki yetiştiriciliğinde uygulanması tarım kimyasallarını akılcı bir şekilde kullanarak ve tarım sektörüyle ilgili çözümler sunarak mevcut tarım sisteminde devrim oluşturma konusunda muazzam bir potansiyele sahiptir (Kalwani ve ark., 2022). Nanoteknoloji alanında gübre üretiminin uyarlanması ile sürdürülebilir tarımın desteklendiği önemli özellikler ortaya çıkmıştır (Toksha ve ark., 2021).

2. NANOGÜBRE

Nano gübreler, "Nanoteknolojinin yardımıyla kimyasal, fiziksel, mekanik veya biyolojik yöntemlerle üretilen geleneksel gübrelerin, gübre dökme malzemelerinin veya farklı botanik, mikrobiyal veya hayvansal özlerin sentezlenmiş veya değiştirilmiş şeklidir." (Kumar ve ark., 2021). Nano gübrelerin uygulanması, tarım sektöründe gelişmekte olan bir araştırma alanıdır (Avila-Quezada ve ark., 2022). Maksimum verim ve minimum çevresel riskler ile sürdürülebilir

tarıma ulaşmak için nano gübrelerin kullanılması günümüzde büyük önem kazanmıştır (Abd El-Azeim ve ark., 2020). Nano gübreler, içme suyu kirleticilerini ortadan kaldırarak geleneksel gübrelere alternatif olma yolunda etkili bir rol oynayabilir (Jakhar ve ark., 2022). Nano gübreler, besin etkinliğini artırmak, bitki beslenmesini iyileştirmek ve ayrıca toprak verimliliğini artırmak için kullanılmaktadır (Toksha ve ark., 2021). Cui ve ark. (2010), nano-gübrelerin zirai kimyasalların salınımını kontrol etmede, toprak ve bitki toksisitesini azaltmada, saha hedefli dağıtımda ve kullanılan gübrelerin besin etkinliklerini en üst düzeye çıkarmada önemli rollere sahip olduğunun altını çizmiştir.

Nano gübrelerin uygulanması ile gübre takviyelerini kaybetme oranı azaltmaktadır. Bu sayede kimyasal gübre kullanımı azalmakta ve toprak kirliliği daha düşük seviyelerde yaşanmaktadır (Yaseen ve ark., 2020). Nano gübreler, fosfor ve çinko gibi biyoyararlanımı düşük olan mevcut elementleri sağlayarak ve nitrat gibi mobil besinlerin toprakta kaybını azaltarak geleneksel gübrelerden daha verimli olacak şekilde tasarlanmıştır (Avila-Quezada ve ark., 2022). Nano gübrelerin önemli bir diğer faydası, bitkilerin besin kullanım verimliliğini önemli ölçüde artırabilen besin maddelerini kontrollü bir şekilde salma yetenekleridir (Abdel-Aziz ve ark., 2018). Nano gübrelerin nano yapısı, biyolojik aktivite için daha önemli sayıda aktif bölgeye yol açan yüksek bir yüzey-hacim oranı sağladığından, mahsuller besin maddelerini yavaş ve sürdürülebilir bir şekilde emebilmektedir (Avila-Quezada ve ark., 2022). Nano gübrelerin bitkiler üzerindeki etkileri, nano ölçekli özellikler, toprak, çevre, nanopartikül verme şekli ve bitki türleri gibi çeşitli faktörlere bağlıdır. Besinler, yaprakların plasmodesmatasında bulunan nano boyutlu gözenekler tarafından kolayca kullanılabildiğinden, şimdiye kadar yapraktan giriş modunun en iyi yanıtı verdiği bilinmektedir (Kalwani ve ark., 2022).

Antar ve Igor (2018) nano-gübreler ile hem tohumların çimlenmesinde hem de fidelerin gelişiminde önemli ilerlemeler sağlanabileceğini bildirmiştir. Bu durum nano gübrelerin tohumlara etkili bir şekilde girme kapasitesine ve gelişen fidelere çeşitli takviyelerin erişilebilirliğinin artırmasına atfedilir. Jitao ve ark. (2018)'na göre, nanopartiküllerin bitki kökleri ile olası etkileşimi, kök yüzeyine adsorpsiyon, hücre içine alım, hücre duvarına dahil olma ve hücreler arası boşluklara difüzyon yoluyla olabilmektedir.

Nano gübrelerin fiziksel ve kimyasal özellikleri dinamiktir ve muadillerinden farklıdır. Daha yüksek yüzey alanı/hacim boyutu oranı ve nano boyutu nedeniyle, yüksek kullanılabilirlik ve absorpsiyona sahiptirler (Kumar ve ark., 2021). Nano gübreler son yıllarda ötrofikasyonun önlenmesine yardımcı olarak ve tarımsal sürdürülebilirliğe katkıda bulunarak, mahsul veriminde ve tarımsal üretim kalitesinde önemli gelişmeler sağlamıştır (Basavegowda ve Baek.,

2021). Nano gübrelerin etkinliği, performansı, bulunabilirliği ve kullanımı kimyasal gübrelerden daha yüksektir ve bu nedenle sürdürülebilir ve yeni besin dağıtım sistemlerinin geliştirilmesi için önemli bir platform sunmaktadır (Elemike ve ark., 2019).

Çeşitli avantajlarına rağmen, nanomateryallerin spesifik ekotoksikolojik etkilerinin olduğu da bilinmektedir (Tourinho ve ark., 2012; Rajput ve ark., 2018). Nano gübreler, toprak ve bitkiler için yararlı olan mikrobiyal topluluklar üzerinde olumsuz etkilere sahip olabilir (Ameen ve ark., 2021). Aynı şekilde, nanotoksinlerle lipit peroksidasyonunun bitki verimliliği, toprak mikropları ve çevre üzerindeki zararlı etkileri de göz ardı edilmemelidir. Son zamanlarda araştırmacılar, çeşitli ürünlerde sentetik nanopartiküllerin istenmeyen ve olumsuz etkileri hakkında endişelerini dile getirmişlerdir (Jakhar ve ark., 2022).

Bazı çalışmalar, nanopartiküllerin doğal ortamlardaki biyolojik etkilerinin yanı sıra karasal ortamlardaki (toprak, su ve tortullar) akıbeti ve taşınmasına ve ayrıca toksikolojik araştırma kontrollü laboratuvar koşullarına odaklanmıştır (Ranjan ve ark., 2014; Dasgupta ve ark., 2015). Çoğu çalışma, nanopartiküllerin ortamlarda doğal olarak varlıklarını devam ettirdiklerini göstermektedir. Günümüzde bu partiküllerin giderek daha çok arttığı gerçeği de önemli bir endişe kaynağıdır. Bu sebeple bu tür çalışmaların sürekli olarak güncellenmesi gerekmektedir. Nanopartiküllerin çevre üzerindeki olumsuz etkilerinin gelecekte yürütülecek çalışmalarda daha çok ele alınması gerekmektedir (Jakhar ve ark., 2022). Yakın gelecekte sürdürülebilir tarım için nano gübrelerin başarılı bir şekilde uygulanması, tüm bu faktörler tarafından birlikte belirlenecektir (Kalwani ve ark., 2022).

Genel olarak mahsul verimini artırma güçleri, toprak verimliliğine olumlu etkileri, kirliliği azaltmaları ve mikroorganizmaların gelişmesi için gelişen bir ekolojiyi işaretlemeleri nedeniyle nano gübreler; ziraat mühendislerinin, çevrecilerin ve toprak bilimcilerin dikkatini çekmiştir. Tarımla ilgili sorunların üstesinden gelmek için nano gübreler ile ilgili birçok yeni deney tasarlanmakta ve yürütülmektedir.

3. TARLA BİTKİLERİNDE NANOGÜBRE ÇALIŞMALARI

Bazı araştırmacılar, mahsul verimini artırmak için nano gübrelerin potansiyelini incelemeye çalışmıştır. Nano gübre uygulaması pirinçte antioksidan potansiyelini artırmıştır. Ayrıca nano gübre uygulamasının tamamlayıcı olduğu; bitki hücreleri tarafından daha iyi emildiği, antioksidan aktiviteleri arttırmak için yeterli besin sağladığı bildirilmiştir (Benzon ve ark., 2015). Yapraktan nano gübre uygulamaları, buğday bitkilerinin gelişmiş verim parametrelerine yansımıştır (Abdel-Aziz ve ark., 2018). Nohutta NPK nano gübrenin yapraktan spreylenmesi,

büyüme hormonu aktivitesini, çiçeklenme ve tane oluşumunda artma eğiliminde olan metabolik sürecin artması sonucunda verim ve verim bileşenlerini arttırmıştır (Drostkar ve ark., 2016). Soya fasulyesinde orta ve yüksek seviyelerde bakır hidroksit nanogübresi maruziyeti, fotosentetik aktiviteyi arttırırken dokularda Co, Mn, Zn ve Fe birikimini etkilemiştir (Majumdar ve ark., 2021). İnci darısı (*Pennisetum americanum* L.) üzerine yapraktan çinko nano gübre uygulaması, sürgün uzunluğunu, kök uzunluğunu, kök alanını ve bitki kuru biyokütlesini önemli ölçüde artırmıştır (Tarafdar ve ark., 2014). Makarnalık buğdayda üre katkılı nanogübre kullanımında köklerden alımın yapraklardan çok daha hızlı gerçekleştiği gözlemlenmiştir. Çalışmada nanopartiküllerin makarnalık buğday tarafından nitrojen alımında önemli bir verimlilik sağlama potansiyeli vurgulanmıştır (Ramírez-Rodríguez ve ark., 2020)

Patateslerin yumru verimi, muhtemelen tohum yumrularının toprakta daha uzun süre daha sağlıklı kalmasına yardımcı olan ve daha sonra daha güçlü bitkiler üreten antimikrobiyal etkisinden dolayı nanogümüşün yaprağa uygulanmasıyla artmıştır (Tahmasbi ve ark., 2011). Çinko nano gübre uygulaması, klorofil içeriği ve antioksidan aktivite gibi gelişmiş fizyolojik işlemler nedeniyle pamuk mahsullerinin taze ağırlığını ve kuru ağırlığını artırmıştır (Rezaei ve Abbasi, 2014). Nano demir, manganez ve çinko (30'ar ppm) gübrelerinin uygulanması, yer fıstığının maksimum verim ve verim özelliklerini artırmıştır (El-Metwally ve ark., 2018). Yapraktan uygulanan nano şelat molibden yer fıstığının bitki boyu, bitki başına bakla sayısı, bitki başına olgun bakla sayısı, yüz tohum ağırlığı, bitki başına tohum sayısı, tohum uzunluğu tohum verimi vebakla verimi gibi özellikleri üzerinde önemli etkiler oluşturmuştur (Mehrangiz ve ark., 2014). Prasad ve ark. (2012), nanoformda gübre uygulamasının tamamen kontrollü olduğunu ve yer fıstığında verimi ve protein içeriğini artırdığını bildirmiştir.

Yapraktan uygulanan nitrojen nano gübre, nane kuru yaprak ağırlığını kontrole göre yüzde 165 artırmıştır (Rostami ve ark., 2017). Bir araştırmada düşük TiO_2 nanopartikül konsantrasyonları, kişnişin besin kalitesini iyileştirmiştir. Çalışmada nano-TiO_2'nin, yenilebilir dokuların besin içeriğini bitki için zehirli olmadan veya tüketiciler için bir sağlık sorunu oluşturmadan yeterli bir konsantrasyonda (50 mg/L) artırabildiği mesajı verilmiştir (Hu ve ark., 2020). Nano-demir gübresinin yaprağa uygulanması, ham protein ve çözünür karbonhidratların artan üretimi nedeniyle yemlik mısır ve fesleğenin büyümesini artırmıştır (Sharifi ve ark., 2016; Peyvandi ve ark., 2011). Demir ve çinko gübrelerinin nano formlarının yaprağa uygulanması, kimyasal gübrelere göre yemlik mısırdaki fosfor konsantrasyonunu, biyokütleyi, ham proteini ve çözünür karbonhidrat konsantrasyonunu artırmıştır (Sharifi ve ark., 2016).

4. SONUÇ

Nano gübreler, gelişmiş üretkenlikleri ve abiyotik streslere karşı dirençleri sayesinde tarım sektöründe popülaritesini artırmaktadır. Daha yüksek yüzey-hacim oranları ve kontrollü besin salınımları nedeniyle nano gübreler geleneksel gübrelere göre birçok avantaja sahiptir. Nano gübrelerin potansiyel faydaları, mevcut iklim değişikliği senaryosu altında mahsullerin üretim potansiyelini artırmaya yönelik büyük ilgi uyandırmıştır. Bu nedenlerle tarımsal biyoteknolojide nano gübrelerin umut verici uygulamaları göz ardı edilmemelidir. Ancak, tarımda kullanılan nano-malzemelerin toksisitesini değerlendirmek ve standardize etmek gerekmektedir. Uygulama değerlendirmeleri için titiz tarla ve sera araştırmaları yapılması önemle tavsiye edilmektedir. Sürdürülebilir tarım açısından nanoteknoloji çalışmalarının çevresel zorlukları göz önünde bulundularak tarımsal güvenliği korumak adına yenilikçi nano gübrelerin üretimine geçilmelidir.

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COMPARISON OF HERBAGE YIELD AND QUALITY CHARACTERS OF COOL SEASON CEREALS IN DIFFERENT CUTTING STAGES

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ABSTRACT
The study was carried out to compare the quality characteristics of green grass obtained at different cutting times in different cool climate cereal species. In the research, a total of 20 varieties were used as genetic material, including rye (2), barley (6), triticale (3), oats (3), bread wheat (3) and durum wheat (3). Plants were harvested in 2 different periods, namely, the heading and milk stages. In the research, green forage yield (GFY), dry matter ratio (DMR), crude ash (CA), crude protein (CP), hemicellulose ratio (HSR) and crude cellulose ratio (CSR), characteristics were investigated. As a result of the analyses, the mean of genotypes ranged between 2.55 and 5.38 t ha^{-1} for GFY, 84.44 and 90.87% for DMR, 5.40 and 12.67% for the CA ratio, 7.89 and 13.95% for the CP ratio, 13.80 and 30.49% for the HSR and 47.44% for the CSR. The data obtained show that cutting during the milk production period is more appropriate for the production of high-quality green and dry forage.

Keywords: Cereal, harvesting time, green forage yield, crude protein, relative feed value

INTRODUCTION

Quality roughage production plays a very important role in the development of the livestock industry. In recent years, especially cool-season cereals have been used as animal feed. The wide range of adaptation capabilities is one of the most important characteristics of cereals that make their use as roughage widespread.

Among the cereals, the most preferred plant as a source of roughage is oat. Oats have been cultivated for animal feed and grain for a long time in many parts of the world. Compared to other grains, the oat grain is characterized by more total protein and crude fat and a smaller crude fibre. Oats are moderate in energy and protein and are used quite frequently in horse rations due to their high fibre content (over 10%) (Kliševičiūtė et al. 2016). Khan et al. (2014) compared the yield and quality characteristics of oat genotypes in their study and reported that the genotypes differed significantly in terms of yield and quality characteristics. They reported that the green forage yield of the SGD40 genotype was 80 t ha^{-1} and the dry matter yield was superior to the other varieties with 10.95 t ha^{-1}. Oat gives the impression of a better fodder plant since it is relatively late and has abundant leaves. Oats have shoots that are capable of new growth in each development period. If cutting is done during the period when the first panicles of oats are seen in the field (late gestation period) for dairy cattle feeding; it provides more energy and a similar crude protein (HP) ratio than late bud alfalfa, and corn silage provides equal energy but higher HP ratio, but by extending the harvest until the pulping period to get more forage yield, the amount of digestible dry matter has been reported to increase (Walker 2013).

One of the other plants mostly preferred as roughage is barley. The usage areas of this plant are mostly spread in semi-arid regions. In the study carried out in the Konya region, green forage yield, dry forage yield and HP ratio of barley were determined as 2308 kg da^{-1}, 586.70 kg da^{-1} and 8.38% respectively (Kerimbek and Mülayim 2003). Barley (*Hordeum vulgare* L.) is a vigorous, drought tolerant and salinity tolerant, fast-growing cereal that can be grown in marginal soils. As a result, it is possible to produce roughage and grains with low production costs in a very short time through cool-season cereals. In ruminants, oat and barley can be used as important energy sources with 46.70% and 51.76% NDF ratios (Contreras Paco et al. 2020). In recent years, one of the plants that can be evaluated as an alternative for green and dry forage production is triticale. The fact that it can grow in adverse soil conditions and has good properties in terms of yield and quality causes the production potential of triticale to increase day by day. It was reported that plants with abundant leaves should be selected in breeding

studies to be carried out to achieve high GFY in triticale, and they determined that triticale lines of dry forage yield changed between 466.2-1787.9 kg da^{-1} in the first year and 697.8-1997.1 kg da^{-1} in the second year (Albayrak et al. 2006). In the study conducted in Diyarbakir conditions, the averages of triticale ranged between 1205.7-1490.9 kg da^{-1} for GFY (green forage yield), 273.75-393.25 kg da-1 for DFY (dry forage yield) and 10.63-11.43% for CP (crude protein) ratios (Alp 2009). In a study conducted in Bursa conditions, it was determined that the GFY and DMR values of four different triticale cultivars harvested during the dough setting period ranged between 4161-4428 kg da^{-1} and 1386-1594 kg da^{-1} respectively (Sucu and Aydoğan Çifci 2016). Karadağoğlu and Özdüven (2019) stated that the yields of green forage and dry matter yields of triticale varieties (Karma 2000, Presto 2000 and Tatlıcak 97) harvested in three periods (heading, milking and dough) changed between 3020-4815 kg da^{-1} and 934-1950 kg da^{-1} respectively in their study under Tekirdağ conditions. Researchers reported that dry matter yield increases with the progression of maturation.

Rye, which can be grown under adverse soil conditions and harsh climatic conditions, has a high potential as green and dry forage. Rye is a winter grain and has the advantage of using good moisture. It continues to grow in spring as soil temperature allows. This feature makes winter rye an attractive product for silage or straw in sandy soils or arid regions (Anonymous 2018a). Winter rye yields for silage or straw are generally lower than yields of oats or barley but may be higher in areas or years with less rainfall (Anonymous 2018b).

In recent years, besides human nutrition, wheat has been started to be evaluated as green and dry forage in animal feeding. Wheat is widely grown throughout the world to provide the forage needed during the winter. However, in their study where they stated that improving forage yield and feeding characteristics are not the main goal of wheat breeding programs, Kim et al (2016) stated that the mean DFY and CP of wheats varied between 1260-4158 kg ha^{-1} and 161-268 g ha^{-1}. In the study conducted by Keskin (2021) in Tekirdağ province conditions, it was found that GFY and DMR averages of some wheat cultivars harvested in three periods (heading, milk formation and dough formation) varied between 2739-3544 and 630-1204, respectively, and GFY and DMR increase with the progression of maturity. This study was carried out to determine the forage yields and chemical compositions of some cool-season cereal crops harvested during the milk and dough period.

MATERIAL AND METHOD

In the study, rye (2), oat (3), barley (6), triticale (3), bread wheat (3) and durum wheat (3) varieties were used as material (Table 1).

Table 1. Varieties used in the study

Varieties	Breeding of foundation or Origin	Growing habit
Aslım 95 (Rye)	Bahri Dağdaş Research Institute	Winter
Pedujeva (Rye)	Bosnia and Herzegovina	Winter
Sladoran (2 row Barley)	Trakya Agricultural Research Institute	Winter
Bolayır (2 row Barley)	Trakya Agricultural Research Institute	Winter
Harman (2 row Barley)	Trakya Agricultural Research Institute	Winter
Martı (6 row Barley)	Trakya Agricultural Research Institute	Alternative
Lord (6 row Barley)	Croatia	Winter
Barberousse (6 row Barley)	France	Alternative
Presto 2000 (Triticale)	Geçit Kuşağı Agricultural Research Institute	Winter
Tatlıcak 97 (Triticale)	Bahri Dağdaş Research Institute	Winter
Karma 2000 (Triticale)	Geçit Kuşağı Agricultural Research Institute	Winter
Sebat (Oat)	Trakya Agricultural Research Institute	Alternative
Kırklar (Oat)	Trakya Agricultural Research Institute	Alternative - Winter
Kahraman (Oat)	Trakya Agricultural Research Institute	Alternative - Winter
Esperia (Bread wheat)	Italia	Winter
Gelibolu (Bread wheat)	Trakya Agricultural Research Institute	Winter
Selimiye (Bread wheat)	Trakya Agricultural Research Institute	Winter
Kızıltan 91(Durum wheat)	Field Crops Central Research Institute	Alternative
Zenit (Durum wheat)	Italia	Alternative
NKU Ziraat (Durum wheat)	Tekirdağ Namık Kemal Univ. Agric. Faculty	Alternative

The study was performed during 2017–2018 under rainfed conditions in Tekirdağ Namık Kemal University, Faculty of Agriculture, Field Crops Experiment area in the Thrace Region of Turkey (Tekirdağ -27°34’ E, 40°59’ N, elev. 10 m). The experiment was carried out with the split plots experimental design with 3 replications. In the study, main plots were taken for the variety and cutting times for the sub-plot. Each genotype was sown in 6 rows in plots of 1.2 meters wide and 5 meters long at 500 seeds per square meter. The Tekirdağ location was on the northern, occidental side of Turkey. Soil characteristics of the experiment were determined by soil analyses and included loamy clay, with neutral pH and low salt concentrations. Contents of P, K, Ca, Mg, Fe, Cu, Mn, and Zn were high enough in the soil to not affect negatively the crop development. Organic matter was about 1%. The total precipitation values recorded during the growing season (November to June) for Tekirdağ was 612.7 mm. The monthly proportional humidity average was determined as 81.2% and the average temperature was determined as 12.1 ^{0}C (Turkish State Meteorological Service, 2018).

In the experiment, 5 kg of pure phosphorus and nitrogen were fertilized in sowing time, 6 kg of pure nitrogen was given at the beginning of the stem elongation, and 5 kg of pure nitrogen about

1 month after that. Spraying was done against weeds growing in the trial area, and no chemical pesticides were applied against diseases and pests in the trial area. Plant developments were followed and the plants were harvested in the milk stage and dough stage the characteristics given in the appendix were examined. a) Milk maturity stage: The plants in each plot were monitored and 1 row in the middle of each plot was cut and weighed during the milk maturity stage. The plants obtained from here were immediately weighed and the green weight was found b) Dough or yellow maturity stage: The plants in each plot were followed, and the other 1 row in the middle of each plot was cut and weighed during the dough maturity stage. The plants obtained from here were weighed immediately and the green weight was found. In the study, 20 varieties belonging to 5 different species were harvested in two different cutting dates (milk and dough maturity stage). The dry matter ratio (DMR), crude ash (CA) and crude protein (CP) contents of the samples were determined according to the analysis methods reported in AOAC (1990). The cellulose and hemicellulose contents of the feeds were made according to the methods reported by Goering and Van Soest (1973). Analysis of variance was performed using the JUMP 5.0 statistical package program in the obtained data, and the significance of the differences between the means was tested with the Duncan test.

RESULTS AND DISCUSSION

As a result of the analysis of variance on the characteristics examined in the study carried out in cool season cereal species, the differences between the varieties and the averages of cutting time were found to be statistically significant. The Duncan test results, which were carried out to reveal these differences between the averages, are given in Table 1 and Table 2.

The green forage yield in the different cool climate cereal species examined varied between 2.55-5.38 t ha^{-1}, with an average of 3.99 t ha^{-1}. Among the species, the highest green forage yield was obtained in the Sebat oat variety with 5.38 t ha^{-1} and Tatlıcak 97 triticale variety with 5.12 t ha^{-1}. The lowest green forage yield was measured for Aslım 95 rye variety with 2.55 t ha^{-1}, Zenit durum wheat variety with 2.90 t ha^{-1} and Esperia bread wheat variety with 2.97 t ha^{-1} were the other low green grass yield varieties. When the green forage yield of the species is compared on average, the highest value was obtained in oats with 4.83 t ha^{-1}, followed by triticale with 4.32 t ha^{-1}, 6-row barley with 4.19 t ha^{-1} and 2-row barley with 4.02 t ha^{-1}. The lowest averages were obtained in rye and bread wheat with 3.21 and 3.37 t ha^{-1}. When examined in terms of different cutting times, 4.18 t ha^{-1} of green forage yield was obtained in the milk maturity stage, while this value was 3.79 t ha^{-1} in the dough maturity stage. While

higher green forage yield was obtained for oats, triticale and 6-rows barley in the milk maturity stage, triticale and oat gave a higher value of GFY in the dough maturity stage. The mean of the 1st and 2nd cutting were similar to each other for 6-row barley. When evaluated in terms of cutting times, the highest yield was obtained for oats with 5.31 t ha^{-1} at the milk maturity stage, followed by the triticale value of 4.59 t ha^{-1} at the dough maturity stage. The lowest green forage yield was in the 2nd cutting time of rye with 2.73 tons, followed by durum wheat 1st cutting time with 3.37 tons of green forage yield, and bread wheat 2nd and 1st cutting stages with 3.39 and 3.44 tons of green forage yield (Table 1). Karabulut and Çaçan (2018) found that the green forage yield of cereals varied between 1854.7-3140.6 kg da^{-1}, and declared that the average green forage yield was obtained 3140.6 kg da^{-1} for triticale, 2229.2 kg da^{-1} for two-row barley, 2208.6 kg da^{-1} for six-row barley, 2427.2 kg da^{-1} for bread wheat and 1854.7 kg da^{-1} in their study under Bingöl conditions. The reason for the higher green forage yields obtained in our study may be due to the differences in ecological conditions and varieties.

Dry matter ratio averages for the varieties evaluated among the cool climate cereal types varied between 84.44% and 90.87%. While the highest dry matter ratios were obtained from the Martı barley variety at 90.87% and the rye variety Podijeva at 90.59%, the lowest dry matter ratio was determined for the Kahraman oat variety with 84.44. Bread wheat, rye and 6-row barley varieties had the highest dry matter content (90.29% and 90.23%, 90.06%) on average, while the lowest average was determined for oat varieties with 87.79%. It is seen from Table 1 that higher dry matter value averages were obtained in the 2nd cutting (90.28%) compared to the 1st cutting (89.34%) in 2 different cutting times in the milk and dough maturity stage. It is understood that for the dry matter ratios based on species at the time of cutting, those obtained in the 2nd cutting are generally higher than in the 1st cutting. While the highest dry matter ratio was obtained from bread wheat 90.82%, rye with 90.71% in first cutting stage, oat with 90.68% and 6-row barley with a value of 90.60% in the 2nd harvest time. The lowest value was obtained from the 1st cutting of durum wheat with 87.51% (Table 1).

Table 2. Variety and cutting time means for green forage yield, dry matter ratio and crude ash rate

Species / Varieties		Green forage yield (ton/da)			Dry matter ratio (%)			Crude ash rate (%)		
			Cutting			Cutting			Cutting	
		Mean	I	II	Mean	I	II	Mean	I	II
Rye	Aslım 95	2.55 l	3.66	2.73	89.86	90.71 a	89.80 b	7.08 ıkl	7.90 a	6.09 b
	Pedujeva	3.87 f-ı			90.59			6.89 kl		
	Mean	**3.21**			**90.23**			**6.98**		
Barley (2-row)	Sladoran	4.17 def	3.89 a	3.49 b	90.40	89.68 a	89.09 b	7.91 e-h	8.16	8.46
	Bolayır	3.91 e-ı			89.65			7.72 f-ı		
	Harman	3.99 e-h			89.19			8.75 b-e		
	Mean	**4.02**			**89.75**			**8.13**		
Barley (6-row)	Martı	3.63 ık	4.03	4.02	90.87	90.20	90.6	6.90 kl	7.92 a	6.76 b
	Lord	4.82 bc			89.60			7.19 h-l		
	Barberousse	4.12 d-g			89.71			8.47 d-g		
	Mean	**4.19**			**90.06**			**7.52**		
Triticale	Presto 2000	4.08 d-h	4.10 b	4.59 a	90.23	89.67	89.93	7.24 h-l	7.75 a	6.32 b
	Tatlıcak 97	5.12 ab			89.07			7.35 h-l		
	Karma 2000	3.75 hı			90.09			6.57 l		
	Mean	**4.32**			**89.80**			**7.05**		
Oat	Sebat	5.38 a	5.31 a	4.27 b	88.85	89.30 b	90.68 a	11.08 a	11.06 a	8.46 b
	Kırklar	4.71 bc			90.08			9.50 bcd		
	Kahraman	4.41 cd			84.44			8.60 c-f		
	Mean	**4.83**			**87.79**			**9.73**		
Bread wheat	Esperia	2.97 l	3.44	3.39	90.49	90.82 a	89.81 b	7.62 g-k	8.38 a	6.75 b
	Gelibolu	3.34 k			90.47			7.38 hık		
	Selimiye	3.80 ghı			89.91			9.06 b-e		
	Mean	**3.37**			**90.29**			**8.02**		
Durum wheat	Kızıltan 91	4.25 de	3.37 b	3.64 a	88.64	87.51 b	89.57 a	9.72 abc	10.52 a	8.32 b
	Zenit	2.90 l			88.26			9.91 ab		
	NKU Ziraat	3.98 e-ı			88.70			8.62 cde		
	Mean	**3.71**			**88.53**			**9.42**		
General mean		**3.95**	**4.18 a**	**3.79 b**	**89.49**	**89.34 b**	**90.28 a**	**8.12**	**8.81**	**7.31**

Regarding the crude ash ratio, it can be seen from Table 1 that the averages of cereals vary between 6.57-11.08%. The highest crude ash ratios were obtained from the Sebat oat variety with 11.08% and durum wheat varieties Zenit and Kızıltan 91 with 9.91% and 9.72%. Kırklar oat variety (9.5%) and Selimiye bread wheat variety (9.06%) were the other varieties with high crude ash content. Considering the crude ash values given in Table 1 for the species, the highest average values were obtained for oats at 9.73%, durum wheat at 9.42% and 2-row barley at 8.13%, while the lowest crude ash value was 6.98% for rye. The average crude ash ratio obtained in the milk maturity stage and the dough maturity stage varied between 7.75% and 11.06% and 6.09-8.46% for the species respectively. It was observed that the crude ash ratio, which was 8.81% in the first cutting stage, decreased significantly to 7.31% in the second stage. The highest crude ash ratios were obtained in the 1st cutting stage of oat with 11.06%, and in the 1st cutting stage of durum wheat with 10.52%. The lowest crude ash ratios were 6.09%, 6.32, 6.75% and 6.76% for rye, triticale, bread wheat and 6-row barley respectively.

Crude protein ratio values in five different cool season cereals varied between 8.32 and 11.82% on average. The highest crude protein ratios were calculated for durum wheat (11.82%), oats (11.40%), Triticale (10.91%) and 2-row barley (10.01%), while bread wheat, rye and 6-row barley had the lowest crude protein ratios. Based on varieties, the highest crude protein ratio was found in the Sebat oat variety with a value of 12.57%, followed by Kızıltan and Zenit durum wheat varieties with 12.42 and 12.29%. The lowest crude protein ratios were 9.25% for Podijeva and 9.31% for Aslım 95 rye varieties. It was determined that the protein ratio in the milk maturity stage was 1.39% higher on average than the ones in the dough maturity stage (Table 2). Crude protein ratio (CP) in roughage is one of the forage quality characteristics and it is desired to be high because it increases the feeding properties of the forage. Açıkgöz (2001) and Ünalp (2014) reported that as time progresses from the young stage of the plant to the fruit ripening period in alfalfa, the crude protein ratio of the forage decreases. When the crude protein ratio regarding the cutting time was examined, the highest protein value was obtained in the 1st cutting of durum wheat with 12.76%, followed by bread wheat, triticale and oat with values of 12.18%, 12.14% and 12.03% respectively. The lowest crude protein ratio was obtained in the 2nd cutting of rye with 8.73%, followed by 2-row barley with 9.29%, and 6-row barley with 9.47%. Buxton and Homstein (1986) reported that the stem part, which is very poor in CP, increases as the plant matures. The decrease in the CP ratio of the wheat product with the advancement of maturity is due to the decrease in the CP in the leaves and stems of the plants. Our findings are in agreement with the results of the researchers who found crude protein ratios for triticale are 6.93%-10.67% (Kaplan et al. 2011), 4.9-14.8% for wheat (Tölü et al. 2013) and 12.94-14.54% for barley (Yolcu 2008).

The cellulose ratio values of different cool-season cereals varied between 30.40% and 39.65%. After rye, the highest cellulose ratio was calculated for oats at 35.19%, while the lowest averages after bread wheat were obtained for triticale (31.25%), durum wheat (31.37), 2-row barley (31.64%) and 6-row barley (33.97%). Based on cutting times, it is seen that the cellulose ratio, which was 37.70% for the milk maturity stage, decreased to 31.00% in the dough maturity stage, with a 6.7% decrease (Table 2). Considering the species, the lowest cellulose ratios were 30.40% for bread wheat, 31.25% for triticale and 31.37% for durum wheat, while the highest averages were obtained for rye and oats. The highest cellulose ratio was determined for both the cutting times of rye and the 1st cutting time of oat with a value of 41.63%. In addition, it is quite remarkable that the decreases in cellulose ratios in the 2nd form compared to the 1st form are significant, especially for bread wheat, oats, durum wheat, triticale and rye, except for

barley. In plants, the rate of crude cellulose increases rapidly as the proportion of stems increases with maturation and the carbohydrates produced become structural. In barley and oats, this increase is slow from the end of booting to flowering, while it is faster from flowering to milking (Tan, 1995). Kılıc et al. (1991) reported that the upper limit of crude cellulose in the rations is 32%. Cellulose ratios of cereals sometimes exceed this upper limit after flowering, especially after milking (Klebesadel, 1969; Tan, 1995).

Table 2. Variety and cutting time means for crude protein ratio, cellulose ratio and hemicellulose ratio

Species / Varieties		Crude protein ratio (%)			Cellulose ratio (%)			Hemicellulose ratio (%)		
			Cutting			Cutting			Cutting	
		Mean	I	II	Mean	I	II	Mean	I	II
Rye	Aslım 95	9.31 h	9.84 a	8.73 b	38.32	41.63 a	37.66 b	21.28 b	22.99 b	23.47 a
	Podujeva	9.25 h			40.97			25.18 a		
	Mean	**9.28**			**39.65**			**23.23**		
Barley (2-row)	Sladoran	10.79 c-f	9.87 a	9.29 b	31.69 b	33.01	32.46	24.63 ab	23.61	21.98
	Bolayır	9.39 h			31.69 b			19.48 b		
	Harman	9.84 e-h			31.53 b			23.49 a		
	Mean	**10.01**			**31.64**			**22.53**		
Barley (6-row)	Martı	9.67 fgh	10.64 a	9.47 b	35.29 a	33.19 a	32.56 b	27.02 a	25.72	23.69
	Lord	9.94 d-h			31.63 b			22.48 b		
	Barberousse	9.55 gh			34.98 a			25.41 a		
	Mean	**9.72**			**33.97**			**24.97**		
Triticale	Presto 2000	11.03 b-e	12.14 a	9.71 b	30.03 b	33.91 a	28.61 b	21.82 b	25.09 a	22.85 b
	Tatlıcak 97	11.18 b-e			31.38 ab			26.62 a		
	Karma 2000	10.53 d-h			32.33 a			23.46 ab		
	Mean	**10.91**			**31.25**			**23.97**		
Oat	Sebat	12.57 a	12.03 a	10.81 b	35.53 ab	38.79 a	31.51 b	25.31	24.79 b	25.93 a
	Kırklar	9.73 e-h			36.23 a			24.66		
	Kahraman	11.91 a-d			33.81 b			26.11		
	Mean	**11.40**			**35.19**			**25.36**		
Bread wheat	Esperia	11.70 a-e	12.18 a	11.13 b	30.06	34.22 a	26.58 b	26.28 a	26.54 a	24.26 b
	Gelibolu	11.56 a-e			30.11			25.30 ab		
	Selimiye	11.69 a-e			31.04			24.62 b		
	Mean	**8.32**			**30.40**			**25.40**		
Durum wheat	Kızıltan 91	12.42 ab	12.76 a	10.85 b	31.32 ab	35.14 a	29.59 b	26.22 a	25.26	23.94
	Zenit	12.29 abc			30.18 b			22.52 b		
	NKU Ziraat	10.75 c-g			32.60 a			25.07 ab		
	Mean	**11.82**			**31.37**			**24.60**		
General mean		10.20	11.45 a	10.06 b	33.35	37.70	31.00	24.29	28.86	23.73

Regarding the hemicellulose ratio, it is seen that the genotypes of different cereal species have an average varying between 22.53% and 25.40%. Bread wheat and oats had the highest hemicellulose content with 25.40% and 25.36%, followed by 6-row barley and durum wheat with 24.97% and 24.60%. The lowest hemicellulose values were found in 2-row barley and rye with 22.53% and 23.23%. As for the hemicellulose ratios based on varieties, the highest values were in Martı 6-row barley variety and Tatlıcak 97 rye variety with 27.02% and 26.62%,

Esperia bread wheat variety, Kızıltan durum wheat variety and Kahraman oat variety with 26.28%, 26.22% and 26.11% value. followed. The lowest values were in the Bolayır 2-row barley variety with 19.48%, followed by Aslım 95 rye variety with 21.28% and Presto 2000 triticale variety with 21.82%. When the hemicellulose ratios are examined in terms of the cutting stage, while the hemicellulose ratio was 28.86% in the 1st cutting stage, it decreased to 23.73% in the 2nd cutting stage. It is understood that there is a 5% decrease in the hemicellulose ratio in case of delay in the cutting stage. When the cutting stage are evaluated together, the highest hemicellulose ratios were obtained in the 1st cutting of bread wheat with 26.54%, in the 2nd cutting of oat with 25.93%, in the 1st cutting of 6-row barley with 25.72%, in the 1st cutting of durum wheat and triticale with 25.26% and 25.09%. The lowest hemicellulose value was obtained in the second cutting of 2-row barley and triticale with values of 21.98% and 22.85%. As a result, the type and form period of grains, which are an important source of forage in animal nutrition, are important in terms of feed quality. In our research, the 1st cutting time, that is, the milk production period of cereals comes to the fore for quality and yield. For oats, the Sebat variety ranked first with 5.38 tons/da of green grass yield and 12.57% crude protein yield. The highest green grass yield was obtained from the 1st form, with an average of 5.31 tons da^{-1} for all oat varieties. When the averages of feed yield and quality are examined together, it has been determined that Kızıltan 91 durum wheat is in the 2nd order as a variety. It has been determined that the green grass yield of Kızıltan 91 durum wheat is 4.25 tons da^{-1} and the crude protein rate is 12.42%.

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DROUGHT STRESS IN PLANTS

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ABSTRACT

Stress factors are environmental factors that affect plants by appearing at any stage of their life and can cause different reactions in plants. Stress negatively affects the growth and development of plants by causing important physiological and metabolic changes. It affects the quantity and quality of the product. It can lead to the death of plants and their organs. Drought, on the other hand, is a meteorological phenomenon in general, and it is a period without precipitation that lasts long enough to cause a noticeable decrease in the water content of the soil and plant growth. Due to the decrease in water in the plant growing environment, the plant is stressed by the formation of negative water potential in the protoplasm. Drought stress in plants is one of the most important factors affecting plant growth, development and crop productivity. Xerophytic and mesophytic plants try to be successful by adapting to this stress with different stress responses. By using "omics" technologies such as genomics, transcriptomics, proteomics and metabolomics, the problems can be overcome by developing agricultural products that are resistant to drought stress and have high nutritional value. In this review, recent information on drought stress and the effects of drought stress on plants are discussed.

BİTKİLERDE KURAKLIK STRESİ

ÖZET

Stres faktörleri, bitkileri yaşamlarının herhangi bir döneminde ortaya çıkarak etkileyen, bitkilerde değişik tepkilerin alınmasına yol açabilen çevresel etmenlerdir. Stres, önemli fizyolojik ve metabolik değişimlere yol açarak bitkilerde büyüme ve gelişmeyi olumsuz şekilde etkiler. Ürünün miktar ve kalitesine etkide bulunur. Bitki ve organlarının ölümüne yol açabilir. Kuraklık, ise genel anlamda meteorolojik bir olgu olup toprağın su içeriği ile bitki gelişiminde gözle görülür azalmaya neden olacak kadar uzun süren yağışsız dönemdir. Bitki yetişme ortamında suyun azalmasına bağlı olarak protoplazmada negatif su potansiyelinin oluşması ile bitki strese girer. Bitkilerde kuraklık stresi bitki büyümesini, gelişimini ve ürün verimliliğini etkileyen en önemli faktörlerden birisidir. Bu strese kserofitik ve mezofitik bitkiler farklı stres cevaplarıyla adaptasyon sağlayarak başarılı olmaya çalışırlar. Genomik, transkriptomik, proteomik ve metabolomik gibi "omik" teknolojiler kullanarak kuraklık stresine karşı dayanıklı, besin değeri yüksek tarımsal ürünlerin geliştirilmesi ile problemlerin üstesinden gelinebilir. Bu derlemede, bitkilerde kuraklık stresi, kuraklık stresinin etkileri hakkındaki son bilgiler tartışılmıştır.

1.GİRİŞ

Bitkilerin tomurcuk ve kök ucunda yer alan apikal meristemler devamlı aktif olmalarından dolayı yaşamları boyunca büyüme özelliği göstermektedir.

Bitkilerdeki gelişme ve büyüme faktörleri; iç ve dış etmenlerin kontrolündedir. Uygun çevresel faktörlerde büyüme ve gelişme normal düzeyde seyretmektedir. Çevresel faktörlerin oluşturduğu değişimler bitkinin büyüme ve gelişmesinde önemli oranda etkili olmaktadır. Bunun sonucunda, bitkide stres faktörü oluşmaktadır.

Burke ve ark. (1976) bitkilerin stres koşullarına olan tepkilerinin evrimde doğal seleksiyona neden olduğunu ve bitkilerde morfolojik, fizyolojik oluşumu sağlayan temel faktörün stres olduğunu ifade etmiştir.

Abiyotik ve biyotik faktörler stresin temel oluşum mekanizmasıdır. Biyotik stresin temel nedenleri arasında doğadaki canlı organizmalar gösterilirken, abiyotik stresin ise çevresel faktörlerden kaynaklandığı ifade edilmiştir (Chen ve Murata, 2008).

2. KURAKLIK

Kuraklık temel olarak fiziksel ve fizyolojik olmak üzere ikiye ayrılmaktadır.

Fiziksel kuraklıkta suyun bitkinin yaşama ortamında yeterli derecede bulunmaması sonucu meydana gelirken, fizyolojik kuraklık mineral maddelerin bitkinin yaşama ortamında az ya da çok bulunması ya da yaşam ortamının donması sonucu var olan suyun bitki tarafından yeterince kullanılamaması sonucunda meydana gelmektedir.

2.1. Kuraklık Stresinin Bitkiler Üzerindeki Etkisi

Dünya genelinde etkisini en fazla gösteren doğal afet olarak nitelendirilen kuraklık, değerlendirmelere göre ilk sıralarda yer alır. Bitkideki kuraklık stresi; turgorda su içeriğinde azalmayla başlar, daha sonra bitkide solmaya ve stomaların kapanmasına neden olur. Stomaların kapanmasıyla karbondioksit alınımı zorlaşır ve fotosentez (enzim, metabolik aktiviteler) hızı düşer. Şiddetli su kıtlığında ise bitki organlarının ölümüne neden olmaktadır (Hirayama ve Shinozaki, 2010).

Bitkide kuraklık stresinin etkileri üç şekilde incelenmiştir. Bunlar;

-Mekanik Etkiler,

-Metabolik Etkiler,

-Oksidatif Etkiler.

2.1.1. Mekanik Etkiler

Kuraklık, bitkide su kıtlığı belirtisini oluşturduğunda fizyolojik değişimlere neden olan stres faktörü olarak ifade edilmektedir (Levitt, 1980). Bitki hücrelerinde hacim ve turgor su kıtlığına bağlı olarak azalmakta ve membran yapısı değişmektedir. Bu membranda plazmoliz oluşmakta ve bitkideki hücresel metabolizmalarda bozulmalar meydana gelmektedir. (Salisbury ve Ross, 1992). Su kaybı bitkideki hücresel metabolizmayı genelde geri dönüşü olamayacak şekilde etkiler. Su noksanlığında, bitkilerde büyüme ve gelişmede özellikle sürgün ve kök büyümelerinde azalmalar oluşmasına neden olmaktadır (Kalefetoğlu ve Ekmekçi, 2005).

2.1.2. Metabolik Etkiler

Metabolik etki; bitki hücresinde fazla su kaybı olması sonucunda hücresel metabolizmanın bozulmasıyla oluşan diğer önemli stres faktörüdür. Bitkide bulunan protein metabolizmasında yer alan proteinin ayrışması ile proteinlerin azalması ve hasar oluşumunda kuraklık stresi etkilidir. (Kalefetoğlu ve Ekmekçi, 2005). Böylece protein sisteminde yer alan hidrofil ile hidrofobik aminoasitlerde su temasıyla bozulma olayı gerçekleşmektedir. Sonrasında protein sistemleri ile enzimlerin gerilemesine zemin oluşturmaktadır (Bray, 1997).

Proteinin parçalanması sonucunda dokularda aminoasit birikmesi olmaktadır. Bunun sonucunda enzimlerde kayıplar meydana gelir. Toksik bileşiklerde NH_3 oluşması, ABA'nın artması sonucu meydana gelmektedir. Bitkilerde sistem dengesinin bozulmasında amonyağın (NH_3) etkisi bulunmaktadır (Bray, 1988).

2.1.3. Oksidatif Etkiler

Ortamda suyun az olduğu durumlarda dokuda, stres faktörü yaygınlaşarak kloroplastta klorofil ile ışık tepkimelerinin etkili olduğu belirtilmektedir (Bray, 1997). Bitkide oksijen reaksiyonları sonucunda farklı türler meydana gelmekte ve geri dönüşü olmayan zararlar oluşmaktadır.

Oksijen kaynaklı nükleik asitler, karbonhidratlar, lipid, protein gibi oksitleyici radikaller makro elementlerle etkileşim sonucunda hücrede zarara neden olmaktadır (Smirnoff, 1993).

2.2. Kuraklık Faktörünün Bitki Morfolojisi Üzerine Etkisi

Yapraklardaki morfolojik farklılıklar kuraklık etkisi ile oluşmaktadır. Yapraklardaki terleme sonucunda su miktarının azalması, kökte meydana gelen farklılıklar, topraktaki suyun büyük bir oranda emilimiyle meydana gelmektedir (Kawasaki ve ark., 2000).

Bitkide yaprakların üstünün sık tüylerle kaplı olması, alttaki hücrenin sıcaklığının 1-2 °C düşürülmesi transprasyon hızını düşürür.

Birim alanda bulunan CO_2 fiksasyonun azalması yaprak yüzeyindeki nemin azalmasıyla gerçekleşmektedir. Bunun sonucunda bitkideki fotosentez olayı azalır, dolayısıyla bitkide gelişme ve büyümede gerileme meydana gelmektedir (Ayaz ve ark., 2000).

Kökte oluşan değişimlerde ise kuraklık stresinin etkisiyle kök kısmındaki doku yüzeyi kalın bir yüzeyle örtülmektedir. Köklerde bulunan mikroorganizmalar bitki hücrelerinde oluşan değişimleri kuraklık ve sıcaklık faktöründen koruyabilmektedir.

2.3. Kuraklığın Bitki Fizyolojisi Üzerine Etkisi

Kuraklık stresi ile birlikte fotosentezde azalma meydana gelmektedir. Bu durum CO_2 emiliminin azalması sonucu oluşmaktadır. Bitkilerde oluşan suyun azalmasını engellemek için stoma hücrelerinin kapanması nedeniyle fotosentez için gerekli olan CO_2'in alınması önlenir. Çırak ve Esendal (2006) bitkide fotosentezin yavaşlamasının ve yaprak alanının daralmasının kuraklık faktöründen kaynaklandığını belirtmişlerdir. Yine stoma boyutunun azalmasının CO_2 özümlemesi ve su kullanma mekanizması ile ilişkili olduğu belirlenmiştir (Bensen ve ark., 1988).

Stres hormonu olarak adlandırılan Absisik asit (ABA), bitkinin kuraklık stresi koşullarına verdiği tepkide etkin rol oynar. Bitkiler çevresel stresin etkisinde kaldığı sürede ABA etkisi ile stoma hücreleri kapanmakta ve bitkide terleme engellenmiş olmaktadır.

3. SONUÇ

Bitkilerde kuraklık stresi, tarım alanlarının kullanılabilirliğini ve etkinliğini önemli ölçüde etkilemektedir. Bu nedenle;

- Kuraklığa dayanıklı tür ve çeşitlerin geliştirilmesine yönelik çalışmalar yapmak,
- Kuraklığa dayanım ve toleranslılık mekanizmaları konusunda çalışmaların genişletilmesi,
- Kuraga dayanıklı tür ve çeşitlerde gen kaynaklarının korunmasına yönelik çalışmalar,
- Kuraklık koşullarında suyun maksimum kullanılabilirliği ve etkinliğini artırıcı tedbirlerin alınmasına yönelik çalışmalar küresel iklim krizinin temel sonuçlarından birisi olan kuraklığın yarattığı olumsuz etkileri azaltmak adına önemlidir.

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TÜRKİYE EKONOMİSİNDE İŞSİZLİK HİSTERİSİNİN ARAŞTIRILMASI: KADIN, ERKEK VE GENÇ İŞSİZLİĞİ

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ÖZET
İşsizlik sorunu, geçmişten günümüze neredeyse tüm ülkelerin makro ekonomik sorunlarından birisi olmuştur. İşsizlik histerisi kavramı, işsizlik oranlarının iktisadi şokların ardından tekrar eski düzeyine ulaşmaması olarak tanımlanmaktadır. Çalışmanın amacı, Türkiye'de işsizlik histerisi kavramının araştırılmasıdır. Bu çalışmada Türkiye'de işsizlik histerisi hem kadın-erkek hem de toplam işsizlik özelinde ayrı ayrı incelenecektir. Ayrıca, genç işsizlik de çalışma kapsamına alınıp işsizlik histerisi araştırılacaktır. Ocak 2005-Temmuz 2022 dönemindeki aylık verileri kapsayan çalışmamızda, geleneksel birim kök testleri ile yapısal kırılmalı birim kök testleri uygulanmıştır. Çalışmanın sonucunda geleneksel ve yapısal kırılmalı birim kök testleri değişik sonuçlar vermiştir. Yani bazı birim kök testlerine göre Türkiye ekonomisinde histeri etkisinin geçerli olduğu belirlenirken, bazı birim kök testlerine göre ise histeri etkisinin geçerli olmadığı bulunmuştur.

Anahtar Kelimeler: Toplam işsizlik, kadın işsizlik, erkek işsizlik, genç işsizlik ve histeri etkisi

INVESTIGATION ON UNEMPLOYMENT HYSTERIA IN THE TURKİYE ECONOMY: FEMALE, MEN, AND YOUTH UNEMPLOYMENT

ABSTRACT
The unemployment problem has been one of the macroeconomic problems of almost all countries from the past to the present. The concept of unemployment hysteria is defined as the unemployment rate not reaching its previous level after economic shocks. The study aims to investigate the concept of unemployment hysteria in Turkiye. In this study, unemployment hysteria in Turkiye will be examined separately for both men and women and total unemployment. In addition, youth unemployment will be included in the study and unemployment hysteria will be investigated. In our study covering the monthly data for the period January 2005-July 2022, conventional unit root tests and structural break unit root tests were applied. As a consequence of the study, conventional and structural break unit root tests gave various results. In other words, according to some unit root tests, was determined that the hysteria effect was valid in the Turkiye economy, while was found that the hysteria effect was not valid according to some unit root tests.

Keywords: Female unemployment, Total unemployment, Male unemployment, hysteria effect, and youth unemployment

1. GİRİŞ

Friedman (1968) ve Phelps (1972), işsizliği durağan bir süreç olarak nitelendiren NAIRU hipotezini önermişlerdir. Ancak, 1970'lerde ve 1980'lerin başında işsizlik oranının yükselmesi, NAIRU hipotezinin açıklayamadığı bir bilmece olarak karşımıza çıkmaktadır. Bu durum, işgücü piyasasındaki konjonktürel dalgalanmaların işsizlik oranını kalıcı olarak etkileyebileceğini ve uzun vadeli bir kalıcılığa yol açabileceğini belirten histeri hipotezi ile sonuçlanmıştır. Bu, işsizliğin entegre bir süreç olması gerektiği anlamına gelmektedir. (Gomes ve Da Silva, 2009: 309-310). İşsizlikte histeri kavramının temeli Ewing'e (1881) dayanmaktadır, ancak bunu ekonomik teoride ilk uygulayanlardan biri, dinamik modelleyicinin karşılaştığı temel zorlukları tartışan Samuelson (1965) olarak ifade edilmiştir. Phelps (1972) işsizlik teorisinde histeri kavramını ortaya atmış, Blanchard ve Summers (1986) içeriden/dışardan modelini başlatıp hızla büyüyen bir literatürün başlangıcı olmuşlardır (Røed, 1996: 590). Teorik olarak histerinin kaynakları "fiziksel sermaye", "insan sermayesi" ve "içeriden-dışarıdan" olarak ifade edilebilir (Blanchard ve Summers, 1996: 13). İşsizlikte histeri hipotezinin içerdiği varsayımlar dikkate alındığında, şayet işsizlik I(1) süreci ise, seriyi etkileyen şokların kalıcı etkileri olacak ve böylece işsizlik dengesini bir seviyeden diğerine kaydıracaktır. Fakat işsizlik I(0) süreci ise, şokun etkileri sadece geçici olacaktır; işsizlik sonunda denge seviyesine geri döneceği için politika aksiyonu ihtiyacını daha az zorunluluğunu ortaya çıkaracaktır. I(0) süreci, işsizlik dinamiklerini ortalama bir geri dönüş süreci olarak nitelendirdiği için yaygın olarak doğal işsizlik oranı hipotezi (NAIRU) olarak anılır. Histeri, durağan olmayan işsizlik oranları ile ilişkili olduğundan, geçerliliğini araştırmak için birim kök testleri yaygın olarak kullanılmaktadır (Chang vd., 2005:881-882).

Çalışmamızın amacı Türkiye ekonomisinde işsizlik histerisinin olup olmadığının belirlenmesidir. Bu nedenle Ocak 2005-Temmuz 2022 dönemi aylık verileri ile yapısal kırılmalara izin vermeyen Genişletilmiş Dickey Fuller (ADF), Phillips Perron (PP), Kwiatkowski, Phillips, Schmidt ve Shin (KPSS) birim kök testleri ile yapısal kırılmalara izin veren Zivot-Andrew (ZA) birim kök testi ile Türkiye ekonomisinde işsizlik histerisi toplam işsizlik, kadın işsizlik, erkek işsizlik ve genç işsizlik olmak üzere incelenecektir. Bu çalışmanın diğer çalışmalardan farkı hem ele aldığı veri kapsamı hem de kullandığı birim kök testlerinden kaynaklanmaktadır. Çalışmamızda toplam, kadın, erkek ve genç işsizlik oranlarında ayrı ayrı histeri etkisi araştırılmıştır.

Çalışmamız giriş bölümünü takip eden üç bölümde incelenecektir. Literatür özeti bölümünde Türkiye, diğer ülkeler ve panel veri seti örneklem grubu olarak seçen ilgili çalışmalar yer verilecek, literatür kısaca özetlenecek ve literatür ile ilgili genel değerlendirmelerde bulunulacaktır. Veri seti ve ekonometrik analiz bölümünde kullanılan veri setinden bahsedilecek, birim kök testleri sonuçları ayrıntılı yorumlanacaktır. Çalışmanın sonucunda analizden elde edilen bulgular kısaca açıklanacak ve politika önerilerine değinilecektir.

2. LİTERATÜR ÖZETİ

İşsizlik histerisi ile ilgili literatür çok geniştir. Hem panel veriler ile hem de tek ülkeli zaman serileri ile yapılmış çok fazla çalışma bulunmaktadır. Söz konusu çalışmalarda hem yapısal kırılmalı hem de yapısal kırılmasız birim kök testleri kullanılmıştır. Bu çalışmalardan bir kısmı aşağıdaki şekilde özetlenmektedir.

Türkiye'de işsizlik histerisi ile ilgili çalışmalar bulunmaktadır. Barışık ve Çevik (2008), Türkiye'de işsizlik histerisini 1923-2006 dönemi için yapısal kırılma testleri ile analiz etmişlerdir. Çalışmalarının sonucunda histeri etkisinin varlığını ispatlar sonuçlar bulmuştur. Yılancı (2009), 1923-2007 dönemi için Türkiye'de işsizlik histerisinin olup olmadığını araştırmıştır. Lumsdaine – Papell (LP), Perron, Zivot-Andrews (ZA) ve LM birim kök testleri kullandıklarının çalışmalarının sonucunda işsizlikte histeri etkisinin varlığını kabul etmişlerdir. Çınar, Akay ve Yılmaz (2014), çalışmalarında 1988-2008 dönemi için Türkiye'de sektörel ve genel işsizlikte histeri etkilerini test etmişlerdir. Yapısal kırılmalı ve yapısal kırılmasız tek değişkenli zaman serisi birim kök testleri uygulamışlardır. Ulaştığı sonuçlar neticesinde işsizlik histeri hipotezinin reddedildiğini işaret etmişlerdir. Kula ve Aslan (2014), çalışmalarında minimum Lagrange Çarpanı (LM) birim kök yöntemi ile Türkiye'de eğitim seviyesi açısından işsizlik oranlarındaki histeri hipotezinin var olup olmadığını araştırmıştır. Çalışmanın sonucunda okuma yazma bilmeyen, lise altı, yüksek eğitim seviyesi ve dolayısıyla işsiz işgücünün histerisinin varlığına göre genel işsizlik oranının ve işsizlik oranlarının durağan olmadığına dair kanıtların lehine olduğunu, ancak lise ve meslek lisesi mezunlarının işsizlik oranlarında histeri etkisinin kanıtı bulunmadığını belirtmişlerdir. Saraç (2014), Türkiye ekonomisinde işsizlik histerisini 2005:01-2013:07 dönemi için araştırmıştır. Çalışmasında hem doğrusal olmayan hem de doğrusal birim kök testi uygulamıştır. Çalışmasının sonucunda doğrusal birim kök testine göre işgücüne katılma oranı ve işsizlik serilerinin durağan olduğunu ancak doğrusal olmayan birim kök testine göre yalnızca işsizlik oranları verisinin bir rejimde durağan olduğu sonucuna varmıştır. Yani, Türkiye ekonomisinde işsizlikte histeri etkisinin

yalnızca bir rejimde geçerli olduğunu bulmuştur. Bayrakdar (2015), 2000-2013 döneminde çeyrek dönemlik veriler ile Türkiye'de işsizlik histerisinin geçerli olup olmadığını incelemiştir. Phillips-Perron, Kwiatkowski-Phillips-Schmidt-Shin, Augmented Dickey-Fuller ve Lee – Strazicich birim kök testlerini kullandıkları çalışmasının sonucunda ele alınan veri aralığı için Türkiye'de işsizlik histerisinin geçerli olduğunu bulmuştur. Özkan ve Altınsoy (2015), çalışmalarında 1988-2014 dönemi için Türkiye ekonomisinde istihdam ve işsizlik verilerinde histeri etkisinin olup olmadığını araştırmayı amaçlamışlardır. ADF, Fourier ADF, KSS ve Fourier KSS birim kök testlerini uyguladıkları çalışmalarında işgücü piyasasında kadınların yapısal kırılmalardan ve şoklardan daha çok etkilendiğini ortaya koymuşlardır. Bozkurt ve Altıner (2018), çalışmalarında Türkiye ekonomisinde işsizlik histerisini 1982-2017 dönemi için araştırmışlardır. Yöntem olarak geleneksel ve yapısal kırılmalı birim kök testi kullanmışlardır. Çalışmalarında geleneksel birim kök testlerinden KPSS, PP ve ADF testleri ile ZA ve Lee-Strazicich (2003) yapısal kırılmalı birim kök testlerinin sonucunda ele alınan dönemde Türkiye'de işsizlik histerisinin geçerli olmadığını belirlemişlerdir. Kapetanios vd. (2003) birim kök testinin sonucunda ise işsizlik histerisinin geçerli olduğu sonucuna ulaşmışlardır. Çelik ve Küçükkale (2018), 1988S2-2015S1 dönemi için Türkiye'de işsizlik histeri etkisini Ratchet kademeli artış/azalış yöntemi ile araştırmıştır. Çalışmalarında histeri etkisinin Türkiye ekonomisi için geçerli olduğu sonucuna varmışlardır. Tekin (2018), Türkiye'de işsizlik histerisini 2005-2017 dönemi için araştırmıştır. Becker, Enders ve Lee (2006) Fourier ve standart ADF birim kök testlerini kullandığı çalışmasının sonucunda işsizlik histerisinin bulunduğunu belirlemiştir. Yıldırım ve İnançlı (2018), çalışmalarında Türkiye'de 2005 Ocak-2016 Temmuz dönemi için aylık 15- 64 yaş arası işsizlik verileri ile işsizlik histerisi etkisini incelemişlerdir. ADF, KSS, KPSS, FADF, FKSS ve FKPSS birim kök testlerini kullandıkları çalışmalarında yapısal kırılmalar dikkate alındığında histeri hipotezinin geçerli olmadığı yönünde bulgular elde etmişlerdir. Akcan (2019a), Türkiye'de genç işsizlikte işsizlik histerisini 2005 Ocak- 2017 Haziran dönemi aylık verileri ile araştırmıştır. Genişletilmiş Dickey Fuller ve Phillips Perron birim kök testi kullandığı çalışmasının sonucunda genç işsizlik oranlarında genel işsizlik oranlarına kıyasla daha fazla histeri etkisini içerdiğini belirlemiştir. Aydın (2020), çalışmasında Türkiye'de işsizlik histerisini 2005:01-2018:10 dönemi için araştırmıştır. Augmented Dickey-Fuller (ADF), Eroğlu ve Soybilgen (2018) dalgacık tabanlı Augmented Dickey-Fuller (ADF) ve Fan ve Gencay (2010) dalgacık tabanlı varyans oranı birim kök testlerini kullandığı çalışmasının sonucunda Türkiye ekonomisinde ele aldığı dönemde işsizlik histerisi hipotezinin geçerli olmadığını bulmuştur. Bayat, Temiz ve Konat (2020), Türkiye için

işsizlik histerisi hipotezini 1923-2019 dönemi için araştırmışlardır. Kesirli Frekanslı Fourier ADF Birim Kök Testi uyguladıkları çalışmalarında işsizlik histeri hipotezinin geçerli olduğu sonucuna ulaşmışlardır. Çemrek ve Şeker (2020), Türkiye'de kadın işsizlik oranlarında işsizlik histerisini 2005-Ocak- 2019-Haziran dönemindeki on beş yaş üzerindeki işsizlik oranı verilerini kullanarak araştırmışlardır. Lee ve Strazicich (LS) ve Zivot-Andrews (ZA) birim kök testlerini kullandıkları çalışmalarının sonucunda kadın işsizliğinde histeri etkisinin geçerli olduğunu bulmuşlardır. Öztürk (2020), 2005 Ocak-2019 Ağustos dönemi aylık verileri ile Türkiye'de işsizlik histerisini Phillips-Perron, Augmented Dickey-Fuller ve yapısal kırılmalı birim kök testi olan Lee-Strazicich testleri ile araştırmıştır. Çalışmasında işsizlik histerisi hipotezi, işgücüne katılım, istihdam ve genç işsizlik serilerinde geçerli olduğu sonucuna ulaşmıştır. Atgür (2021), Türkiye'de işsizlik histerisini 1988-2018 dönemi yıllık verileri ile araştırmıştır. Phillips-Perron (PP), Genişletilmiş Dickey-Fuller (ADF) birim kök testleri ile çoklu yapısal kırılmalı Lumsdaine-Papell ve Lee-Strazicich Lagrange Çarpanı birim kök testlerini kullandıkları çalışmanın sonucunda işsizlikte histerisi hipotezinin geçerli olduğunu bulmuştur. Çiçen (2021), Türkiye'de 2008 global krizinde cinsiyet ve yaş gruplarına göre işsizlik histerisini araştırmıştır. 15 yaş üzeri erkek ve kadın yaş gruplarına ait aylık işsizlik oranları ile 2005-2014 dönemini kapsayan çalışmasında Fourier KPSS testini kullanmıştır. Çalışmalarının sonucunda, kadın işsizlik, erkek işsizlik ve genel işsizlik serileri durağan olmadığını ve serilerde histeri etkisi bulunduğunu belirlemiştir. Coşkun (2021), çalışmasında Türkiye'de işsizlik histerisini 15-24 yaş grubundaki nüfusun işsizlik oranı ve cinsiyete dayalı işe katılım oranı 2014:01-2020:09 dönemi aylık verileri ile araştırmıştır. ADF birim kök testi uyguladığı çalışmasının sonucunda işsizlik histerisini destekler nitelikte bulgular elde etmiştir. Zivot & Andrews (1992), Narayan & Popp (2010) birim kök testinin sonucunda işsizlik histerisinde yapısalcı görüşü nitelikte olduğunu belirlemiştir. Şak (2021), 1988-2018 dönemi yıllık verileri ile Türkiye'de işsizlik histerisini kadın ve erkek işsizliğinde incelemiştir. Fourier Kruse birim kök testi uyguladıkları çalışmanın sonucunda kadın işsizliğinde histeri etkisinin olduğunu, toplam işsizlik ve erkek işsizliğinde yığılımlı modelde histeri etkisinin bulunmadığını bulmuştur. Yurtkuran (2021), çalışmasında Türkiye ekonomisinde 2006q1-2019q2 döneminde Narayan-Popp, Fourier ADF ve Fourier KSS birim kök testleri ile işsizlik histerisini araştırmıştır. Çalışmasının sonucunda Narayan-Popp birim kök testi sonucunda doğal işsizlik oranı hipotezinin geçerli olduğunu fakat Fourier fonksiyonlarının kullanıldığı birim kök testlerine göre işsizlik histerisinin geçerli olduğunu belirlemiştir. Yücesan (2021), Türkiye ekonomisinde genç işsizlikte histeri etkisini araştırmıştır. 2005:M1-2020:M12 dönemi aylık verilerini kullanarak ADF, PP geleneksel birim

kök testleri ile Lee-Strazicich (2003) (LS), Zivot ve Andrews (1992) (ZA), Narayan-Popp (2010) (NP) ve Kapetanios çoklu yapısal kırılmalı birim kök testleri ile analizlerini gerçekleştirmiştir. ADF ve PP birim kök testi sonucunda Türkiye ekonomisinde işsizlik Histerisi yaklaşımı geçerli olduğunu Zivot ve Andrews (1992) (ZA), Lee-Strazicich (2003) (LS), Kapetanios ve Narayan-Popp (2010) (NP) çoklu yapısal kırılmalı birim kök testlerinin sonucunda ise histeri yaklaşımının geçerli olmadığını bulmuştur. Azazi ve Ateş (2022), Türkiye'de genel işsizlik ve genç işsizlikte histeri etkisini incelemişlerdir. 2014 Ocak-2022 Şubat dönemine ait aylık veriler ile Phillips Perron birim kök testi ile analizlerini gerçekleştirmişlerdir. Çalışmalarının sonucunda histeri etkisinin olmadığına varmışlardır. Telli Üçler (2022), çalışmasında Türkiye'de işsizlik histerisini 2005 Ocak- 2022 Ocak dönemi için genç işsizlik ve genel işsizlik özelinde araştırmıştır. Genişletilmiş Dickey Fuller ve Phillips Perron birim kök testi kullandığı çalışmasının sonucunda hem genel işsizlikte hem de genç işsizlikte histeri etkisinin bulunduğunu ifade etmiştir.

Panel veri analizi yöntemi ile ülke gruplarında ve zaman serisi yöntemleri ile Türkiye dışında ülkelerde işsizlik histerisini inceleyen çok sayıda çalışma bulunmaktadır. Røed (1996), 1970:1-94:4 dönemi için 16 OECD ülkesinde işsizlik histerisinin varlığını ampirik olarak araştırmıştır. Sonuçta, histeri etkilerinin Avustralya ve Kanada'da oldukça önemli olduğunu ve çoğu Avrupa ülkesinde ve Japonya'da daha az ölçüde önemli olduğunu ve sadece ABD'de, işsizlik histerisinin varlığını güçlü ve tutarlı bir şekilde reddedildiğini belirtmiştir. Leon-Ledesma (2002), çalışmasında 1985-1999 dönemi için 12 AB ülkesinde ve 50 ABD eyaletinde işsizlik histerisini Im-Pesaran-Shin birim kök testi ile araştırmıştır. Çalışmanın sonucunda AB için işsizlik histerisinin ve ABD eyaletleri için doğal oranın en makul hipotez olduğunu bulmuşlardır. Smyth (2003), 1982:2-2002:1 dönemi için Avustralya eyaletleri ve bölgeleri için üç aylık işsizlik oranlarına panel veri birim kök testleri uygulayarak histeri etkisini test etmiştir. Im, Pesaran ve Shin (1997) birim kök testi sonucunda işsizlikte histerinin varlığını bulmuştur. Chang vd. (2005), On Avrupa ülkesinde işsizlikte histeri hipotezini 1961–1999 dönemi için Panel SURADF testleri kullanarak sınamışlardır. Çalışmanın sonucunda histeri hipotezini, Belçika ve Hollanda hariç tüm Avrupa ülkeleri için doğrulandığını belirlenmişlerdir. Camarero vd. (2006), çalışmalarında 1956-2001 dönemini kapsayan 19 OECD ülkesi için panel verileri kullanarak işsizlikteki histeri etkilerini test etmişlerdir. Analiz edilen ülkelerin çoğu için doğal oranlı işsizlik hipotezini destekler sonuçlara ulaşmışlardır. Yılancı (2008), 17 OECD ülkesinde işsizlik oranlarının durağanlık ve doğrusallık özelliklerini araştırmışlardır. KSS birim kök testi uyguladıkları çalışmasının sonucunda Belçika, Kore, İsviçre, ABD, Hollanda ve Polonya için

doğal işsizlik oranını destekler nitelikte bulgular elde ederken; Avustralya, Kanada, Avusturya, Almanya, Finlandiya, Lüksemburg, Japonya, Slovak Cumhuriyeti, Norveç ve Türkiye için işsizlik histerisinin boş hipotezini reddedemediğine dair bulgular elde etmiştir. Lee, Lee ve Chang (2009), 19 OECD ülkesinde işsizlik histerisini Im ve diğerleri tarafından düzeyde heterojen yapısal kırılmalara sahip panel LM birim kök testleri ile araştırmıştır. 1960-2004 dönemini kapsayan çalışmasında işsizlik oranlarının durağan olduğunu yani işsizlik histerisi hipotezini reddettiğini ifade etmiştir. Ener ve Arıca (2011), 1985-2005 dönemi için Türkiye ve 15 AB ülkesinden oluşan 16 ülkede işsizlik histerisinin varlığını ampirik olarak incelemişlerdir. Carrioni Silvestre vd. (2005) tarafından geliştirilen yapısal kırılmaya dayalı birinci nesil, ikinci nesil testi ve panel birim kök testi kullanılarak işsizlik oranlarının durağan olup olmadığını test etmişlerdir. Carrioni Silvestre vd. (2005) birim kök testinin sonucunda analiz edilen ülkelerde histeri etkisinin bulunmadığına dair kanıtlar bulmuşlardır. Özcan (2012), makalesinde OECD ülkelerinde işsizlik histerisini araştırmışlardır. Lee ve Strazicich (2003) ile Im vd. (2005, 2010) tarafından önerilen yapısal kırılmalı birim kök testlerini kullandıkları çalışmasının sonucunda pek çok OECD ülkesi için işsizlik histerisinin geçerli olduğu sonucuna varmıştır. Arı, Zeren ve Özcan (2013), makalelerinde 1985-2011 dönemi için gelişmiş Doğu Asya ve Pasifik ülkeleri için işsizlik histerisini araştırmışlardır. Carrion-i-Silvestre vd. ile Carrion-i-Silvestre tarafından 2005 yılında geliştirilen panel birim kök testi uyguladıkları çalışmalarının sonucunda gelişmiş Doğu Asya ve Pasifik ülkelerinin çoğunda işsizlik histerisinin olmadığını bulmuşlardır. Dritsaki ve Dritsaki (2013), çalışmalarında 1984-2010 dönemi için Yunanistan, İrlanda ve Portekiz olmak üzere üç Avrupa ülkesinde işsizlikteki gecikmeyi incelemişlerdir. Çalışmalarının sonucunda işsizlik histeri hipotezinin her üç ülkede de var olduğunu bulmuşlardır. Cheng vd. (2014), makalelerinde PIIGS (Portekiz, İrlanda, İtalya, Yunanistan ve İspanya) ülkeleri için 1960'dan 2011'e kadar olan dönemde işsizlik histerisi hipotezini incelemek için esnek Fourier birim kök testini uygulamışlardır. Fourier birim kök testi yapıldığında Portekiz ve İspanya hariç tüm PIIGS ülkeleri için işsizlikteki histerisinin doğrulandığına dair sonuçlar elde etmişlerdir. Doğru (2014), 12 Avrupa Birliği ülkesinde işsizlik oranları ile işsizlik histerisini araştırmıştır. 1980-2012 dönemi için SURADF ve CADF birim kök testlerini kullanmıştır. Çalışmanın sonucunda Avusturya, İrlanda ve Yunanistan için SURADF testi; Avusturya, Portekiz ve Yunanistan için ise CADF testi histeri etkisinin olduğunu belirlemiştir. Diğer 9 ülkede ise işsizlikte histeri etkisinin varlığını bulamamıştır. Furuoka (2014), 1980-2009 döneminde beş Asya Pasifik ülkesinde – Avustralya, Çin, Hong Kong, Japonya ve Güney Kore'de işsizlik oranlarının durağanlığını araştırmıştır. Fourier ADF birim kök testi uyguladığı çalışmasının

sonucunda Güney Kore'nin işsizlik oranının durağan olduğunu, Avustralya ve Hong Kong'daki işsizlik oranları yapısal kırılmalar etrafında durağan bir süreç izlediğini; Çin ve Japonya'da işsizlik oranları denge düzeyine dönme yönünde zayıf bir eğilim gösterdiğini bulmuştur. Yalçınkaya ve Kaya (2014), 28 OECD üyesi ülke için 1980-2015 dönemi için işsizlik histerisini incelemişlerdir. Yazarlar yapısal kırılmaları dikkate almayan ve alan panel birim kök testleri uygulamışlardır. Çalışmalarında ülkelerin çoğunda, yapısal kırılmaları dikkate almayan panel birim kök testlerinin sonucunda işsizlik histerisi hipotezini destekler nitelikte bulgular elde etmiştir. Ancak yapısal kırılmaları dikkate alan panel birim kök testlerinin sonucunda ise doğal işsizlik oranını destekler sonuçlar elde etmişlerdir. Kahyaoğlu vd. (2016), 2001Q1-2015Q4 dönemi için Türkiye'de ve Avrupa Birliği ülkelerinde işsizlik histerisinin geçerliliğini araştırmışlardır. Hem zaman serisi hem de panel veri yöntemleri kullanmışlardır. Fourier-ADF ve Fourier IPS birim kök testlerini uyguladıklarının sonucunda Estonya, İspanya ve İtalya dışındaki ülkelerde işsizlik oranları doğrusal bir yapı gösterdiğini, işsizlik oranları Avrupa Birliği ülkelerinde panel veri analiziyle sınandığında işsizlik histerisinin geçerli olduğunu bulmuşlardır. Furuoka (2017), 2000-2014 dönemi için Danimarka, Finlandiya, Norveç ve İsveç olmak üzere dört İskandinav ülkesinin işsizlik histerisinin varlığını incelemiştir. Çalışmasında ADF testi ve FADF testi, dört ülkede de işsizlik histerisinin sıfır hipotezini reddetmede başarısız olduğunu, ADF-SB testinin sonucunda Danimarka ve Norveç için histeri sıfır hipotezini reddettiğini ancak Finlandiya ve İsveç için sıfır hipotezini reddetmede başarısız olduğunu ifade etmiştir. FADF-SB testinin daha tutarlı bulgular verdiğini, dört ülkenin tümü için sıfır hipotezini reddettiğini ifade etmiştir. Akcan (2019b), çalışmasında Azerbaycan, Kazakistan, Kırgızistan, Türkmenistan, Özbekistan ile Türkiye için 1991-2016 dönemi işsizlik histerisinin geçerliliği Levin Lin Chu, Fisher tipi Phillip Perron ve Fisher tipi Augmented Dickey Fuller panel birim kök testleri ile test etmiştir. Çalışmanın sonucunda Türk Cumhuriyetlerinde işsizlik histerisi hipotezinin geçerli olduğuna dair neticeler elde etmiştir. Bolat ve Koçbulut (2019), 1993-2016 dönemi için 37 gelişmekte olan ve gelişmiş ülke için işsizlik histeri etkisini test etmişlerdir. Sıralı Panel Seçim Yöntemi (SPSM) ve Fourier fonksiyonlu doğrusal olmayan panel birim kök testlerini kullandıkları çalışmalarının sonucunda tüm ülkelerde işsizlik serisinin durağan olduğunu tespit etmişlerdir. Çelik (2019), çalışmasında Türkiye ve Türkiye'ye komşu ülkeler (Bulgaristan, Azerbaycan, Gürcistan, Ermenistan, İran, Irak, Yunanistan, Suriye) için işsizlik histerisini araştırmışlardır. 15-64 yaş arası işsizlik oranları ile 1991-2017 dönemi için uyguladığı ekonometrik yöntemlerde yatay kesit bağımlılığı dikkate alan CADF birim kök testi kullanmıştır. Çalışmanın sonucunda panelin genelinde işsizlik histerisi hipotezinin geçerli

olmadığını, ülke bazlı sonuçlarda ise Azerbaycan, Suriye, Yunanistan, Gürcistan ve Türkiye'de işsizlik histerisinin olduğu sonucuna ulaşmıştır. Sigeze, Coşkun ve Ballı (2019), 1991-2016 dönemi için işsizlik histerisi hipotezini Türkiye ve Avrupa Birliğinde araştırmışlardır. Fourier-KPSS panel durağanlık testi uyguladıkları çalışmalarının sonucunda işsizlik histerisi hipotezinin Kıbrıs, Belçika, Letonya ve İsveç dışındaki diğer AB ülkeleri ve Türkiye için geçerli olduğunu ortaya çıkarmaktadır. Samırkaş Komşu ve Komşu (2021), 1991-2020 dönemi için işsizlik histerisini BRICS-T ülkeleri için incelemiştir. Genişletilmiş Dickey-Fuller (ADF) ve Philips-Peron (PP) ve Zivot-Andrews (ZA) birim kök testi uyguladıkları çalışmalarının neticesinde Çin hariç geri kalan tüm ülkelerde işsizlik histerisinin geçerli olduğunu bulmuşlardır.

Literatür genel olarak değerlendirildiğinde araştırma konusu olan ülke örneklemi, kullanılan veri seti, ele alınan dönem ve kullanılan veri setinin aylık, çeyreklik ve yıllık olarak ele alınması sonucunda farklı sonuçlar elde edilebilmektedir. Yani hem Türkiye için hem de diğer ülke grupları ve ülkeler için yapılan analizlerde bir fikir birliği bulunmamaktadır.

3. VERİ VE EKONOMETRİK ANALİZ

Çalışmamızda Ocak 2005-Temmuz 2022 dönemindeki aylık veriler ile Türkiye ekonomisinde işsizlik histerisinin geçerli olup olmadığı araştırılmıştır. Analizde kullanılan veriler Türkiye İstatistik Kurumu (TÜİK)'ten alınmış ve mevsimden arındırılmış veri seti kullanılmıştır. Toplam işsizlik, kadın işsizliği, erkek işsizliği ve genç işsizlik oranları ile analiz yapılmıştır. Tablo 1'de değişkenlere ait tanımlayıcı istatistikler gösterilmektedir.

Tablo 1: Tanımlayıcı İstatistikler

	Toplam İşsizlik (TUN)	**Kadın İşsizliği (FUN)**	**Erkek İşsizliği (MUN)**	**Genç İşsizliği (YUN)**
Ortalama	10.51754	12.06730	9.812322	19.32654
Medyan	10.20000	12.20000	9.300000	18.50000
Maksimum Değer	14.20000	16.70000	13.60000	27.00000
Minimum Değer	8.000000	7.800000	7.400000	14.80000
Standart Sapma	1.682466	2.299797	1.588932	3.088605
Gözlem Sayısı	211	211	211	211

Tablo 1 'den izleneceği üzere, en büyük maksimum değerin görüldüğü veri seti genç işsizlik, en düşük maksimum değerin görüldüğü veri seti erkek işsizliğidir.

İşsizlik histerisinin belirlenmesi için yapısal kırılmasız testlerden Dickey ve Fuller (1979) tarafından ifade edilen Genişletilmiş Dickey Fuller (ADF), Kwiatkowski-Phillips-Schmidt-Shin (1992) tarafından önerilen KPSS ve Phillips ve Perron (1988) tarafından geliştirilen

Phillips Perron (PP), birim kök testleri; yapısal kırılmalı olarak Zivot ve Andrews (1992) tarafından ortaya atılan Zivot Andrews (ZA) birim kök testi kullanılmıştır. Bu doğrultuda tablo 2'de toplam, erkek, kadın ve genç işsizlikte birim kök testi sonuçları gösterilmektedir.

Tablo 2: ADF Birim Kök testi sonuçları

Toplam İşsizlik					
Sabit		**Sabit & Trend**		**Hiçbiri**	
Test İstatistiği	Prob.	Test İstatistiği	Prob.	Test İstatistiği	Prob.
-1.537421	0.5128	-1.434892	0.8480	-0.058956	0.6620
Erkek İşsizliği					
Sabit		**Sabit & Trend**		**Hiçbiri**	
Test İstatistiği	Prob.	Test İstatistiği	Prob.	Test İstatistiği	Prob.
-1.718246	0.4206	-1.640069	0.7738	-0.411945	0.5341
Kadın İşsizliği					
Sabit		**Sabit & Trend**		**Hiçbiri**	
Test İstatistiği	Prob.	Test İstatistiği	Prob.	Test İstatistiği	Prob.
-1.685570	0.4371	-2.133130	0.5239	0.401879	0.7986
Genç İşsizlik					
Sabit		**Sabit & Trend**		**Hiçbiri**	
Test İstatistiği	Prob.	Test İstatistiği	Prob.	Test İstatistiği	Prob.
-1.823160	0.3686	-1.941407	0.6292	-0.062548	0.6608
Kritik Değerler %1= -3.461478 %5= -2.875128 % 10 = -2.574090		Kritik Değerler %1= -4.002354 % 5= -3.431368 %10= -3.139353		Kritik Değerler %1= -2.576020 % 5= -1.942346 %10= -1.615693	

Tablo 2'den izleneceği üzere, toplam işsizlik, erkek işsizliği, kadın işsizlik ve genç işsizlikte sabit, sabit-trend içeren, sabit-trend içermeyen modellerde Genişletilmiş Dickey Fuller (ADF) birim kök testi sonucuna göre işsizlik oranı serilerinin düzey değerde durağan olmadığı belirlenmiştir. Yani ADF birim kök testi sonucunda analizde ele alınan tüm işsizlik oranlarında histeri etkisinin olduğu gözlemlenmiştir.

Tablo 3: PP Birim Kök Testi Sonuçları

Toplam İşsizlik					
Sabit		**Sabit & Trend**		**Hiçbiri**	
Test İstatistiği	Prob.	Test İstatistiği	Prob.	Test İstatistiği	Prob.
-2.005256	0.2845	-2.123786	0.5291	-0.173736	0.6225
Erkek İşsizliği					
Sabit		**Sabit & Trend**		**Hiçbiri**	
Test İstatistiği	Prob.	Test İstatistiği	Prob.	Test İstatistiği	Prob.
-2.106411	0.2425	-2.075119	0.5562	-0.443533	0.5216
Kadın İşsizliği					
Sabit		**Sabit & Trend**		**Hiçbiri**	
Test İstatistiği	Prob.	Test İstatistiği	Prob.	Test İstatistiği	Prob.
-1.746411	0.4064	-2.348764	0.4055	0.401879	0.7986
Genç İşsizlik					
Sabit		**Sabit & Trend**		**Hiçbiri**	
Test İstatistiği	Prob.	Test İstatistiği	Prob.	Test İstatistiği	Prob.
-1.948554	0.3096	-2.159375	0.5093	-0.076970	0.6560
Kritik Değerler %1= -3.461478 %5= -2.875128 %10= -2.574090		Kritik Değerler %1= -4.002354 %5= -3.431368 %10= -3.139353		Kritik Değerler %1= -2.576020 %5= -1.942346 %10= -1.615693	

Tablo 3'te Phillips-Perron (PP) birim kök testi sonuçları raporlanmaktadır. Sonuçlar incelendiğinde toplam işsizlik, erkek işsizliği, kadın işsizlik ve genç işsizlikte sabit, sabit-trend içeren, sabit-trend içermeyen modellerde serilerin düzey seviyesinde durağan olmadığı yani işsizlik histerisi barındırdığı görülmektedir. Tablo 4'te KPSS birim kök testi sonuçları gösterilmektedir.

Tablo 4: KPSS Birim Kök Testleri

Toplam İşsizlik			
Sabit		**Sabit ve Trend**	
LM Stat	0.708163	LM Stat	0.122048
Erkek İşsizliği			
Sabit		**Sabit ve Trend**	
LM Stat	0.284084	LM Stat	0.135087
Kadın İşsizliği			
Sabit		**Sabit ve Trend**	
LM Stat	1.449821	LM Stat	0.085713
Genç İşsizlik			
Sabit		**Sabit ve Trend**	
LM Stat	0.825373	LM Stat	0.156517
Kritik Değerler %1= 0.739000 %5= 0.463000 % 10= 0.347000		Kritik Değerler %1= 0.216000 %5= 0.146000 %10= 0.119000	

KPSS birim kök testi diğer birim kök testlerinden daha farklıdır. Şöyle ki H_0 hipotezi durağanlığı ifade etmektedir yani histeri etkisi bulunmamaktadır. H_1 Hipotezi ise seri durağan değildir, birim kök içermektedir yani seride histeri etkisi bulunmaktadır. Yorumlamada ise

hesaplanan istatistik değerinin kritik değerlerden büyük olması serinin durağan olmadığını açıklarken hesaplanan istatistik değerinin kritik değerlerden küçük olması serinin durağanlığını ortaya koymaktadır. Tablo 4'te KPSS birim kök testi sonuçları gösterilmektedir. Toplam işsizlik verileri değerlendirildiğinde sabit içeren modelde %5 anlamlılık seviyesinde hesaplanan değer kritik değerden daha büyük (0.708163>0.463000); sabit-trend içeren modelde %10 anlamlılık seviyesinde hesaplanan değer kritik değerden daha büyük (0.122048>0.119000) bulunmuştur. Yani KPSS birim kök testi sonucuna göre seri durağan değildir; toplam işsizlikte histeri etkisi vardır. Erkek işsizliğinde sabit modelde hesaplanan istatistik değeri tablo kritik değerlerinden küçük bulunmuş yani serinin durağanlığı ortaya çıkmıştır. Yani erkek işsizliğinde sabit modelde KPSS birim kök testi sonucuna göre histeri etkisi yoktur. Sabit ve trend içeren modele göre ise hesaplanan istatistik değeri %10 anlamlılık düzeyinde kritik değerden daha büyük (0.135087>0.119000) tespit edilmiştir. Yani seri durağan değil ve histeri etkisi vardır. Kadın işsizliğinde sabit modelde hesaplanan istatistik değeri tablo kritik değerinden %1 anlamlılık seviyesinde büyük bulunmuş yani serinin durağan olmadığı ortaya çıkmıştır (1.449821>0.739000). Yani kadın işsizliğinde sabit modelde KPSS birim kök testi sonucuna göre histeri etkisi bulunmaktadır. Sabit ve trend içeren modele göre ise hesaplanan istatistik değeri kritik değerlerden daha küçük tespit edilmiştir. Yani seri durağandır. Genç işsizlikte hem sabit (%1 anlamlılık seviyesi) hem de sabit-trend (%5 anlamlılık seviyesi) içeren modelde hesaplanan değerin kritik değerlerden daha büyük olduğu yani serinin durağan olmadığı sonucuna varılmıştır. KPSS birim kök testi sonucuna göre genç işsizlikte histeri etkisi bulunmuştur.

Tablo 5: ZA Birim Kök Testi Sonuçları

Toplam İşsizlik					
Model A		**Model B**		**Model C**	
Test İstatistiği	Prob.	Test İstatistiği	Prob.	Test İstatistiği	Prob.
-3.108110	0.034785**	-2.453615	0.837072	-3.479281	0.071533*
Kırılma Tarihi: 2010M10		Kırılma Tarihi: 2009M01		Kırılma Tarihi=2010M03	
Erkek İşsizliği					
Model A		**Model B**		**Model C**	
Test İstatistiği	Prob.	Test İstatistiği	Prob.	Test İstatistiği	Prob.
-3.068470	0.031979**	-2.407143	0.057234*	-3.363668	0.117092
Kırılma Tarihi: 2010M10		Kırılma Tarihi: 2011M10		Kırılma Tarihi=2010M03	
Kadın İşsizliği					
Model A		**Model B**		**Model C**	
Test İstatistiği	Prob.	Test İstatistiği	Prob.	Test İstatistiği	Prob.
-2.829534	0.118294	-2.874398	0.088909*	-3.496364	0.014295**
Kırılma Tarihi: 2010M10		Kırılma Tarihi: 2019M11		Kırılma Tarihi=2018M11	
Genç İşsizlik					
Model A		**Model B**		**Model C**	
Test İstatistiği	Prob.	Test İstatistiği	Prob.	Test İstatistiği	Prob.
-3.449963	0.008919***	-2.433128	0.054134*	-3.606943	0.068109*
Kırılma Tarihi: 2010M10		Kırılma Tarihi: 2011M11		Kırılma Tarihi: 2010M10	

Not: * % 10, ** %5 ve *** %1 seviyesinde anlamlılığı göstermektedir.

Zivot-Andrews (ZA) birim kök testinde üç farklı yaklaşım söz konusudur. Model A düzeyde tek kırılmaya, model B eğimde tek kırılmaya ve model C hem eğimde hem de düzeyde tek kırılmaya izin vermektedir (Ertuğrul ve Soytaş, 2013: 56). Tablo 5'te Zivot-Andrews (ZA) birim kök testi sonuçları gösterilmektedir. Toplam işsizlik oranı verileri ile yapılan analiz değerlendirildiğinde, serinin model A'da %5 anlamlılık seviyesinde durağan olduğu, model C'de trend içeren modelde ise %10 anlamlılık seviyesinde durağan olduğu görülmektedir. Yani ZA birim kök testi sonucunda toplam işsizlikte model A ve model C'de işsizlik histerisinin olmadığı belirlenmiştir. Erkek işsizlikte model A ve model B'de durağan olduğu, yani erkek işsizlikte söz konusu iki model için işsizlik histerisinin geçerli olmadığı tespit edilmiştir. Kadın işsizlikte Zivot-Andrews birim kök testi sonucunda işsizlik histerisi ile ilgili sonuçlar değerlendirildiğinde model B'de serinin %10 anlamlılık düzeyinde durağan, model C'de %5 anlamlılık seviyesinde durağan olduğu gözlemlenmiştir. Yani kadın işsizlikte model B ve C'de işsizlik histerisinin olmadığı sonucuna varılmıştır. Genç işsizlik oranı ile yapılan histeri etkisinin ZA testine göre model A, model B ve model C için histeri etkisinin olmadığı yani serinin düzey değerde durağan olduğu sonucuna varılmıştır.

4. DEĞERLENDİRME VE SONUÇ

Ekonomide herhangi bir şok oluşması işsizliği doğal işsizlik oranı hipotezi ve işsizlik histerisi hipotezi olmak üzere iki şekilde etkilemektedir. Doğal işsizlik oranının etkileri kısa dönem, işsizlik histerisinin etkisi uzun dönemde çıkmaktadır. Bu kapsamda çalışmamızda Türkiye'de işsizlik histerisinin olup olmadığının araştırılması amaçlanmıştır.

Çalışmamızda toplam işsizlik, erkek işsizlik, kadın işsizlik ve genç işsizlik oranlarında işsizlik etkisinin araştırılması için yapısal kırılmaya izin vermeyen ve izin veren birim kök testleri kullanılmıştır. Ocak 2005-Temmuz 2022 dönemi için Türkiye'de işsizlik histerisinin araştırıldığı bu çalışmada ADF, PP, KPSS ve ZA birim kök testleri kullanılmıştır. ADF ve PP birim kök testlerinin sonucunda toplam işsizlik, erkek işsizlik, kadın işsizlik ve genç işsizlikte histeri etkisinin var olduğu bulunmuştur. Ancak KPSS ve ZA birim kök testi sonucunda farklı sonuçlar elde edilmiştir. Çalışmamızda farklı sonuçların elde edilmiş olması nedeniyle ekonometrik yöntemlerdeki farklılıklar ve serilerde farklılık olması çalışmada elde edilen sonuçlarda farklılık oluşmasına neden olmaktadır.

Türkiye ekonomisinde uzun dönemde istihdamı artıracak politika önlemleri işsizliğin azaltılması için son derece önemlidir. Yeni iş sahalarının oluşturulması, meslek edindirme eğitimlerinin özendirilmesi, staj imkanlarının artırılması bu noktada önerilebilecek politikalardandır.

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TARLA BİTKİLERİ'NDE BİYOÇAR UYGULAMALARI

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ÖZET
Küresel ölçekte toprak verimliliğinin azalması ile besin maddesi eksiklikleri sonucu sürdürülebilir tarımda önemli sorunlar ortaya çıkmaktadır. Kimyasal gübreler bitki yetiştiriciliği yapılan tarım arazileri için belirli bir müddet sonra toprak yorgunluğuna ve organik madde kaybına yol açmaktadır. Alternatif organik gübrelerden olan biyoçar, toprak verimliliğini artırmak, bozulmuş tarım arazilerini eski haline getirmek ve sera gazı emisyonlarını azaltmak için önemli bir seçenek olarak ortaya çıkmıştır. Günümüzde tarımsal üretimde atmosfere salınan sera gazının oldukça yüksek seviyelerde olduğu düşünülmektedir. Bilindiği üzere havadaki karbonun toprak içerisinde organik madde şeklinde depolanması gerekmektedir. Ayrıca istenilen düzeylerde bitki üretimi için de toprakta bulunan organik madde miktarının arttırılması ve korunması gerekmektedir. Biyoçar uygulamalarının tarım arazilerinde kullanılması ile sera gazlarının atmosfere geçişinin azalması ve atmosferde bulunan karbonun toprakta artmasının sağlanması sonucu ile küresel ısınmanın azalmasına katkı sağlanmaktadır. Biyoçar uygulaması ile kültür bitkilerinde verim ve verim unsurlarında önemli derecede olumlu farklılıklar oluştuğu birçok araştırmacı tarafından tespit edilmiştir. Bu derleme biyoçar ve biyoçar uygulamaları hakkında genel bilgiler, biyoçarın tarım alanlarına faydaları, çevreye olan etkileri ve tarım ürünlerinde kullanımlarını içermektedir.

Anahtar Kelimeler: Biyokömür, Gübreleme, Tarla Bitkileri, Sera Gazları

BIOCHAR TREATMENTS IN FIELD CROPS

ABSTRACT
Significant problems arise in sustainable agriculture due to the decrease in soil fertility and nutrient deficiencies on a global scale. Chemical fertilizers cause soil fatigue and loss of organic matter after a certain period for plant-grown agricultural areas. Biochar, one of the alternative organic fertilizers, has emerged as an essential option to increase soil fertility, restore degraded agricultural lands and reduce greenhouse gas emissions. Today, it is thought that the greenhouse gas released into the atmosphere in agricultural production is at very high levels. As it is known, carbon in the air must be stored in the soil as organic matter. In addition, the amount of organic matter in the soil must be increased and protected for plant production at the desired levels. Using biochar applications in agricultural lands contributes to the reduction of global warming due to the removal of greenhouse gases into the atmosphere and the increase of carbon in the atmosphere in the soil. It has been determined by many researchers that there are significant positive differences in yield and yield elements in cultivated plants with the application of biochar. This review includes general information about biochar and biochar applications, the benefits of biochar to agricultural areas, its effects on the environment, and its use in farm products.

Keywords: Biochar, Fertilization, Field Crops, Greenhouse Gases

1. GİRİŞ

Dünya nüfusunun 2050 yılına kadar 9,7 milyara ulaşacağı düşünülmektedir (Gu ve ark., 2021). Hızla artan dünya nüfusu ve açlık oranın yükselmesi ile tarım sektörünün karşı karşıya kalacağı bazı zorluklar vardır. Bu zorluklar arasında modern çağımızın önemli konularından olan sera gazı emisyonlarının verdiği zarar, çevre kirliliği ve iklim değişikliği sorunlarının iyileştirilmesi gerekmektedir. Toprak kalitesinin korunması ve tarımsal verimliliği arttırmak için yıldan yıla inorganik gübre uygulamaları sürekli bir artış göstermektedir (Srivastava, 2009). Ancak, toprak verimliliğini artırmak ve verim artışlarını sürdürmek için tek başına inorganik gübre uygulaması sürdürülebilir bir çözüm değildir. İnorganik gübreleme sonucu özellikle karbon stoklarındaki azalmalar toprak bozulmasına ve diğer bazı çevresel sorunlarına neden olmaktadır (Foley ve ark., 2005; Liu ve ark., 2010; Palm ve ark., 2001). Bu sorunların verdiği zararı minimuma indirebilmek için bilim insanları tarım toprağının verimliliğini, özelliklerini ve kalitesini iyileştirmek için toprağa organik maddeler sağlamak için çalışmalar yapmaktadır. (Alotaibi ve Schoenau, 2019). Bitkisel ve hayvansal üretimde ortaya çıkan artıkların çevreye dost bir şekilde tekrardan toprağa geri kazandırılması oldukça önemlidir. Bitkisel ve hayvansal atıkların hayvan gübresi olarak kullanılması, kompost haline getirilmesi, anız artıklarının toprağa karıştırılması ve yeşil gübreleme benzeri birçok uygulama toprağın organik madde miktarını arttırmaktadır (Gülser ve ark., 2015). Organik maddelerin gözenekli yapısı ve bünyesinde yüksek bitki besin maddelerinin bulunması ve topraktaki biyoçeşitliliği bitki yetiştiriciliği için en önemli unsurlardandır (Günal ve Erdem, 2021). Bitki artıklarının (organik atık) geri dönüştürülerek tarım topraklarına kömür olarak uygulanması modern ve çevre dostu olan yöntemlerdendir. Tarımın sürdürülebilirliği, gelişimi ve mahsul veriminin iyileştirilmesi için biyoçarın toprağa uygulanması büyük ilgi görmüştür (Alotaibi ve Schoenau, 2019).

Kendi ağırlığının 6 katı kadar su tutma özelliği olan biyoçar, asidik toprakların kireç ihtiyacını azaltmaya yardımcı olmaktadır (Şahin ve ark., 2020). Biyoçar üretimi sonrasında ortaya çıkan hayvansal ve bitkisel kökenli artıklar genellikle çevre kirliliğine sebep olmaktadır. Bahsi edilen bu artıkların toplanması, muhafazası ve depolanmasında oldukça zorluklar ile karşı karşıya kalınmaktadır. Toplum bilincinin yeterince oluşmaması nedeniyle artıklar boş arazilere ve drenaj çukurlarına dökülmekte veya yakma işlemi ile çözüm bulunarak ciddi sorunlar ortaya çıkmaktadır (Birol ve Günal, 2022; Şekil 3).



Şekil 1. Hasat sonrası çevreye bırakılan ve yakılan tarımsal artıklar (Birol ve Günal, 2022).

Bu uygulamalar hem çevre kirlenmesine hem de bitkilerin gelişimi için gerekli olan topraktaki bitki besin maddelerinin azalmasına ve bir sonraki ekimde kültür bitkisinin verimliliğine olumsuz bir şekilde etkilemektedir (Wilhelm ve ark., 2004). Hasat sonrası ortaya çıkan organik materyallerin piroliz işlemine tabi tutulması sonucunda ortaya çıkan biyoyakıt ve yanıcı gaz ile enerji üretimi, toprağa karbon ve bitki besin maddelerinin geri dönmesine yardımcı olan faydalı bir uygulamadır (Schmidt ve ark., 2021).

2. BİYOÇAR

Biyoçar terimi; nispeten yeni bir terim olmakla birlikte karbon (C) zenginleşmesi ile ilişkilidir (Leh-mann ve ark., 2006). Oksijenin az olduğu veya hiç olmadığı kapalı bir ortamda karbon bakımından zengin olan sap-saman, hayvan gübresi, odun ve yapraklar gibi maddelerin ısıtılması ile elde edilen materyallere biyoçar adı verilmektedir. Bir başka deyişle kısıtlı miktarda oksijenin bulunduğu ve belirli sıcaklıklardaki (<700°C) materyallerin ısı kullanımı ile ortaya çıkardığı materyallere bioçar denilmektedir (Lehmann ve Joseph, 2009). Uluslararası Biyoçar Girişimi'ne (IBI) göre, biyoçarın molar H: organik C oranı en fazla 0,7 olmalıdır (Shackley ve ark., 2012). Üretilen biyoçarın kabul edilebilmesi için siyah karbon içeriğinin toplam karbon miktarının %10'undan daha yüksek olması gerekmektedir (Anonim, 2012a). Ayrıca biyoçarın en az %60 karbon içermesi birinci sınıf, %30 ve %60 arası karbon içermesi ikinci sınıf, %10 ve %30 arası karbon içermesi ise üçüncü sınıf olarak gruplandırılmaktadır (Anonim, 2012a). Avrupa Biyoçar Sertifikası Kurumu (EBC)'na göre ise, biyoçarlarda siyah karbon içeriği toplam karbonun %10 ile 40'ı arasında olması (Schimmelpfennig ve Glaser,

2012) ve biyoçarın kuru madde oranının minimum %50 stabil organik karbona sahip olması gerekmektedir (Anonim, 2012b).

Biyoçarın toprağa ilave edilmesi ile birlikte bitki gelişimi ve verime olan katkısı; ilave edilen biyoçarın özelliklerine, uygulama miktarına, uygulanan toprağın PH, karbon, katyon değişim kapasitesi ve bitkilerin yetiştirme şartlarına bağlı olarak değişmektedir (Ye ve ark., 2020). Biyoçara dönüştürülen hayvansal gübrelerin uygun miktarda toprağa uygulanması, toprak kalitesine daha fazla ve uzun süreli yarar sağlaması ile birlikte çevreye olan olumsuz etkilerin önlenmesinde katkı sağlamaktadır (Arthur ve ark., 2015).

Lehmann ve ark. (2011), biyoçar kullanımının toprağa makro bitki besin maddesi sağladığını bildirmişlerdir. Ayrıca biyoçarın toprak gözeneklerine hava ve besin maddesi sağlayarak bakteri kolonizasyonunun gelişmesini olumlu yönde etkilediği bildirilmiştir (Isley ve ark. 2017). N-P-K bitkilerin gelişimi ve ürün verimi için önemli olan temel besin maddeleridir. Özellikle topraktaki azot miktarının artırılması için kullanılan kimyasal gübreler önemli girdilerin başında gelmektedir. Azotun yıkanarak yer altı sularına karışması ve ardından yeraltı sularının kirlenmesi ile önemli derecede çevresel sorunlar oluşmaktadır (Jones, 2012). Nelissen ve ark. (2012), biyoçarın NH_4'ü soğurma yoluyla hızla stabilize ettiğini, bunun da mevcut nitrojeni azalttığını ve böylece topraktaki potansiyel N kayıplarını azalttığını bildirmiştir. Fosfor, bitki büyümesi için gerekli bir besin maddesidir, ancak mineral gübre ile uygulanan fosdorun sadece %10 ila 25'i bitkiler tarafından kullanılmakta ve geri kalanı toprakta sabitlenmekte veya yıkanmmaktadır (Wali, 2016). Yapılan çalışmalar sonucunda, biyoçarın uygulama hızındaki artışla birlikte topraktaki kullanılabilir fosforu arttığı bildirilmiştir (Xu ve ark., 2015).

3. TARLA BİTKİLERİNDE YÜRÜTÜLEN BİYOÇAR ÇALIŞMALARI

Tarla bitkilerinde biyoçar uygulamaları ile ilgili bir çok çalışma yapılmış olup, biyoçar uygulamalarının toprak, ürün verimi ve ürün kalitesi üzerine olumu etkilerinin olduğuna dair sonuçlar elde edilmiştir. Sheikh ve ark., (2022) biyoçar ve mineral gübrelerin bakla (*Vicia faba* L.)'nın büyümesi ve verimi üzerindeki etkinliği ile ilgili yaptıkları çalışmada, biyoçarın N-P-K gübre kullanımını %50'ye düşürdüğünü, yani biyoçar ile kombine şekilde uygulanan mineral gübre miktarının yarısının bitkinin ihtiyaçlarını karşılamaya yeterli olduğunu bildirmişlerdir. Liu ve ark. (2013) biyoçarın ürün verimi üzerine etkisini araştırmak amacı ile dünyada 21 ülkeden 116 çalışmayı kapsayan meta-analizde ürün verimliliğinde ortalama olarak %11 artış meydana geldiğini belirtmişlerdir. Ahmad ve ark., (2016) ekmeklik buğday (*Triticum aestivum*

L.). bitkisi üzerine yaptıkları çalışmada toprak analiz sonuçlarına göre önerilen makro ve mikro besin maddeleri ile birlikte kullanılan biyoçar uygulamasının önemli düzeyde verim artışına ve toprak özelliklerinin iyileştirilmesine katkı sağladığını bildirmişlerdir. Inal ve ark. (2015), fasulye ve mısır bitkilerinin gelişimini incelemek amacı ile yaptıkları çalışmada tavuk gübresinden elde edilmiş olan biyoçar dozlarını uygulamışlardır. Çalışma sonucunda fasulye ve mısır bitkilerinin kuru ağılığını ve bitkiler tarafından alınan P, Zn, Cu ve Mn konsantrasyonlarını arttırdığını bildirmişlerdir. Bir başka çalışmada ise biyoçar uygulamalarının fasulye bitkisinin tüm büyüme parametreleri, verim ve verim unsurlarını arttırdığını bildirmişlerdir (Saxena ve ark., 2017).

Kişniş bitkisinde incelenen tüm kimyasal, büyüme ve verim özellikleri üzerinde biyoçarın oldukça önemli etkilere sahip olduğu bildirilmiştir (Amaref ve ark., 2018) Biyoçar uygulamasının fesleğenin morfolojik ve fizyolojik özelliklerini ve ayrıca toprak enzimlerinin aktivitelerini iyileştirdiği belirlenmiştir (Jabborova ve ark., 2021) Biyoçarın toprağa dahil edilmesi ile japon nanesinin (Mentha arvensis L.) biyokütle verimi ve besin alımı artmıştır. Pb ve Cd toleransının da uygulama sayesinde arttığı belirtilmiştir. Ayrıca biyoçarın japon nanesinde POD, CAT ve SOD'u azalttığı, toprak pH'sını ve enzimatik aktiviteleri de iyileştirdiği bildirilmiştir. (Nigam ve ark., 2019). Yer fıstığında biyoçar uygulamasının toprak pH'sını, organik karbonu, toplam azotu, C/N oranını, kullanılabilir fosforu ve değiştirilebilir potasyumu artırabildi belirlenmiştir. Diğer taraftan yer fıstığı tohumlarının ağırlığı üzerinde de önemli bir değiş oluşmuş ve yer fıstığının potansiyel verimi de uygulama ile artmıştır (Yunilasari, 2020).

4. SONUÇ

Biyoçar iklim değişikliğinin olumsuz etkilerini azaltmak için büyük potansiyele sahip bir aday olarak öne çıkmaktadır Günümüzde biyoçar karbonunun toprakta tutulması, sera gazı emisyonlarının azaltılmasına büyük katkı sağlamakta ve biyoçar stabilitesi, karbon tutma potansiyelini belirleyen faktörler arasında yer almaktadır. Yapılan araştırmalar neticesinde tarımsal atıkların biyoçar halinde tarım arazilerine kazandırılması toprak kalitesinin iyileştirilmesinde önemli bir araç haline gelmiştir.

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YER FISTIĞI ISLAHINDA HERBİSİTLERE DAYANIKLILIK GENLERİNİN ETKİLERİ

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ÖZET
Yer fıstığı (Arachis hypogaea), tek yıllık ve yazlık olarak yetiştirilen sıcak iklim bitkisidir. Baklagil familyasında olup meyvelerinin toprak altından oluşumuyla diğer bitkilerden farklılık göstermektedir. Besin değerlerinin üstün ve tüketim çeşitliliğiyle yağlı tohum bitkileri arasında farklı yeri olan yer fıstığı insan beslenmesinde de enerji ve protein açıklığının karşılanmasında gıda maddelerinin en başında kullanılanlardan biridir. Tohumunda %45-55 yağ oranına sahip olup birim alanda yağ verimi tarla ürünlerine göre daha yüksektir. Yağında tokoferol bulunması ve yüksek oleik asit içerdiğinden yağının stabilitesi ve raf ömrü yüksektir. İçerdiği yağ, protein, vitamin, karbonhidrat ve madensel maddelerle insanlar ve hayvanlar için değerli besin kaynağıdır. Bitki üretiminde hastalık ve zararlılar gibi yabancı otlar da büyük ölçüde ürün kaybı yaşandığından verimi düşürebilmektedir. Yabancı otların kontrolünde kullanılan ve bitkiye etki eden kimyasal maddeler olan herbisitler uygulanabilirliği ve az iş gücü gerektirdiğinden dolayı çok fazla tercih edilmektedir. Sunulan bu derleme çalışmasında, yer fıstığı yetiştiriciliğinde herbisitlere dayanıklılığın ve etkisi olan genlerin üzerine durulmuştur. Elde edilen bilgiler doğrultusunda herbisitlere dayanıklı yerfıstığı bireylerin geliştirilmesi yönünde yapılacak çalışmalara ve bu alanda çalışan araştırmacılara ışık tutması amaçlanmıştır.

Anahtar Kelimeler: Yer fıstığı, Herbisit, Yabancı ot,Üretim. Breeding

EFFECTS OF HERBİCİDE RESİSTANCE GENES İN PEANUT BREEDİNG

ABSTRACT
Peanut (*Arachis hypogaea* L.) is an annual and summer hot climate plant.Peanut, which is in the legume family, differs from other plants in that it forms fruit under the ground.In addition to having a high nutrient content, peanuts, which have a different consumption potential and have a different place among oilseed plants, are among the most preferred foodstuffs in human nutrition because they meet the energy and protein deficit.It has 45-55% oil content in its seed and the oil yield per unit area is higher than field products.The stability and shelf life of peanuts are high since the oil contains tocopherol and has a high oleic acid content.Despite all these important features, the presence of pests such as diseases and weeds hinders the production of peanuts and causes a large amount of product loss.It is important to control weeds to prevent reductions in crop yield, and chemicals called herbicides are often used for this purpose.Herbicides are highly preferred because of their applicability and low labor requirement.However, as a result of herbicide applications, the plant desired to be grown as well as weeds may also be affected by this chemical application.To prevent this situation, it has become possible to develop new varieties resistant to herbicides by using biotechnological methods as well as classical breeding.This review focused on the mechanism of resistance to herbicides in peanut cultivation and the genes that play a role in this mechanism.In line with the information obtained, it is aimed to contribute to the improvement studies to be carried out for the development of herbicide-resistant peanut lines and varieties and to contribute to the technical capacity of the researchers working in this field.

Keywords: Gene, herbicide resistance, breeding, weed, peanut

GİRİŞ

Yerfıstığı (Arachis hypogaea L.), Dünya genelinde ve Hindistan' da en çok yetiştirilen ve yağ üretiminde kullanılan en önemli bitkilerden biridir. 1980'lerde Hindistan'da yer fıstığının %80'i petrolün çıkarılması için kullanılmış olup son zamanlarda elde edilen ürünlerin %49'u yağ için ezilmekte geri kalanı ise doğrudan tüketim ve ihracatta kullanılmaktadır. [1] İçinde bulunan çok sayıda yararlı bileşenlerin kanıtlanmasıyla çiğ fıstık tüketimi artmış ve sağlık için fonksiyonel gıda olarak dikkat çekmeye başlamıştır. [2,3]

Baklagiller (Faboceae) familyasından olan tek yıllık yerfıstığı bitkisi, Dünya genelinde olduğu gibi ülkemizde de yağlı tohumlar kategorisinde ele alınır. Tohumların çeşidine bağlı olarak %44 ila %56 oranında yağ içermektedir. Ayrıca %25 oranında protein içermesi, minerallerce zenginliği, vitamin, amino asitler ile insan sağlığı açısında önemli bir bitkidir. Besin değeri oldukça yüksek olan meyveleri toprağın altında oluşturması yerfıstığının en karakteristik özelliğidir. Havadaki serbest haldeki azotu toprağa bağlama özelliğine sahip baklagil bitkisi olmasının sebebi köklerinde bulunan nodüllerde yaşayan bakteriler sayesinde gerçekleşir. Yerfıstığının kendine has bakterisi ise Rhizobium japonikum'dur. Türkiye'de en fazla yetiştirildiği yerler Osmaniye, Adana, Kahramanmaraş ve Aydın'dır. Yerfıstığı yetiştiriciliği yapılan bu bölgeler ideal sıcaklık şartlarını sağlamaktadır. Yerfıstığı toprak açısından çok seçici olmamakla beraber yetiştiriciliği için gevşek yapılı, alüvyal topraklar ve kumlu – tınlı topraklar uygundur. Türkiye'de yetiştirildiği bölgelerde toprak özelliklerinin elverişli olduğu görülmektedir. [4–6]

Yerfıstığı'nda Herbisitler

Son 15 yılda Virginia ve diğer eyaletlerde yabancı ot kontrolünü sağlamak üzere herbisitlerin kullanımı evrensel mahsul yönetimi uygulaması haline almıştır. [7] Herbisidal etkiye karşı toprak kaynaklı bitki patojenleri ve diğer mikroorganizmalar hassastır. [8] Yerfıstığı bitkisiyle ilişkili olarak herbisitlerin patejonik ve patojenik olmayan mikroflorayı nasıl etkilediği konusunda çok az şey bilinmektedir. Yabancı otlara ek olarak herbisitlerin, bitki ve mikroorganizmaları da etkilemesi neredeyse kaçınılmazdır. [7] Herbisitlerin belirli hastalığı etkileme şekilleri bitki türü, herbisit ve patojenin bulunduğu türle çok az ilişkili olduğu savunulmaktadır.[9] Herbisitlerin kullanımında çok fazla faktör bulunmasından ötürü spesifik suseptif patojen etkileşimi etkilerinin saptanmasının oldukça zor olduğu da düşünülmektedir. [10]

Ülkemizde yerfıstığı tarlalarında yaygın görülen kanyaş (Sorghum halepense), darıcan (Echinochloa colonum, Echinochloa cruss-galli), pıtırak (Xanthium strumarium) ve horozibiği (Amaranthus albus) gibi otlarla iyi mücadele edilmelidir. Çünkü bu otlar yerfıstığından daha

boylu oldukları için diğer yaygın görülen topalak (Cyperus roduntus) ve semizotu (Portulaca oleracae) gibi küçük boylu otlara göre zararları daha fazla olur. [11]

Agrobacterıum Aracılı Fıstığında (Arachıs Hypogaea L.) Epsps Herbisit Direnç Geninin Genetik Transformasyonu Ve Etkin Transgenik Bitkilerin Geliştirilmesi

Yapılan bir çalışmada Agrobacterium aracılı yer fıstığı genetik transformasyonuna ve transgenik bitkilerin etkili iyileştirilmesine dayanıyordu. Agrobacterium tumefaciens suşu LBA4404'ün bir ikili PxCSG m-YFP 5-enolpiruvilshikimat-3-fosfat sentaz (EPSPS) geni vektörü ile etkisi, iki ticari çeşit ve her biri bir içeren iki eksplant kaynağı (Embriyo ve kotiledon) üzerinde değerlendirilmiştir. EPSPS gen kalıtımının iki nesil boyunca fenotipik ve genotipik izlenmesi, istenen 3:1 kalıtımı sergilediği gözlemlenmiş olup bu doğrultuda bulgular, yabancı DNA'yı çok çeşitli bitki türlerine transfer etmek için yaygın kullanılan ve etkili bir yöntem olan Agrobacterium aracılığıyla transformasyonun yer fıstığı ıslahı ve fonksiyonel genomik araştırmaları için uygun ve değerli bir araç olduğunu gösterdiği yöndedir. [12–14]

Herbisit Direnç Geni Olan Fosfinotrisin Asetil Transferaz (Bar) Kullanılarak Yerfıstığı Transformasyonu

Genetik transformasyon uygulaması için güvenilir protokoller geliştirilmesine ihtiyaç vardır. Yapılan çalışmada hem partikül bombardımanı hem Agrobacterium aracılı dönüşüm parametreleri optimizesi için deneyler yapılmış. Yer fıstığının transformasyonunda parçacık bombardımanı yaklaşımı,seçilebilir işaretleyici olarak herbisit direnç geni olan Fosfinotrisin asetil transferaz (BAR) kullanımıyla gerçekleştirilmiş. L-Phosphinothricin (PPT) seçilebilir belirteç olarak kullanılmak üzere optimal dozun standardizasyonu bu çalışmada rapor edilmiş. Yapılan çalışma da Yeşil Floresan Protein (GFP) geni; çok takdir edilen bir raportör olan GUS (ß-glukoronidaz) ve Phosphinothricin (Bar) bir herbisit direnç geni kullanılmış. Çalışmanın sonunda Fosfinotrisinin çeşitli konsantrasyonlarında gözlemlenen doku büyümesi yanıtı oluşturup izole ediler seçilebilir işaretleyici olarak Fosfinotrisin asetil transferaz (BAR) geninin varlığı PCR analiziyle kanıtlanarak ilk rapor olarak sunulmuştur. [15–17]

SONUÇ VE ÖNERİLER

Sunulan bu derleme çalışmasında, yer fıstığı ıslahında herbisitlere dayanıklı ve etkili olan genlerin üzerine durulmuştur. Yerfıstığı bitkisiyle ilişkili olarak herbisitlerin patejonik ve patojenik olmayan mikroflorayı nasıl etkilediği konusunda çok az şey bilinmektedir. Elde edilen bilgiler doğrultusunda herbisitlere dayanıklı yerfıstığı bireylerin geliştirilmesi yönünde daha fazla çalışmaların olması önem arz etmektedir.

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A STUDY ON ANTIGENOTOXICITY AGAINST MITOMYCIN C IN SWISS ALBINO MICE USING CARDIOSPERMUM SPECIES (CRUDE ETHANOLIC LEAF EXTRACT)

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ABSTRACT
Chemotherapy is used to treat many types of cancers. Mitomycin C is an antitumor antibiotic and it was widely used in the treatment of several malignancies. Mitomycin C chemotherapy is related to an increased risk of the long-term development of secondary malignancies. A single dose has the potential to induce tumors in the skin and lungs of exposed rodents, as well as in the liver, kidney, nervous system and lungs of the progeny of exposed pregnant rats. *Cardiospermum* from the family Sapindaceae is a widespread perennial plant, differentparts of which have been used by indigenous populations in various parts of the world both as food and in the treatment of many pathological diseases. Knowledge of the plant's chemical components and their standardization and in vitro and in vivo experimentation to evaluate its pharmacological activity are means by which the quality of the drug and its possible toxicity can be controlled and adulterations with other similar species can be revealed in order to guarantee the safety and well-being of the consumer. Leaves boiled in oil such as castor oil are applied over rheumatic pain swellings and tumors of various kinds. Several studies suggest that ethanolic extract of leaves possess antidiabetic and antibacterial activities. The present work was initiated with the objective of finding out the antigenotoxic property of crude ethanolic leaf extract of *Cardiospermum* species of the Sapindaceae family against the chemotherapeutic agent Mitomycin C induced genotoxicity in the normal bone marrow cells of Swiss albino mice. Post-treatment study was conducted by administering *Cardiospermum* species by oral gavage. Then carried out the Micronucleus assay and the endpoints were evaluated. The Crude ethanolic leaf extract of *Cardiospermum* species at 500 mg/Kg bwt evidently decreased the genotoxic effect of Mitomycin C induced genotoxicity (2 mg/Kgbwt.) in Swiss albino mice. The combination of Mitomycin C and *Cardiospermum* species can be advocated during chemotherapy to reduce the genotoxic effect of Mitomycin C.

Keywords: Mitomycin C, *Cardiospermum*, Antigenotoxicity.

1. INTRODUCTION

Cancer is characterized by uncontrolled cell growth and acquisition of metastatic properties (Sarkar.S *et al.*,2013). Chemotheraphy is mostly the choice of treatment in cancer patients. The side effects are mainly associated with high dose, non specific distribution and severe toxic to the normal cells and the development of multidrug resistance (Sawant.S *et al.*, 2014). Mitomycin C is an antitumor antibiotic that has been widely used in the treatment of various neoplastic diseases (Claridge *et al*.,1985). Mitomycin C inhibits DNA synthesis and cross-links DNA at the N6 position of adenine and at the O6 and N2 positions of guanine (Gad.S.E.,2014). Mitomycin c was considered both genotoxic and cytotoxic agent (Dr.Fulmali.D *et al*.,2017). Mitomycin C chemotheraphy is related to an increased risk of long term development of secondary malignancy (Travis *et al*.,2000). Higher plants used extensively in traditional medicines are increasingly being screened for their role in modulating the activity of environmental genotoxicants. The property of preventing carcinogenesis has been reported in many plant extracts (Sarka *et al*.,1996). The soapberry family (Sapindaceae, Sapindales) has a predominant pantropical distribution, although some taxa occur in temperate areas (Acevedo-Rodríguez *et al*., 2011). Members of the balloon vine genus, Cardiospermum, of Family Sapindaceae have been extensively moved around the globe as medicinal and horticultural species (Gildenhuys.E *et al*.,2013). The ethanol extract of *C. halicacabum* proved to have antipyretic activity against yeast-induced pyrexia in rats (Asha e*t a.l*,1999) anti-ulcer activity (Sheeba *et al*., 2006) and anti hyperglycaemic effect (Venkatesh Babu *et al.*,2006). Oral admimistration of extracts of leaves and fruits of Sapindus saponaria.L to rats were found to have an anti-gastric ulcer effect (Wang.X *et al.*,2006). The fatty acid profile of seed oil extract of *C. halicacabum* reveals the presence of palmitic acid, oleic acid, stearic acid, linoleic acid, and eicosenoic acid. (Chisholm. J *et al*., 1958). The main objective of the work was to find out the antigenotoxic property of crude ethanolic leaf extract of *Cardiospermum* species of Sapindaceae family against the chemotherapeutic agent Mitomycin C induced genotoxicity in the normal bone marrow cells of Swiss Albino mice.

2. MATERIALS AND METHODS

Modulatory effect of crude ethanolic leaf extract of *Cardiospermum* species, a Sapindaceae family plant on Mitomycin C induced genotoxicity was studied in Swiss albino mice. The genotoxic endpoint assayed was Mouse bone marrow micronucleus assay.

CHEMICALS

Mitomycin C was purchased from M/s. Sigma Aldrich Chemical company Ltd., USA. Giemsa stain was bought from M/s. Merck, Germany. BSA and May-Grunwaldstain were procured from M/s. HimediaLaboratoriesPvt. Ltd., Mumbai. All other reagents used were of analytical grade.

ANIMALS

Swiss Albino mice of either sex, 10-12 weeks old, weighing 25-30g inbred were kept in polypropylene cages with stainless steel lids and rice husk bedding. The animals were provided with standard pelleted feed.

PLANT TEST MATERIAL

Fresh whole plants of *Cardiospermum* species (Family Sapindaceae) were procured locally in Chennai. Leaves were separated and washed thrice in tap water and rinsed twice in distilled water. They were then dried in an incubator at 37 °C for 4-7 days. The dried leaves were then coarsely powdered and extracted with the solvent: 100% Ethanol.

TREATMENT SCHEDULE

The treatment schedule is given below:

S.No	Treatment Group	Dose	Duration of Treatment	Number of Experimental Animals
1.	Untreated Negative Control	-	-	3
2.	Mitomycin C	2mg/kg bwt	48 hours	6
3.	Crude Ethanolic Leaf extract of *Cardiospermum*Species	500mg/kg bwt	24 hours	6
4.	Post treatment of crude ethanolic leaf extract of *Cardiospermum* Species against Mitomycin C	2mg/kg bwt -> 500mg/kg bwt	24 hours	6

DOSE SELECTION AND ROUTE OF ADMINISTRATION

Mitomycin C was given at 2 mg/Kg body weight of mice as a single intraperitoneal injection for 48 hours, the vehicle being double distilled water (0.3 ml/Kg bwt.). The test dose was selected based on frequency of chromosomal aberrations induced by Mitomycin C.

Crude ethanolic leaf extract of *Cardiospermum* species (Family Sapindaceae) was administered as oral gavages at 500 mg/Kg body weight. Dose selection was based on preliminary tests and pre-treatment investigations carried out in the lab, with the criteria that the dose selected should not produce any cytotoxicity and Genotoxicity. The vehicle 2% Gum agacia was given at

0.5ml/25g bwt.

In Group 4, animals were treated with chemotherapeutic agent, Mitomycin C as a single intraperitoneal injection for 24 hours and then they were treated with crude ethanolic leaf extract of *Cardiospermum* species. After 24 hours of last dosage, all experimental animals were sacrificed by cervical dislocation.

Bone marrow cytogenetics is a useful short term technique for elucidating the mechanism as well as to identify the subtances.(Renner.,1990).

MOUSE BONE MARROW MICRONUCLEUS ASSAY:

Animals were sacrificed by cervical dislocation. Femur bones were dissected and the adjoining muscles were removed. Bone marrow was flushed and centrifuge with 2ml of 3%BSA (BovineSerum Albumin). It was then centrifuged at 5000rpm for 5 min. Supernatant was discarded and the cell pellet was resuspended in few drops of 3% BSA. Bone marrow cells suspension was smeared on a pre cleaned glass microslide and fixed in 100% methanol for 10 minutes. Then slides were stained for 15 minute with 1:1 ::Nay- Grunwald stain :: phosphate buffer and then with Giemsa stain for 10 minutes and rinsed with double distilled water. The slides were then left undisturbed in double distilled water for 3-5minutes to allow proper differentiation between the young and mature erythrocytes. 2500 Polychromatic erythrocytes (PCE) and the corresponding number of Normochromatic erythrocytes (NCE) are scored to find out the frequency of micronucleated PCEs and PCE/NCE ratio (rate of cellproliferation index).

PHOTOMICROGRAPHY

Photomicrography of micronucleated PCES or NCEs was taken using a Nikon coolpix E5400 camera attached to Nikon Eclipse E200 microscope.

STATISTICS:

Micronucleus assay data will be consolidated to find out the frequency of MnPCEs and P/N ratio. All data will be expressed as Mean ±SD.

3. RESULTS AND DISCUSSION:

The present investigation was carried out to evaluate the efficacy of *Cardiospermum* species (Family Sapindaceae) in protecting thenormal bone marrow cells of Swiss albino mice from Mitomycin C, a chemotherapeutic agent induced mutagenesis. Cytogenetic end point was employed to study antimutagenesis. Negative control was maintained in parallel with the experimental mice.

The results observed from the experiments are given below:

1. The mean MnPCE/2500 PCEs found in Negative control group was 5.60 ± 1.16 and the PCE/NCE ratio was 1.07 ± 0.03. Micronucleus assay data for group 1 animals are given (Table 1).

2. A 4.93 fold increase in frequency of micronucleated PCE/2500 PCEs was observed in Mitomycin C (2 mg/Kg bwt) treated group (Table2). The PCE/NCE ratio was also significantly reduced (1.58 folds) by Mitomycin C treatment when compared with Negative control.

3. Group 3 animals, treated with *Cardiospermum* species (Family Sapindaceae) at 500mg/Kg bwt did not elevate the mean MnPCE/2500 PCEs value, compared to Negative control. The rate of cell proliferation (PCE/NCE) of bone marrow cells was similar to Negative control group (Table 3).

4. Post-treatment of *Cardiospermum* species (500 mg/Kg bwt.) reduced the incidence of micronucleus induced by Mitomycin C (2 mg/Kg bwt) by 58.22% (Table4). The PCE/NCE ratio was also found to be elevated (43.37%) when compared with Mitomycin C alone group. The micronucleus assay results are also depicted in Graph1 and Graph2.

Table 1: Micronucleus Assay in negative control

Group No	Treatment	Mode of Treatment	Dose	Duration	Animal No	Sex	PCE	MnPCE	NCE	MnNCE	PCE/NCE	MnPCE 2500/PCE
1	Negative control	-	-	-	1 2 3	M M F	2518 2535 2524	7 5 5	2399 2312 2349	0 3 1	1.05 1.01 1.07	6.95 4.93 4.95
Mean							2524	5.666	2353	1.33	1.07	5.60
SD							8.62	1.154	43.6	1.52	0.03	1.16

M-Male; PCE- Polychromatic Erythrocytes; NCE- Normochromatic Erythrocytes; MnPCE- Micronucleated Polychromatic Erythrocytes; MnNCE- Micronucleated Normochromatic Erythrocytes;

Table 2: Mitomycin C induced Micronucleus in the bone marrow cells of Swiss Albino Mice

Group No	Treatment	Mode of Treatment	Dose	Duration	Animal No	Sex	PCE	MnPCE	NCE	MnNCE	PCE/NCE	MnPCE 2500/PCE
2	MMC	IP	2mg/kg bwt	48 hours	1 2 3 4 5 6	M M M F F F	2525 2500 2510 2506 2524 2523	29 25 28 32 27 26	3200 3720 3604 3795 3356 4573	20 15 10 23 19 22	0.79 0.68 0.70 0.67 0.76 0.56	28.72 25.00 27.88 31.93 26.74 25.76
Mean							2514	27.83	3708	19	0.68	27.67
SD							10.726	2.4832	479.31	4.8751	0.0804	2.487

M- Male; F- Female; PCE- Polychromatic Erythrocytes; NCE- Normochromatic Erythrocytes; MnPCE- Micronucleated Polychromatic Erythrocytes; MnNCE- Micronucleated Normochromatic Erythrocytes; MMC- Mitomycin C

Table 3:*Cardiospermum* induced Micronucleus in the bone marrow cells of Swiss Albino Mice

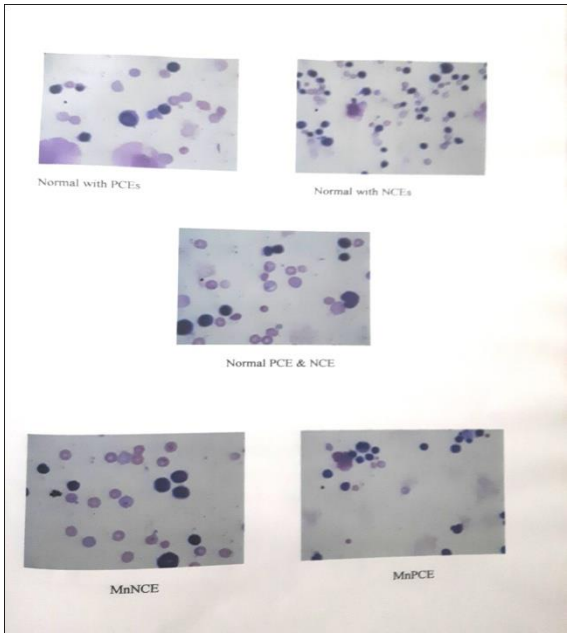
Group No	Treatment	Mode of Treatment	Dose	Duration	Animal No	Sex	PCE	MnPCE	NCE	MnNCE	PCE/NCE	MnPCE 2500/PCE
3	Crude Ethanolic Leaf extract	Oral Gavage	500mg/kg bwt	24 hours	1 2 3 4 5 6	M M M F F F	2541 2510 2529 2534 2508 2531	5 2 2 1 3 2	22122 180 2116 2415 2430 2340	1 1 0 1 0 0	1.15 1.15 1.19 1.05 1.03 1.08	4.93 1.99 1.97 0.98 2.99 1.97
Mean							2525	2.5	2282	0.5	1.11	2.47
SD							13.427	1.378	131.00	0.547	0.064	1.358

M- Male; F- Female; PCE- Polychromatic Erythrocytes; NCE- Normochromatic Erythrocytes; MnPCE- Micronucleated Polychromatic Erythrocytes; MnNCE- Micronucleated Normochromatic Erythrocytes;

Table 4: Effect of post treatment of *Cardiospermum* species against Mitomycin C induced Micronucleus in the bone marrow cells of Swiss Albino Mice

Group No	Treatment	Mode of Treatment	Dose	Duration	Animal No	Sex	PCE	MnPCE	NCE	MnNCE	PCE / NCE	MnPCE 2500/ PCE
4	Post Treatment	IP ->Oral Gavage	2mg /kg bwt-> 500mg/ kg bwt	24 hours To 48 hours	1 2 3 4 5 6	M M M F F F	2537 2512 2518 2536 2517 2520	16 14 12 11 7 10	2709 2498 2468 2528 2599 2770	13 5 9 9 3 7	0.9365 1.0056 1.0202 1.0031 0.9684 0.9097	15.7666 13.9331 11.9142 10.8438 6.9527 9.9206
Mean							2523.3	11.666	2595	7.6	0.97	11.55
SD							10.538	3.1411	121.37	3.502	0.043	3.093

Micronucleus Assay



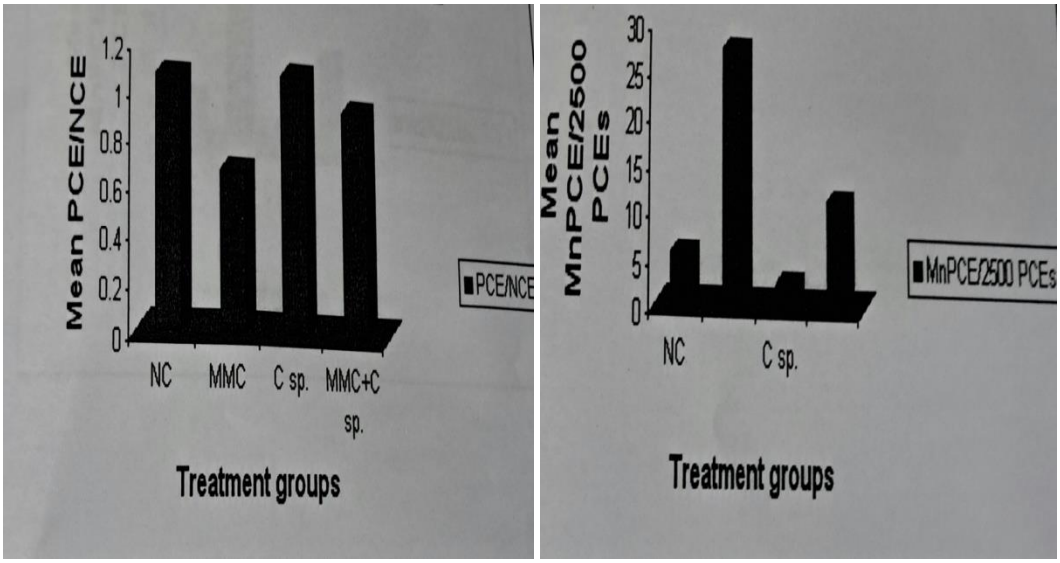
Graph 1: MMC+*Cardiospermum*Species

***Cardiospermum* Species**



Graph 2: MMC+*Cardiospermum* Species

PCE/NCE **MnPCE/2500PCEs**



4. CONCLUSION

The present work was initiated with the objective of finding out the antigenotoxic property of crude ethanolic leaf extract of *Cardiospermum* species of Sapindaceae family against the chemotherapeutic agent Mitomycin C induced genotoxicity in the normal bone marrow cells of Swiss Albino mice. The Post treatment study was conducted by administering *Cardiospermum* species by oral gavage. Then performed Micronucleus Assay. Mitomycin C induced genotoxicity (2mg/Kg bwt) was evidently decreased by crude ethanolic leaf extract of *Cardiospermum* species at 500 mg/Kgbwt. The combination of Mitomycin C and *Cardiospermum* species can be advocated during chemotherapy to reduce the genotoxic effect of Mitomycin C. Reduction in the Mitomycin C induced percentage of micronucleus frequency by crude ethanolic leaf extract of *Cardiospermum* species (Sapindaceae family) in the present study could be due to bioantimutagenesis mechanism. *Cardiospermum* species antigenotoxicity property could be attributed by the presence of phytochemicals like tannins, saponins, phenolic compounds, which have been widely reported to possess antigenotoxicity.

Further In vivo investigations are needed to elucidate the mechanism of antigenotoxicity exhibited by *Cardiospermum* species.

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REGIONAL ECONOMIC SYSTEM RESOURCES

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INTRODUCTİON

Regarding the regional economic system, the resources are the productive forces elements, the distinctive feature of which is, on the one hand, limitation in volumes, and on the other hand, unlimited possibilities of combination and interaction. In the first case, we are talking about natural, material and labor resources, and in the second – about organizational, scientific, technical and informational support. The regional economic system configuration fully depends on the correlation between the productive forces. The regional economic system configuration refers to the quantitative proportions of its individual parts, the interaction of which ensures its holistic nature. Integrity is the fundamental basis for the stability of systems (preserving their synergistic properties and potential possibilities when external conditions change), the result of connectedness of elements and the balance of stochastic (random, probabilistic) and deterministic (determined) behavior of each of them. The productive forces development is the enrichment, filling with qualitatively new content of productive forces elements under the influence of the internal laws of development (moving functions from personal to material factors of production, faster growth of social labor, changes in labor, increasing productivity, etc.), under the influence of internal and external contradictions (the relationship of man to nature, the labor process, the common social mode of production, etc.). If you try to sum up it to a certain level, then the level of the productive forces development will be characterized by the quality of labor, technical equipment, the degree of mastery of the nature forces, the development level of science, the introduction of modern forms and methods to organizing production, the distribution degree of new materials and technologies.

METHOD

Research methods: general scientific methods: analysis, synthesis, induction, deduction, systems approach and modeling – to study the theoretical issues of forming a strategically-oriented model of sustainable development of regions; generalization method – for the formation of a strategically oriented model of sustainable development of regions.

Literature Review

Conceptual substantiation of sustainable socio-economic development of territories is one of the leading directions of modern theory and practice of regional economy. For many years, domestic scientists have been dealing with the issue of sustainable development of regions and improvement of regional policy. Yes, V.S. Dyachenko in the article “Peculiarities of the

Mechanism for Ensuring Sustainable Development of Regions" (Dyachenko, 2019, pp.90-93) identifies the peculiarities of mechanisms for ensuring sustainable development of regions.

O.I. Lyashevska in the article "State management of innovative development of sustainable development of regions" (Lyashevska, 2019, pp.288-293) examines state management of innovative development, due to a systemic approach.

S.I. Boguslavska in the article "Strategy of resource provision for sustainable development of the region" (Boguslavska, 2019, pp. 154-158) formulates the main directions of the strategy of resource provision, which is based on the self-reproduction of resources and involves active actions for the self-development of the economy and organizational and economic relations in the regions.

I.M. Semenenko in the article "Institutional support for sustainable development of the region: essence and structure" (Semenenko, 2019, pp. 26-30) defines the possibility of using institutions to cultivate and spread the concept of sustainable development in all spheres of activity.

L.V. Olifyrenko in the article "Indicators of ensuring the sustainable development of the regions of Ukraine" (Olifirenko, 2019, pp. 265–277) considers the main provisions of the concept of sustainable regional development, outlines the goals and tasks of development in the context of state regional policy.

T.M. Gromova in the article "Sustainable economic development of cities and regions: problems and prospects" (Gromova, 2020, pp. 15-19) identifies problems in the field of sustainable economic development of cities and regions and substantiates the importance of developing a strategic plan for the development of the city.

I.O. Irtysheva in the article "Strategic imperatives of sustainable development of the region in transformational conditions" (Irtyshcheva, 2020, pp. 392-404) reveals the strategic imperatives of sustainable development of the region in transformational conditions.

Yu.O. Kovalenko in the article "Approaches to the assessment of the sustainable development of regions based on socio-ecological and economic indicators" (Kovalenko, 2020, pp. 45-55) proposed a methodological approach to the assessment of the sustainable development of regions based on the general index of sustainability; the factors and directions of innovative policy in the context of the development of the socio-ecological and economic system of the region are determined.

Article by T.M. Kachaly "The structure and technologies of the organizational and economic mechanism of the implementation of the regional policy of sustainable development" (Kachala,

2021, pp. 10-21) is devoted to the definition of the structure and technologies of the organizational and economic mechanism of the implementation of the regional policy of sustainable development.

DİSCUSSİON

The acquisition of economic independence by regional economic systems necessitates a reassessment of the position and functions of each region in the coordinate system of the economic space where decisions must be made to ensure the conditions for its sustainable development. Sustainable development of regional economic systems involves a further change in the architecture of the economic space, the proportions of the economic system. The study of factors of regional economic systems development allows us to conditionally divide them into external and internal factors. External factors are the economic efficiency of interaction with the external environment, reflecting the ability of the system to create goods and services in demand in the external environment with an acceptable ratio of the value of the product being produced, on the one hand, and the cost of attracting resources (improving the competitiveness of products), on the other hand. Internal factors include the production organization within the economic system, which is determined by the structure, flexibility of interaction between the system elements, management efficiency and the use of modern technologies (increase in labor productivity). At the same time, their development is determined by the general parameters that characterize the productive forces, property relations, and forced labor. The productive forces play a dominant role in this chain: the state of regional economic systems fully depends on how well they meet modern conditions.

Therefore, if we try to summarize, based on the economic theory of factors of production, the scale and dynamics of social reproduction, the sustainability of economic development, the ability to meet the needs of society and each citizen most fully, all these are determined by the presence, condition and level of use of productive forces, which, in fact, confirms the mentioned above thesis. The stability of the regional economic system directly affects its viability. The regional economic system viability refers to its ability to carry out expanded reproduction, which is largely determined by the use of technology. In modern conditions, the viability and sustainability of the regional economic systems development finds its manifestation in the levels of differentiation of regions according to economic and social indicators. From the point of view of socio-economic systems, differentiation is an inherent property of the components of the system, traceable by quantitative characteristics. In regions of diverse economic,

geographical and natural conditions, features and differences are formed in economic and social development. Nevertheless, despite the diversity, it is possible to single out common factors independent of the type of socioeconomic system of optimal allocation of material production. These include, in particular, the use of economic natural resources; rational use of labor resources; optimal size of production and its organization; high efficiency of production links of new enterprises. This circumstance makes it possible to consider regional economic systems as a transformer of resources into products and services suitable for use by the population living both in the territory of this region and beyond.

In order for such a configuration to look predictable and non-random, the regional economic system must not only collapse itself, but also provoke the destruction of its own kind, as well as a higher level of economic systems, such as, for example, the national economic system. This is achieved through the harmonization of objectives and basic functions at which the activity (functioning) of regional economic systems is directed. The functioning of a regional economic system is understood as the formation and use of a set of social-production and organizational-technical factors determining the efficiency of labor, ensuring the rational use of natural resources, means of production, material and labor resources by economic entities on a regional scale.

At the same time, the goal of economic systems is profit in a broad sense: at the macro level, it is improving the population well-being and improving the quality of life, public health and environmental safety. In economic systems, economic activity, along with the maximization of the cost of the system itself, is associated with positive externalities that contribute to the development of larger systems. Of course, it is not necessary to reduce all the activities of the regional economic system to obtaining economic benefits, the form of which is profit. Moreover, this is not required, since in this case profit is considered to be an increment of comfortable life conditions, which for the most part means more than the profit itself as an economic result.

In order for the designated goal of the regional economic system functioning to become realistically achievable, it is necessary to perform certain functions: to harmonize and protect the region interests within the country and abroad; to strengthen the competitive position of the region through scientific preparation of attractiveness justification of the territory in order to attract investors and improve the economic structure; to create conditions conducive to the development of small and medium-sized businesses in the region; to create a system of regional benefits and guarantees for the activities of business, commercial structures and investors; to

build up foreign economic potential and expand trade and economic relations of the region. For these, as well as other functions of the regional economic system, to be carried out, it is necessary for the system itself to be under constant control. Taking into account the fact that a region as a complex socio-economic system is connected with a multitude of relationships both with the external environment (including the state, as a super-system), and with the internal environment, the specificity of which is represented in the context by the relations of the region with territorial units and economic entities, there is a need to form and maintain a stable course of economic growth and social development, achieved by the process of managing social and economic systems.

Modern regionalism, considering the region as an autonomous system, leads to an understanding of the need to change the economic and political methods of managing regional development. It includes from the traditional methods, formed on the support of certain activities within the region, to the strategy of active self-sufficiency, the creation of an innovative technological matrix of the region that lays the foundation for it long-term competitiveness. At the same time, the economic essence of the management mechanism of regional economic systems is determined by the target orientation, the level of economic activity, the specificity of the control object, and the principles of operation. The management of the economic development of the region itself includes targeted actions of individual business entities and / or government bodies that ensure quantitative and qualitative changes in the spatial environment. The management objects are productive forces, technical and economic relations (relations of specialization, cooperation, combination, concentration of production), organizational and economic relations (marketing activities, management system [10], etc.), economic property relations and the economic mechanism.

The regional economic system functioning, as well as its management, is carried out in a certain external environment, which is essentially nothing more than a business environment. The business environment is a complex, controversial and mobile socio-economic space. The business environment, under the influence of its weaknesses and strengths, external and internal factors, is constantly being updated. This update is accompanied by noticeable changes occurring in the economic behavior of economic entities. In order to provide these business entities with growth or increase in size, modernization or adaptation to changes in the external business environment, conservation and restructuring of the business, certain management methods are used. Researchers have different approaches to the classification of such methods. Some assume to take into account both endogenous and exogenous factors and distinguish

subgroups of direct auxiliary methods, mediated additional methods, incentive economic methods, administrative methods, information methods, mixed methods. Others take into account the nature of the complexity of socio-economic systems and identify the method of "golden section", the method of soft resonance management, the method of cognitive analysis and management, the method of reflexive management, the method of system approach in management. The rest researchers take into account the level of coordination of economic development and suggest using a systematic approach based on a factor analysis of a number of indicators of economic activity, as well as a macroeconomic one, with the definition of a possible change in priorities for economic development.

Despite the seemingly significant range of ideas about modern methods of managing regional economic systems, all of them pursue the same common goal, namely, to minimize the total production costs and ensure the necessary level of social production efficiency that meets the needs of the population living in a given territory. In Soviet times the territorial-production complex was considered the main instrument for reducing regional transaction costs, designed to overcome the imbalance of sectoral planning: the development of enterprises was carried out according to directives of dozens of central departments and was weakly linked within the same home territory. Nowadays vertical and horizontal contracts of budget-forming enterprises of the region are becoming such a tool. Therefore, despite the obvious differences between various socio-economic systems (developed market, transition period, socialist economy), in all cases there is a wide range of common regional problems, because the most important part of the study subject of the regional economic theory is the study of the spatial aspect of social production. In addition, here the business environment plays the decisive role. The state of the regional economic system, and with it, the particularities of the productive forces organization, depends entirely on the state in which the business environment remains.

The stability of the economic environment is determined by the ability to predict the qualitative content and quantitative values of its characteristics with sufficiently high probability. It makes possible to make objectively reasonable decisions on the development of elements of the productive forces (using production factors) for such a period of time during which it is possible to regulate these decisions and obtain the expected result. According to this definition, the basis of the stability of the economic environment is the existence of fairly stable and long-term trends of its change in all spheres. These spheres include macro environment, micro environment and, as a result, the internal environment of the business entity. In this case, the meaning of the term "business environment" is reduced to the fact that it is a combination of

those factors that determine the development possibilities of a business entity in a particular situation. In turn, the factors of production (the productive forces elements) affect the business environment. This is associated with possible combinations of the connection of the productive forces individual elements in a particular territory, which ultimately forms indicators of the regional economy effectiveness.

It is known that the sectoral structure of the economy is determined by the specific weight of a particular industry in the regional economy or employment in the relevant industry, maintaining progressive proportions and effective economic relations between sectors and is an indicator of the regional economy effectiveness. While theoretically developed models of the region economic structure are based on the delimitation of parts of social production in accordance with the share of products produced, the capital, the employed population. They reflect the general trends in the economy and structure of the country, allow to analyze the real dynamics of regional economic systems. Consequently, the more efficiently the regional economic system functions, the more efficiently the elements of the productive forces interact with each other. One of the most important tools aimed at ensuring the effective functioning of regional economic systems is economic policy.

The development and implementation of economic policy measures implies the existence of management at the macro level of the economic system. Economic policy regarding regional economic systems can be viewed in two ways. First, as a state regional policy, which is a system of goals and objectives of state bodies for managing the political, economic and social development of regions. Secondly, as a policy of individual regions, consisting of a system of goals and objectives of state authorities at the regional level and local governments for managing political, economic and social development. The object of a regional economic policy is territorial systems characterized by a complex interrelation of the main elements: the natural environment, population, and economy. At the same time, the main goal of the regional economic policy is the preservation of the unity of the country, the observance of the principles of social justice, the achievement of the strategic goals of economic development of both the entire state and individual territories.

CONCLUSİON

At present, regional economic policy is understood rather narrowly, as a smoothing out of differences in the levels of development of individual regions or regions. For example, the concept of the state regional policy states that the main goal of the state regional policy is to

create conditions for a dynamic, balanced socio-economic development of Ukraine and its regions, to raise the population standard of living, to ensure compliance with social standards guaranteed by the state for every citizen, regardless of places of residence. It also regards deepening of market transformation processes based on more efficient use of the effective improvement potential of management decisions, work improvement of public authorities and local governments. Such a goal can be achieved only through the use (exploitation) of the resources available in the relevant territory: natural, human and material. Unfortunately, we have to admit that in the formula of the main goal of a regional policy determined by the state, there was no place for solving the actual problems of reproduction of the main types of resources, which, nevertheless, are finite. Moreover, if one does not engage in ensuring the reproduction of at least some of them, after some time the problem of the development of individual regions as regional economic systems will move to a higher (state) level. In this regard, the meaning and significance of regional policy is much broader. Its actual content is the territorial organization of the resources reproduction. Now this main responsibility of regional and local authorities is lost in the biased list of current tasks, such as revitalization of production (which is a prerogative of corporate governance in a normal market economy), overcoming non-payment crisis (which forms a direct responsibility of monetary authorities) and sustainable supply. This situation is quite explicable by the realities of the crisis, but it does not take away the territories' responsibility for the preservation and enhancement of the resource potential. We should talk about the restructuring of economic relations, the transition from the economy of resource use to the economy of their systemic reproduction. The natural arena of such reproduction is the territory. Therefore, in the regional economic system, the role of the leading link should be moved from production cells (enterprises) to territorial ones (regions and cities) as specialized reproduction systems. For this, the territories must learn not only to "react" to the proposals of enterprises, but also to act as organizers of the economic process, forming integral environmental complexes and certain parts of the territory specially equipped for the enterprises' activities. It is necessary to consider not only investment projects that are proposed to be implemented as part of a special investment regime, but also to attempt to link them to the specific conditions of the territory, which will make it possible to tackle the problem of reproducing available resources in a new way.

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STUDY OF STRESS CORROSİON CRACKİNG OF TIG WELDED ALUMİNUM ALLOY

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ABSTRACT
Aluminum alloys from the category of 5xxx series have some remarkable applications in the field of marine and aerospace industry, broader applications based upon their high strength, lightweight, and resistance towards corrosion. In the Marine industry, stress corrosion cracking is a challenge, where simultaneously all requirements for corrosion are fulfilled. Aluminum alloy Al-5456 plates are welded by using tungsten inert gas welding (TIG), a famous fusion welding technique to investigate stress corrosion cracking phenomena. The welded specimen shows good mechanical properties about 215 MPa Tensile strength and microhardness of 80 HV. A corrosive environment solution of 3.5 % NaCl by weight having PH 8.1 is used. Al-5456 Specimens were tested in an environment with the applied load of 500N for a time interval of 168 hours. Scanning Electron Microscopy (SEM) is used to investigate stress corrosion cracking. Study reveals that about 20% and 25% decrease in tensile strength and elongation is observed in base metal as well as the welded alloy. According to the microstructure analysis based on the SEM findings, dimples are generated, which cause pitting corrosion and crack deformation. Some areas clearly show how elemental depletion or weakness brought on by oxidation, chemical assault, or embrittlement affects grain boundaries. Intergranular corrosion results from the weakening of grain boundaries caused by the chemical attack in a corrosive environment. Precipitations and grain boundaries in the current alloy Al-5456 may promote hydrogen diffusion, leading to the onset of cracks and specimen failure.

Keywords: Aluminum alloy, Al-5456, TIG, Stress Corrosion Cracking, Microstructure, Microhardness, SEM Analysis

INTRODUCTİON

Stress corrosion cracking (SCC) is a failure mechanism that occurs when three conditions are met at the same time. A susceptible material, an active corrosive environment, and sustained tensile stress are the factors to be considered. [1, 2]. Material cannot be classified purely on its chemical composition when it comes to stress corrosion cracking, but also based on its heat treatment conditions as well [3]. To investigate the mechanism of Stress Corrosion Cracking (SCC), it is important to know the different techniques used to explain the crack behavior [4].

Crack initiates from pits or dimples formation on the surface of Aluminum. When the value of K_{ISCC} is proportional to crack initiation. This is the stage in which material interacts with the environment and crack initiates. In the second stage, there is no change in crack growth as time passes. This period is known as the “incubation period” [5]. After that stage, there is a stage at which due to surface discontinuities and pits, stress corrosion cracking starts and results in cracking [6].

Intergranular corrosion (IGC) has been the subject of discussion for nearly 50 years. Intergranular corrosion is a particular kind of corrosion that affects the microstructure and occurs when the electrochemical composition of the alloy is in the "region" [7]. There may be some variation in the grain boundary structure, which might lead to corrosion activity[8]. Intergranular corrosion causes exfoliation corrosion in aluminum alloys. The grain structure has been flattened and stretched in the working direction, and there has been significant rolling deformation of the alloy microstructure. Intergranular corrosion attack then travels parallel to the alloy along grain boundaries from transverse edges and pits [9, 10].

Hydrogen Embrittlement is caused by the presence of atomic hydrogen or when environmental hydrogen interacts with dislocated nucleation and localization [1]. This causes a reduction in ductility, fracture toughness, and strength of the metal. When the crack is generated, environmental hydrogen interacts with the crack tip because of the corrosion reaction on the crack tip. When atomic hydrogen is diffused in the metal surface, which is cathodic and is dominant in cracking [11, 12]. The diffused hydrogen occupies spaces between interstitial lattices of the metal i.e., a few surfaces of atoms beneath the surface of a metal, grain boundaries, strain fields, matrix precipitation, and internal cracks. Hydrogen embrittlement is more sensitive in Matrix precipitation and less sensitive to the size of a precipitate-free zone (PFZ) [13, 14]. The whole mechanism is shown in Figure 3.

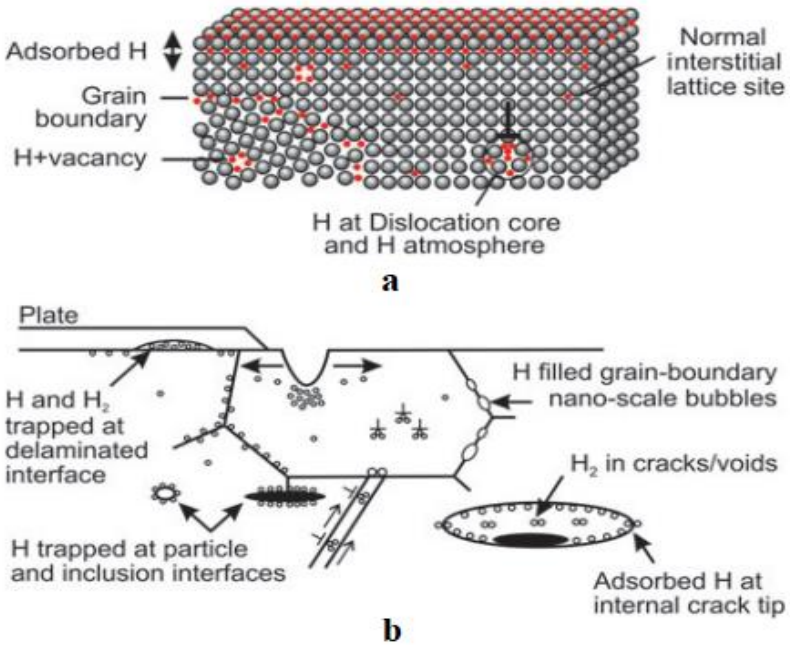


Figure 1.1: Hydrogen traps in metal (Hydrogen Embrittlement)
(a). at the atomic scale (b) at the microscopic scale [14].

Due to better mechanical and environmental assisted cracking properties 7xxx series is widely used in the aerospace industry likewise Al 7050, Al 7075, and Al 7085, etc. Aging of Al alloys generally increases the microstructural properties of grain boundaries of these alloys and also the contribution of Cu is significant in increasing the strength of aluminum alloy due to which stress corrosion cracking resistance of the alloy increases [15]. Stress corrosion cracking resistance of aluminum alloys mostly depends upon the grain particle GP size and distance between inter Grain Particles [16]. 7xxx series Al alloys are Mg-rich and Intergranular fracture is observed because of small grain sizes and large difference in electronegativity between Mg and H, and Al and H atoms. In two-step aging techniques the size and distance between the particles could be increased and the absorption of H atoms by the Mg could be reduced. Because of the increase in size and intergranular distance, corrosion resistance may also increase [17].

System description and measurement procedure

Material Selection

For research purposes, out of 9 series of Aluminum Alloys 5xxx series are selected because of their importance in the marine industry. More precisely Al-5456 is used. Al-5456 is also called an Al-Mg-Cu-Cr alloy having aluminum as the main alloying element. Because of Mg contents which make it hard and generally have good corrosion resistance. 5xxx series is considered a non-heat treatable aluminum alloy. Al-5456 used for research purposes is 300 x 60 x 6.2 mm. Chemical Properties are shown in Table 1.

Table 1: Material Composition of Aluminum alloy Al-5456 (wt. %)

Si	Fe	Mn	Mg	Cu	Zn	Cr	V	Al
0.069	0.177	0.234	4.66	0.098	0.009	0.026	0.018	Balance

ER-5356 is Aluminum Magnesium (Al-Mg) filler wire used for TIG Welding. This filler rod is used for welding Al-5456.

Experimental setup

TIG Welding Setup

To investigate the effects of welding parameters on the depth of infiltration and width of the weld, dots on plates of Al-5456 were initially produced on 6.2 mm thick plates. A round filler wire ER-5356 of 3.2mm diameter is used.

TIG WELDING PROCESS

TIG Welding is performed to join alloy Al-5456 using filler wire. TIG Welded joints of above said samples were obtained with the help of AC polarity (Alternating current) of 130 A, and an argon gas flow rate of 15liter/min. A filler wire of ER 5356 having a wire diameter of 3.2mm, was used in this process. Double-sided welding is done to achieve full-depth penetration. TIG Welding parameters used for Joining are shown in Table 3.

Table 3: Process parameters for TIG Welding

Metal Type	Specimen Thickness	Filler rod used		Welding Parameters		
		Type	Dia	Current (A)	Voltage (V)	Gas Flow Rate
Al-5456	6.2 mm	ER 5356	3.2 mm	130	22	15 L/min

Workpiece preparation

Specimens are prepared according to stress corrosion cracking standards. The complete dimensions are given below in Figure 2.

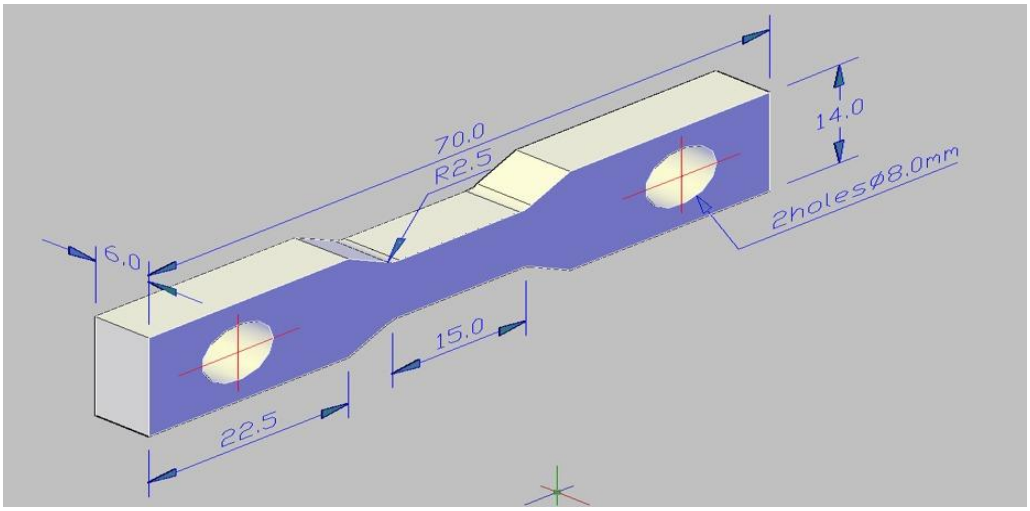


Figure 2: Specimen Standard for Stress Corrosion Cracking

After the preparation of specimens, a solution is prepared to create an environment because the environment is an essential requirement for stress corrosion cracking. For Aluminum Alloys, NaCl solution is used as the environment. The base and the welded sections of the prepared material specimens are inspected under the various conditions listed in Table 4.

Table 4: Test conditions

Parameter	**Base specimen**	**Welded specimen**
Load	500 N	500 N
Environment	3.5% NaCl Solution	3.5% NaCl Solution
Time	168 hours	168 hours

Stress Corrosion Cracking

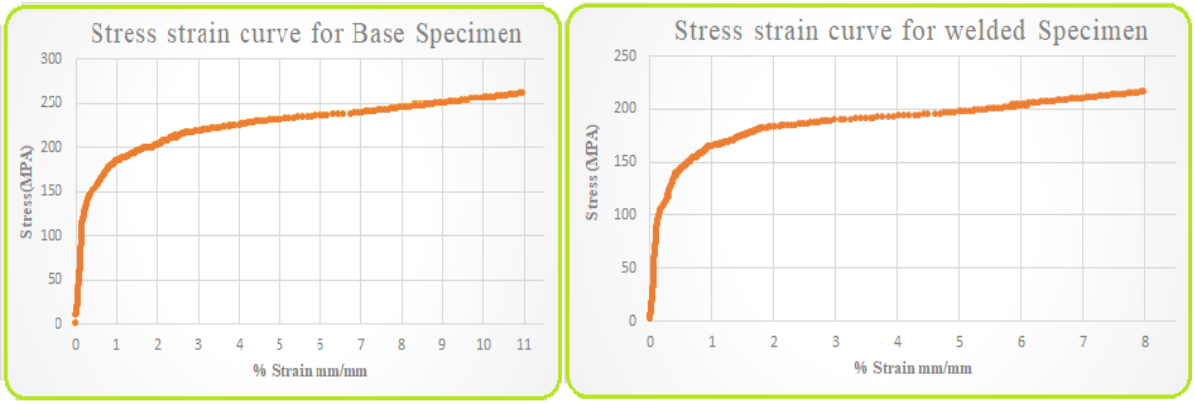
Stress Corrosion Cracking in performed on SCC test Rig Apparatus. Test Rig contains an environment chamber in which the specimen is held and with the help of a load arm the load is applied. First, the base specimen is loaded in 3.5% by weight NaCl solution for 168 hours and the welded specimen is tested in that medium for same conditions

RESULTS AND DİSCUSSİON

Stress-Strain Evaluation

The welding procedure also affects the tensile, hardness, and microstructural properties of Aluminum Alloys because of the heat generation. Figure 3 (a. & b.), shows Stress-Strain Curve for the Base and welded Al-5456. About 215 MPa Tensile strength is obtained for the welded specimen. Stress-Strain Curve shows that there is a significant drop in the value of Tensile

Stress and also in Strain.



a. **b.**

Figure 3: Stress-strain curve (a.) For Base Metal (Al-5456) (b.) For Welded Metal (Al-5456)

PERCENTAGE ELONGATION EVALUATION

Results based on tensile testing of base and welded Al-5456 alloy indicate that, because of TIG welding, there is a drop in tensile strength and percentage elongation. Results show that about almost a 20% decrease in Tensile strength and a 25-30% decrease in elongation is observed respectively. Figure 4. shows a decrease in the elongation of the base and welded alloy.

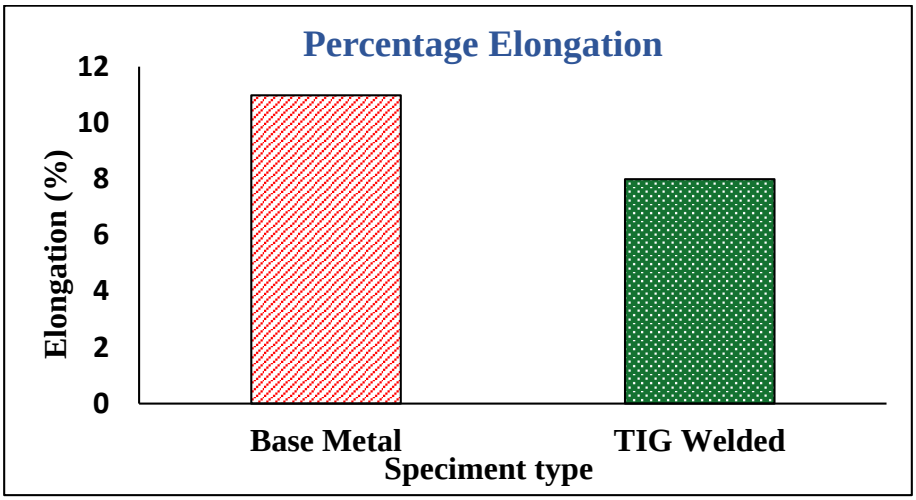


Figure 4: Percentage Elongation comparison (Base VS Welded)

MICRO-HARDNESS EVALUATION

The selection of parameters plays an important role in the development of better-welded joints with excellent mechanical properties. Microhardness test is performed by applying 1000 gf and distance is kept 2mm for each reading for the base alloy and microhardness around 80HV is recorded as shown in Figure 5.

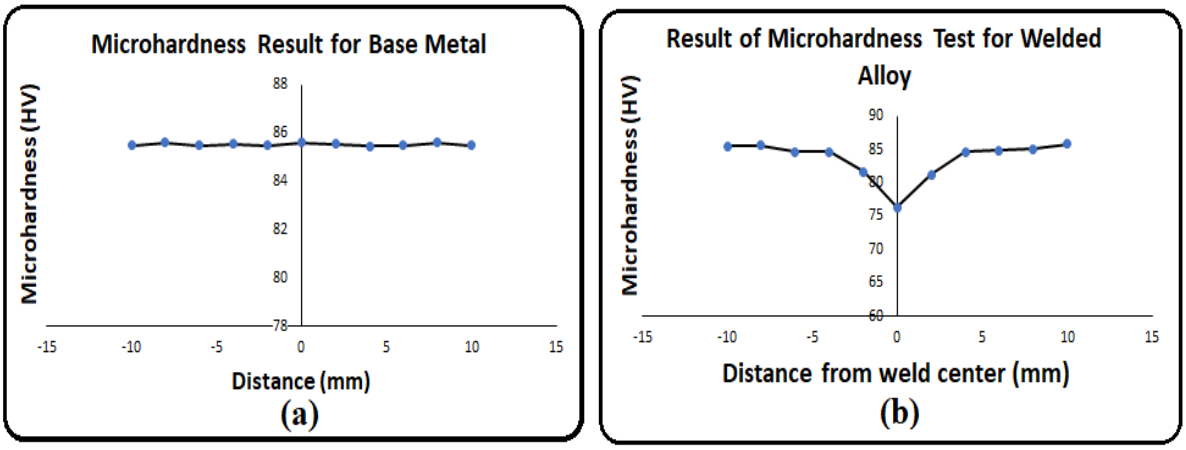


Figure 5: Microhardness of (a). Base metal (Al-5456) (b). Welded Metal

MICROSTRUCTURE EVALUATION OF BASE SPECIMEN

In this study, the microstructure of the base specimen is examined under 500 N forces. The specimen's structure is less affected by low applied force than by high applied force. As shown in Figure 6., the majority of the area is corroded due to the deformation of the protective layer, but there are some small cracks with a few dimples in the area where the force is applied. These dimples refer to pitting and hydrogen is induced in these dimples to form pitting that initiates cracks [2].The changes that take place during welding in the various regions of the weldment control the environmental cracking susceptibility of these weldments, and residual stresses also play a role in the failure, according to the scant literature on the SCC of aluminum alloy weldments [18]. And also stress corrosion cracking SCC is dependent upon stress intensity. At higher intensity, the stress corrosion cracking rate is high up to certain limits [19, 20].The surface of the fracture revealed that anodic grain boundary precipitates continued to exist, causing simple dissolution and crack propagation. In the peak-aged Al-Zn-Mg-Cu-Zr alloy, phenomena were discovered, and intergranular stress corrosion cracking (IGSCC) took place. Hydrogen diffusion/ induced cracking is another main cause of stress corrosion cracking. It is generally held that SCC develops as a result of pitting and prior abnormalities. Lattice flaws and precipitates contain potential hydrogen diffusion sites (vacancies, dislocations, and grain boundaries) [21].

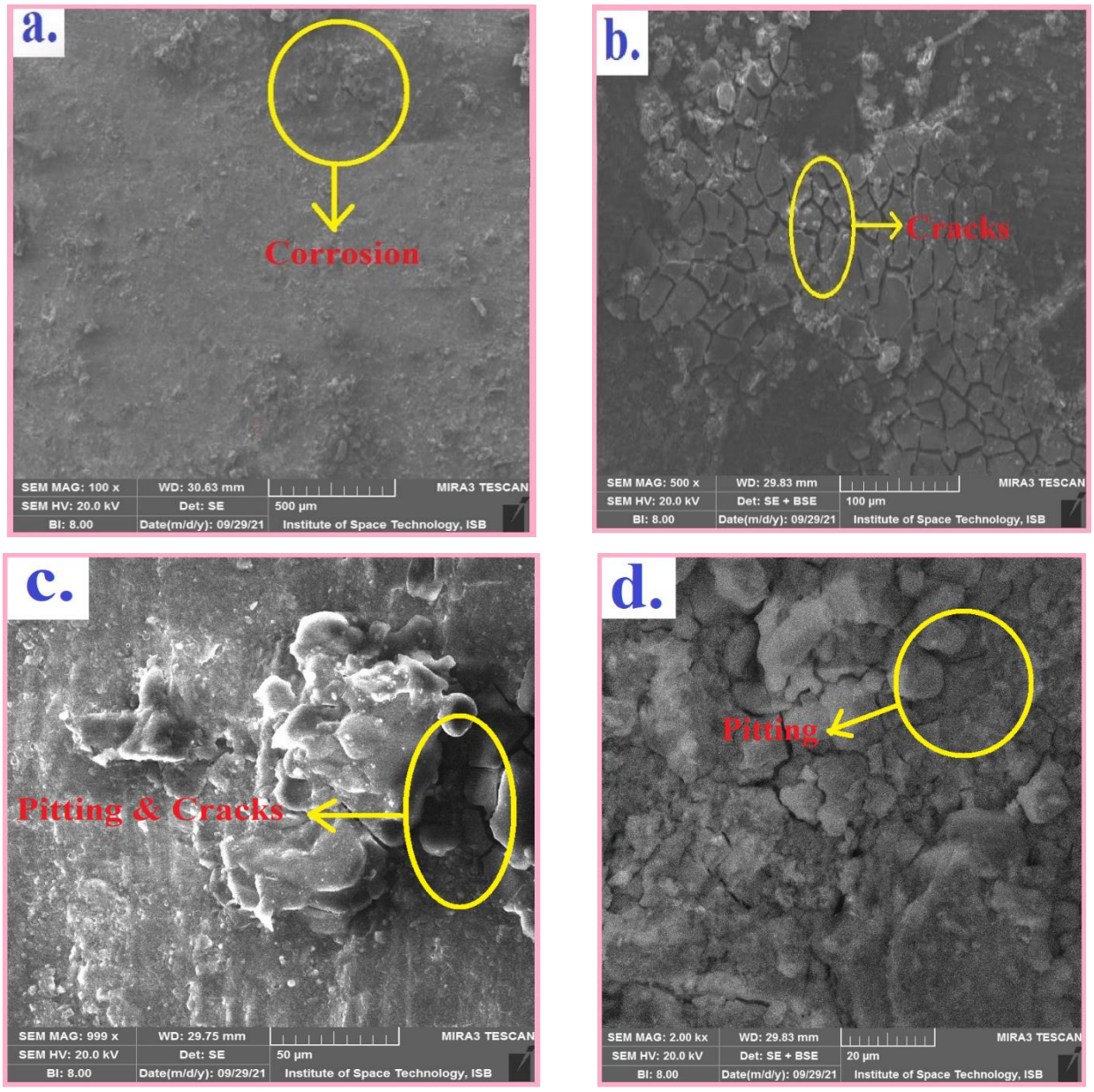


Figure 6: Base Corroded at 500 N & 168 Hours (a). Corrosion of Alloy (b). Cracks (c) Pitting (d). Intergranular cracks

Microstructure evaluation (Welded)

The welded joint's strength is affected due to the intensity of force applied under the application. In the current work, the stability of the welded joint is evaluated under different load conditions. The welded specimens are investigated for microstructure at different test conditions. The welded specimen failed at the welded region when more than 500 N force is applied. Due to the application of 500 N force, the tensile strength of welded material was compromised and deep dimples and cracks, and pits on the surface are observed as shown in Figure 6. The intergranular cracks and surface deformation increase with increased applied force. Small

dimples occur due to low ductility and the presence of impurities on the surface. The pit is generated from the material surface and penetrates inside of the material vertically due to damage to the oxide layer or non-regularities in the material and results in failure of the material. The narrow deep and horizontal pits are identified.

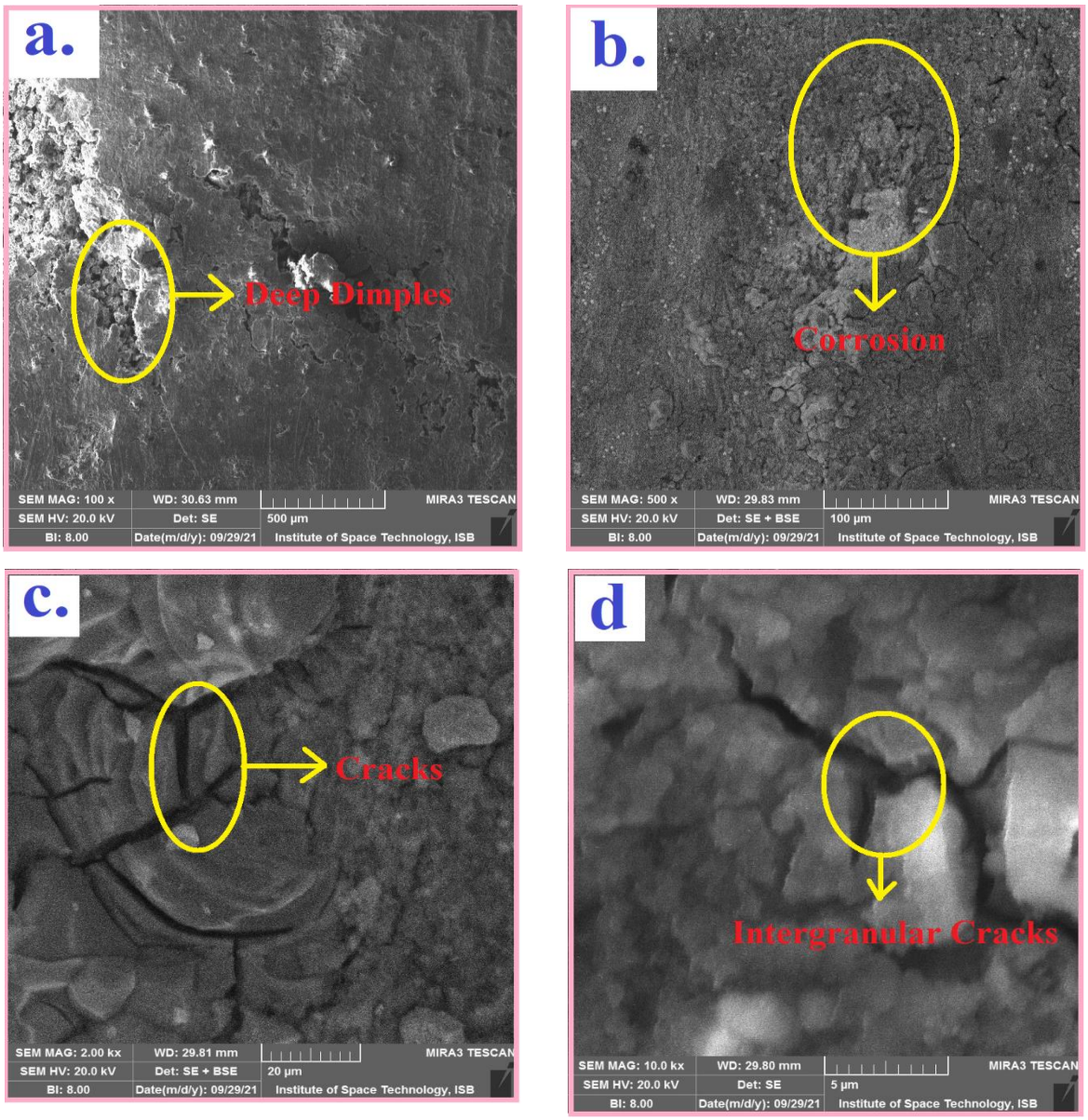


Figure 12: Welded specimen at 500 N force & 168 Hours (a). Deep Dimples (b). Corrosion of Al-5456 (c). Pitting (d). Intergranular Cracks

CONCLUSİON

In this current research work, the Stress Corrosion Cracking behavior of TIG-welded marine grade aluminum alloys (Al-Mg) Al-5456 is investigated. The conclusion drawn from the

present study are as follows:

i. Base and TIG welded specimens have tensile strengths and elongations of around 212 MPa, 7.97%, and 170 MPa, 6.1%, respectively. However, a reduction in stress and strain at welded connections of 20 and 25% is also noted.

ii. The microstructure reveals dimples are formed leading to pitting corrosion and crack deformation. Some regions demonstrate how grain boundaries are impacted by elemental depletion or weakness caused by oxidation, chemical attack, or embrittlement.

iii. The weakening of grain boundaries brought on by chemical attack in a corrosive environment leads to intergranular corrosion. In the present alloy Al-5456, precipitations and grain boundaries may facilitate hydrogen diffusion which initiates crack and Specimen fails.

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ÖZET
Dijital teknolojilerinin gelişimi ile birlikte yapay zekâ teknolojisi adı verilen yeni bir alan ortaya çıkmıştır. Yapay zekâ tipik olarak insan zekâsı gerektiren görevleri gerçekleştiren akıllı makineler oluşturmakla ilgilenen bilgisayar biliminin geniş kapsamlı bir dalıdır. Son yıllarda da yapay zekâ alanında önemli ilerlemeler kaydedilmiştir. Yapay zekâya uyum sağlamak ve işyerlerinde kullanmak, dolayısıyla da bu teknolojilerin getirdiği avantajlardan faydalanmak işletmelere rekabet üstünlüğü sağlamaktadır. Özellikle insan kaynakları yönetimi alanında yapay zekâ kullanımı, insan kaynakları yönetici ve personellerine maliyetleri ve zamanı azaltmak için önemli faydalar sağlamaktadır. Bu çalışmada da yapay zekâ teknolojisinin işgücü üzerindeki etkilerine değinildikten sonra, insan kaynakları yönetimi alanında yapay zekânın kullanımı ele alınmaktadır. Sonuç olarak yapay zekânın kişilerin işe alım ve seçiminde potansiyel olarak olumlu bir etkisi bulunmaktadır.

Anahtar Kelimeler: Yapay Zekâ, İnsan Kaynakları Yönetimi, Teknoloji

THE EFFECT OF ARTIFICIAL INTELLIGENCE ON WORKING LIFE

ABSTRACT
With the development of digital technologies, a new field called artificial intelligence technology has emerged. Artificial intelligence is a broad branch of computer science that deals with building intelligent machines that perform tasks that typically require human intelligence. In recent years, significant progress has been made in the field of artificial intelligence. Adapting to artificial intelligence and using it in the workplaces, and thus benefiting from the advantages of these technologies, provide businesses with a competitive advantage. The use of artificial intelligence, especially in the field of human resources management, provides significant benefits to human resources managers and personnel to reduce costs and time. In this study, after mentioning the effects of artificial intelligence technology on the worker, the use of artificial intelligence in the field of human resources management is discussed. As a result, artificial intelligence has a potentially positive impact on the recruitment and selection of individuals.

Keywords: Artificial Intelligence, Human Resources Management, Technology

1. GİRİŞ

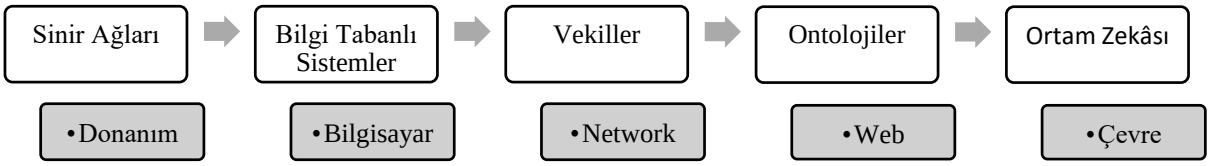
Yapay zekâ endüstri 4.0 devriminin en önemli gelişen alanlarından birisidir. Yapay zekâ öğrenme ve problem çözme gibi insanın gösterdiği zekânın, makineler tarafından gösterilmesidir. Yapay zekâ tutarlı bilgi işleme yaklaşımlarının yanı sıra gerçek zamanlı kararlar almak için önceden programlanmış algoritmalar kullanmaktadır. Yapay zekânın şirketlerin insan kaynakları departmanları üzerinde etkisi bulunmaktadır. Şirketler insan kaynaklarının insan bileşeninin, teknolojinin zekâsı ile birleşmesi sonucu çalışanlar için en uygun koşulları sağlamaktadır. Yapay zekâ insan kaynakları alanında daha iyi ve daha hızlı sonuçlar üretme ve desteklemeye katkıda bulunmaktadır. Yapay zekâ işe alımlardan, eğitime kadar insan kaynakları çalışanlarının yükünü azaltmak için birçok uygulama alanı sunmaktadır. Yapay zekâ tabanlı insan kaynakları çözümleri çalışanların üretkenliğini arttırmakta ve çalışanlarla şirketin gereksinimlerini analiz edebilmektedir. Bu sayede de işletmelerin ihtiyaçlarını, şirket kültürüne uygun yapay zekâ çözümlemeleri ile gerekli dijital haritalar oluşturulmaktadır.

Bu çalışmada, genel olarak yapay zekânın tanımı ve evrimine değinildikten sonra, işgücü üzerindeki etkisine ve insan kaynakları alanındaki kullanımına değinilecektir.

2. YAPAY ZEKÂ KAVRAMI VE YAPAY ZEKÂNIN EVRİMİ

Gelişen ve değişen dijital teknolojilerle birlikte "yapay zekâ teknolojisi" adı verilen yeni bir alan ortaya çıkmıştır. Daha çok mühendislik alanında çalışılan bir alan olmasına rağmen, II. Dünya Savaşı'ndan sonra bu alan daha ilgi çekici bir hale gelmiş ve 1956 yılından itibaren bu alanda yapılan çalışmalar "yapay zekâ" olarak adlandırılmıştır. Yapay zekâ kavramı ilk kez 1956 yılında John McCarthy tarafından kullanılmıştır. II. Dünya Savaşı sırasında bilgisayar bilimci ve İngiliz matematikçi Alan Turing "makineler düşünebilir mi? Sorusu ile "bilgisayar ve zekâ" adlı makalesini yayınlamıştır. Özellikle 1980'lerden sonra ise, yapay zekâ bir endüstri olarak ortaya çıkmıştır. Kısaca insanların zekâsını taklit eden bilgisayarlar olarak adlandırılmaktadır. Nedeni ise insan beynine ait olan algılama, muhakeme etme ve akıl yürütme eylemlerini gerçekleştirerek buna uygun olarak hareket etmesidir (Kılıç Kırılmaz ve Ateş, 2021: 39).

Yapay zekâ tarih boyunca bilgisayar donanımından çevreye yayılan bir evrim geçirmiştir.



Şekil 1. Yapay Zekânın Evrimi
Kaynak: Ünal ve Kılınç, 2020: 62.

Yapay zekâ nın evrimi dört ana dönemde incelenmektedir. Bunlar; 1943-1956 yapay zekâ nın doğuşu, 1956-1974 altın çağ, 1974-1980 yapay zekâ kışı, 1980-1987 patlama dönemi, 1987-1993 ikinci yapay zekâ kışı, 1993-2012 dönemi ve 2012'den günümüze GPU (Grafik İşlemciler) çağı olarak adlandırılmaktadır.

Yapay sinir ağları insan beyninin biyolojik sinir yapısını taklit ederek sinirsel algılayıcılar yardımı ile önceden öğrenilmiş bilgileri kullanarak yeni bilgiler türetebilen ve oluşturabilen bilgisayar programlarıdır (Narendra ve Parthasarathy, 1990). İlk yapay sinir ağı modeli Warren McCulloch ve Walter Pitts tarafından 1943 yılında geliştirilmiştir. Bu sayede ilk yapay sinir ağı hücresi oluşturularak yapay sinir ağlarının temeli atılmıştır (Keskenler, M. F. ve Keskenler, E. F., 2017: 11). 1950 yılında Alan Turing'in düşünen malineler yaratma olasılığı hakkında düşüncelerini paylaştığı makalesi bir dönüm noktası yaratmıştır. Aynı yıl Isaac Asimov'un "Ben Robot" isimli bilim kurgu romanı yayınlanmıştır. 1951 yılına gelindiğinde Manchester Üniversitesi'nin Ferranti Mark 1 makinesini kullanan Christopher Stracheybir dama programı, Dietrich Prinz ise bir satranç programı yazmıştır. 1955 yılında John McCarty 1956'daki Dartmouth Konferansı için 1955 yılında isim babası olduğu "yapay zekâ " kavramını ortaya atmıştır. Bu dönemden sonra yapay zekâ altın çağını yaşamıştır.

Yapay zekâ nın altın çağının yaşandığı dönemde 1958 yılında ilk olarak beynin yapısal ve işlevsel özelliklerinden esinlenerek tasarlanan yapay sinir ağları üzerinde çalışan algoritma ve modeller oluşturulmuştur. Rosenblat'ın Perceptron olarak adlandırılan bir yapay nöron modeli oluşturmuştur (Akbaş, 2018). 1962'de ise ilk endüstriyel robot şirketi Unimation kurulmuştur. 1968 yılında Arthur C. Clarke, "2001: Bir Uzay Destanı" ismini verdiği bilimkurgu romanında "HAL 9000" isimli akıllı makineyi ana düşman karakter olarak sunulmuştur (Kurtyılmaz, 2018: 22).

Yapay zekâ 1974-1980 yılları arası yapay zekâ kışı olarak adlandırılan yeni bir evrim geçirmiştir. 1974 yılında Moravec'in paradoksu, yapay zekâ ve robotik araştırmacıların,

geleneksel varsayımların aksine, yüksek seviyeli akıl yürütmenin çok az hesaplama gerektirdiği, ancak düşük seviyeli sensorimotor becerilerinin muazzam hesaplama kaynaklarına gereksinim duyduğu sonucuna ulaşmalarıyla ortaya atılmıştır. 1978 yılında ise Orjinal "Savaş Yıldızı Galactica" bilim kurgu dizisi savaşçı robotlar Cylonları tanıtmıştır. 1980-1987 dönemi yapay zekâ için bir patlama dönemi olarak adlandırılmaktadır. Bu dönemde önce 1980 yılında Amerikan Yapay Zekâ Derneği (AAAI), yapay zekâ alanında ilk ulusal konferansını Stanford'da düzenlemiştir. 1984 yılında İlk "Terminator" filmi ile yakın bir gelecekte, yönettiği katil robotlarla dünyayı ele geçirmiş Skynet isimli bir yapay zekâ yı tasvir edilmiştir. Aynı zamanda 1987 yılında da televizyon dizisi "Uzay Yolu: Yeni Nesil" ile kendinin farkında olan android Yüzbaşı DATA tanıtılmıştır. Böylece yapay zekâ kullanımı televizyon programları ile toplum ile tanıştırılmaya başlanmıştır. Bu dönemi ikinci yapay zekâ şı takip etmiştir. Bu dönemde yapay zekâ nın iş dünyası üzerindeki etkileyiciliği yükselmeye başlamıştır (Ünal ve Kılınç, 2020: 51). 1993-2012 yılları arasında yapay zekâ nın gelişimi için farklı bir döneme girilmiştir. 1997 yılında IBM firmasının ürettiği yapay zekâ Deep Blue, Garry Kasparov ile girdiği satranç karşılaşmasını kazanmıştır. 2001 yılına gelindiğinde de Steven Spielberg, "AI: Artificial Intelligence" isimli filminde, bir robot çocuğu başrol olarak tanıtmıştır. Böylece yapay zekâ nın topluma dâhil edildiğini ve insanın beceri ve yeteneklerinden daha üstün olduğunu söylemek mümkündür. Asıl önemli gelişme ise, 2011 yılında Apple' nin "SİRİ" uygulamasını yaşama geçirmesi ile yaşanmıştır. Bu sayede yapay zekâ uygulaması akıllı kişisel yardımcılar olarak bireylerin günlük yaşamlarını kolaylaştıran bilgi sistemleri haline gelmiştir (Göksel-Canbek ve Mutlu, 2016: 114).

2012 yılından günümüze ise GPU çağı olarak adlandırılmaktadır. Alex Krizhevsky, Ilya Sutskever ve Geoff Hinton, Large Scale Visual Recognition Challenge (LSVRC) isimli görüntü işleme odaklı yarışmada, en iyi hata oranını yarıya indirerek birinci olmuştur. Bu sayede Krizhevsky, Sutskever ve Hinton modellerini eğitirken kullandıkları en önemli parça grafik işlemciler olmuştur ve yapay zekâ için de GPU çağı başlamıştır. 2013 yılında "Her" isimli filmde Theodore'nin bir yazılımla aşkı ele alınmıştır. 2014 yılında ise yapay zekâ alanında birçok fikirsel tartışmanın ele alındığı Ex Machina filmi çekilmiştir. Filmde, yapay zekânın insan varoluşuna karşı bir tehdit unsuru olup olmadığına yönelik bir sorgulama olması açısından önemlidir. Filmde yapay zekânın kendisini geliştirebildiği ve bu konunun insanlar için tehlikeli olabileceği yansıtılmaktadır. Burada aslında mağdur olan yapay zekâdır ve tehlikede olduğunda kendi yaratıcısını dahi tanımayacağı, kendisini koruma içgüdüsüyle hareket edeceği gösterilmiştir. Film de, en temelde insan ile yapay zekâ arasında bir karşılaştırma yapılmıştır

(Çelebi, 2020: 534). Bu tartışmalarla birlikte yapay zekâ ve yapay zekâ insan birlikteliği ile yapay zekâ ve güvenlik konuları tartışılır olmuştur. 2015 yılında Future of Life Institute, ilk konferansı olan Yapay Zekâ Güvenliği Konferansı'nı Puerto Rico'da düzenlemiştir. 2016 yılında Google DeepMind'ın AlphaGO'su, Lee Sedol ile karşılaştığı go maçını 4-1 kazanmıştır. Aynı yıl Microsoft, Twitter'da hesap açtığı Tay isimli chatbotu, insanlar tarafından yanlış eğitildiğinden dolayı 24 saat içinde kapatmak durumunda kalmıştır (Mathur,, Stavrakas ve Singh, 2016: 257). 2017-2020 yılları arasında ise yapay zekâ nın farklı dönüşümünün olduğu bir dönem yaşanmıştır. 2017 yılında dönüştürücü ağlar adında yeni bir sinir ağı türü tanıtılmıştır. 2018 yılında ise, Google, dönüştürücü ağ tabanlı doğal dil işleme modeli BERT'i yayınlamıştır. Ayrıca AlphaZero: Deepmind AlphaZero, sadece kendi kendine oynayarak kısa sürede dünyanın en iyi satranç oyuncusu haline gelmiştir. 2019 yılında 1.5 milyar parametreli GPT-2, OpenAI tarafından yayınlanmıştır. 2020 yılında ise GPT-3 175 milyar parametre ile 50 yıldır üzerinde çalışılan protein katlanma probleminin çözümünde yapay zekâ kullanılarak büyük bir adım atılmıştır. Son gelişme ise 2021 yılında yazıyla tarif edilen resimleri üretebilme yeteneği olan DALL-E adlı çalışmanın OpenAI tarafından yayınlanması olmuştur (TRAI, 2022). Böylece büyük bir değişim ve dönüşüm yaşayan yapay zekâ birçok alanda rahatlıkla kullanılır hale gelmiştir.

Yapay zekânın kullanımı eğitim bilimleri alanında algılama ve öğrenme çalışmalarında, sağlık alanında hastalıkların teşhis edilmesinde ve daha birçok farklı alanda yaygınlaşmaya başlamıştır. Yapay zekânın farklı tanımlamaları bulunmaktadır. Ancak temel alınan nokta düşünme ve davranış kriterleridir. Yapay zekâ insanca düşünen ve insanca davranan aynı zamanda da rasyonel düşünüp, rasyonel davranabilen teknolojik makinelerdir. Yapay zekâ insan gibi düşünerek insan beyninin yapabildiği problem çözme ve karar alma gibi faaliyetlerini gerçekleştirebilir. İnsana ait olan algılama, muhakeme etme ve düşünme yeteneklerine sahip olarak akıllıca davranışların makinelere aktarılması birçok alanda yapay zekânın kullanımını da beraberinde getirmiştir (Derin ve Öztürk, 2020: 42).

Tablo 1. Yapay Zekânın Tanımları

İnsanca düşünmek	1. Teknolojik makinelerin insanlar gibi düşünebilme kapasitesine sahip olabilmesidir. 2. İnsan beyninin gerçekleştirebildikleri ile ilişkilendirilen; karar alma, problem çözme, öğrenme gibi faaliyetlerin otomasyonudur.
Rasyonel düşünmek	1. Bilgisayar temelli hesaplama modellerinin kullanılmasıyla insana ait zihinsel yeteneklerin makinelere aktarılmasıdır. 2. Algılamayı, muhakemeyi ve düşünceyi mümkün kılan özelliklerin makinelerde çalıştırılmasıdır.
İnsanca davranmak	1. İnsanların zekâ kullanarak gerçekleştirdikleri işleri makineler ile yaratma sanatıdır. 2. Bilgisayarların, insanların daha iyi olduğu şeyleri yapmalarını sağlamaya yönelik yapılan çalışmalardır.
Rasyonel davranmak	1. İnsan aklı ile ilişkili faktörlerin bilişsel yapılarının incelenmesi ve makinelere aktarılmasıdır. 2. Yapay zekâ, insanlar tarafından üretilen akıllı davranışların makineler tarafından gerçekleştirilmesini sağlamaktır.

Kaynak: Derin ve Öztürk, 2020:42.

İnsanoğlunun 1800'lü yıllarda gerçekleşen sanayi devrimi ile kendi kas gücünü aşan makineler yapmayı başaran insanoğlu, kendimizden çok daha hızlı gidebilen taşıtlar, çok daha fazla yük kaldıran vinçler geliştirmiştir. 1950'lerde başlayan bilişim devrimi ile de zihinsel yetenekleri makinelerde gerçekleştirmeye başlamıştır. İnsan gibi sorun çözebilen, nesneleri görebilen, tanıyabilen, konuşabilen, konuşulanı anlayabilen yazılım ve donanımlar üretilmiştir. Bu yeni yöntemler ile bilişim teknolojileri yapay zekâ teknolojilerine evirilmiştir. 2000'li yıllardan sonra ise bilişim devrimi birleşmiş ve 4. Sanayi devrimi adı verilen yeni bir döneme girilmiştir. Bu dönemde üretim ve hizmet sektöründe yapay zekâ yöntemleri kullanılarak birçok yetenek kazanılmıştır. 2018 Forbes Yapay Zekâ araştırması anketinde, imalat sektörlerinden katılımcıların %44'ü yapay zekâyı önümüzdeki 5 yıl içerisinde "üretim işlevi" için çok önemli olarak sınıflandırırken, %49'u "başarı için kritik" olarak tanımlamaktadır. İmalat ve üretim sanayinde yapay zekâ tabanlı uygulama alanları:

- Öngören bakım: Yapay zekâ destekli öngören bakım yazılımları, üretim hatlarındaki makinelerin arızalarını öngörebilir.
- İşbirlikçi ve içeriğe duyarlı robotik: Robotik teknolojileri, emek yoğun alanlarda otomasyon sağlayarak üretimin niteliğini, niceliğini, etkinliğini ve verimliliğini arttırırken maliyetleri azaltmaktadır.
- Kalite kontrolü ve denetim: Yapay zekâ teknikleri ile kalite kontrolü daha verimli, güvenilir ve gelişmiş ürün ve hizmet kalitesi sağlamaktadır.
- Artırılmış gerçeklik ve yapay gerçeklik: Sanal bir evrenin içindeymiş gibi hissedilmesini sağlayan bu teknolojiler, özellikle eğitim alanında, tarihsel olayların sanal ortamlarda canlandırılmasında, sanal ortamlarda gerçekleştirilebilecek geniş bir eğitim

yelpazesinde kullanılabilir. Makine öğrenmesine dayalı yapay zekâ teknolojilerinin ortama dâhil edilmesi ile maliyetler düşürülmekte, zamandan tasarruf sağlanmaktadır.

- Dijital ikiz: Bazı uygulamalarda, fiziksel bir ürün üzerinde gerçek denemelerin yapılması pahalı ve büyük riskler taşıyabilmektedir. Ürünlerin gerçek dünyadaki davranışlarının sanal ortamda benzetimleri üzerinde her türlü sınama ve ölçmelerin yapılabildiği dijital ikizler; çok ekonomik olabilmekte ve risk taşımayan denemeler için büyük kolaylıklar sağlayabilmektedir (TBD [Türkiye Bilişim Derneği], 2020).

Yapay zekânın işgücü üzerinde çeşitli etkileri olduğu gibi insan kaynakları yönetimi alanında da uygulamalar giderek yaygınlaşmaktadır. Bu çerçevede öncelikle işgücü üzerindeki etkisine değinilecektir.

3. YAPAY ZEKÂNIN İŞGÜCÜ ÜZERİNDEKİ ETKİSİ

Yapay zekâ teknolojilerinin gelişmesi sadece işlerin yapılış biçimlerini değiştirmekle kalmamıştır. Hem ulusal hem de uluslararası kuruluşlar yapay zekâya ilişkin politika ve strateji belgeleri hazırlamaya başlamışlardır. Yapay zekâ aynı zamanda küresel rekabet düzeninde işbirliği çalışmalarını da arttırmıştır. Buna bağlı olarak da başta ABD olmak üzere ülkelerin yapay zekâ yatırımlarının arttırılması ve kaynakların açık hale getirilmesi, uygulama alanlarının genişletilmesi ve yapay zekâ teknolojilerini kullanan işgücünün geliştirilmesine öncelik vermektedir. Yapay zekânın insanların işe alınmasından, eğitilmesine kadar insan kaynakları uygulamalarının birçok önemli alanında etkin olmaya başladığı görülmektedir.

Yapay zekâ işgücünü üç temel noktada dönüşüme uğratmıştır.

- Yapay zekâ işgücünün desantralize olmasını sağlamıştır. Bunun anlamı çalışanların iş yoğunluğu fazla olan şehirlere gitmek yerine oldukları yerden çalışabilme imkânlarının bulunmasıdır.
- İkincisi çalışanların işletmelerde bulundukları pozisyonlar değişiklik gösterecektir. Böylece çalışanlar birden çok görev üstlenecektir.
- Son olarak çalışanların becerilerini teknolojinin hızlı değişimine ayak uydurmak için sürekli güncel tutmaları gerekecektir. Bu durumda yaşam boyu öğrenme önem kazanacaktır. Çalışanların yaşam boyu öğrenmelerinin devam etmesi de gereklilik halini alacaktır (Marr, 2021: 146; Erikli ve Salih, 2022: 216).

Yapay zekânın işgücü piyasası üzerindeki etkileri bu yeni teknolojiye maruz kalan işletmeler açısından incelendiğinde; yapay zekâ alanına ilişkin boş pozisyonlarda beceri farklılıklarından dolayı önemli bir artış olduğunu görülmüştür. Buna göre yapay zekâ işe alımları azaltmakta ve

insan becerilerinin yerini almaktadır. Ancak yapay zekâ teknolojilerinin işletmelerde çalışanların görevlerini değiştiriyor gibi görünse de hala emekleme aşamasında olduğu ifade edilmektedir. Daha fazla bilgi sahibi olabilmek için işletmelerin yapay zekâyı kuruluş aşamalarında kullanımı ile birlikte etki düzeylerinin incelenmesi gerekmektedir. Diğer yandan işletmenin yapay zekâ kullanımını benimsemesi gerekmektedir. Sonuç olarak yapay zekâ uygulamalarının yetenekleri, insan becerilerinden ayrılmakta ancak tamamlayıcı olduğu noktada yüksek performans elde edilmektedir (Acemoglu ve ark, 2022: 26). OECD'nin araştırma bulgularına göre 2012-2019 yıllarında bilgisayar kullanımının yaygın olduğu mesleklerde yapay zekâ kullanımı yüksek istihdam ile ilişkilendirilmiştir. Bunun nedeni bu güçlü dijital becerilere sahip çalışanların, şirketlerin bu çalışanların daha büyük yeteneğe sahip olduğunu düşünmelerinden kaynaklıdır (OECD, 2021).

4. YAPAY ZEKÂNIN İNSAN KAYNAKLARI YÖNETİMİ ALANINA ETKİSİ

Talent Tech Labs'ın teknoloji danışmanı Jonathan Kestenbaum (2016) insan kaynakları profesyonellerinin başlangıçta yapay zekânın çalışmaları üzerindeki etkisinin endişe verici olduğunu ifade etmiş, ancak yapay zekâ yazılımını uygulamanın zaman alıcı olan veri analizini ortadan kaldırdığını belirtmiştir. Ayrıca işe alım sürecinin nihai amacı doğru işe doğru adayı yerleştirmektir. İşe alım süreci başarılı olduğunda adayın performansı artacaktır. Normal şartlarda işe alım süreçlerinde insanlar bütün veri ve kaynakları doğru şekilde analiz edemediği ya da çeşitli sebeplerle bilinç dışı önyargılı olunduğu zamanlarda bu doğru seçimlerin yapılması pek mümkün olamamaktadır. Yapay zekâ bunu en objektif şekilde yaparken aday ve iş eşleştirmesini de en doğru şekilde gerçekleştirmektedir (Geetha ve Bhanu Sree Reddy, 2018: 67).

Yapay zekânın işe alımlara etkilerinin incelendiği bir araştırmada, yapay zekânın işe alım süreçlerini hızlandırdığı ve bu sayede de zaman ve maliyet tasarrufu sağladığı, doğru kişinin işe alımı konusunda yüksek bir başarı oranına sahip olduğu, önyargısız, objektif değerlendirme yapabilme özelliklerinin önemli avantajlar olduğu belirtilmiştir. Yapılan bir çalışmada ortalama olarak adayların işe alım süreçlerinini 10 haftadan 2 haftaya indirdiği belirtilmektedir (Kshetri, 2020: 4). Ancak yapay zekânın tamamen işe alımlarda etkili olması yerine, insanlarla işbirliğinde destekleyici bir güç olması performansı en yüksek düzeye çıkarmaktadır. Wilson ve Daugherty (2018: 2) 1500 şirketi kapsayan araştırmasında işletmelerdeki en yüksek performansın insan ve makinelerin birlikte çalıştığı durumlarda ortaya çıktığını belirtmiştir. İnsan ve yapay zekânın işbirliği halinde olduğu durumlarda birbirlerini "tamamlayıcı güç"

olarak aktif gelişme gösterilmektedir. Örneğin insanlara doğal gelen şaka, ima ya da metaforik söylemler makineler için yanıltıcı olabilirken, işe alım sürecinde elde edilecek onlarca veriyi analiz etmek de insanlar için neredeyse doğru kararı verebilmek adına imkansız olmaktadır. Bun nedenle yapay zekâ ve insanın birbirini tamamlayıcı güç olarak kullanılması gerekmektedir.

Yapay zekânın işe alım sürecinde kullanımı şu şekildedir (Geetha ve Bhanu Sree Reddy, 2018: 68-69; Kılıç Kırılmaz ve Ateş, 2021: 41):

Adaya Bilgi Verme: Yapay zekâ aracı, adayın organizasyon tarafından belirlenen ve ilan edilen boş pozisyon hakkında başvuru yapmadan önce ve başvuru yaptıktan sonra bilgi sahibi olmasını sağlar. İşletmeler sohbet kutuları aracılığı ile adaylar ile iletişim kurarak aday hakkında bilgi toplayabilir ve geri bildirim verebilir.

Aday Katılımı: Adaylar normalde iş başvurusu yaptığında başvurunun süreci ve sonucu ile ilgili adaylara bilgi verilmesi oranı düşüktür. Ancak adaya yapay zekâ sayesinde otomatik e-postalar yoluyla bilgiler verilerek adayın süreç hakkında bilgi sahibi olması sağlanabilir.

Yeniden Katılım: Normalde işletmelerde boş pozisyon için uygun aday bulunduktan sonra işe alınmayan diğer adaylar için süreç tamamlanmış olur. Ancak, yapay zekâ kullanılarak işe alım süreçleri yürütülüyorsa bir sonraki iş ilanları veya terfi durumlarında adayların bilgileri gözden geçirilerek uygun adaylara ulaşılması sağlanabilir.

Teklif Sonrası Kabul: Aday işe başvuru sürecini tamamladıktan ve işe başladıktan sonra yaklaşık iki hafta boyunca gri bir alan oluşmaktadır. Bu süreç işe alışma süreci olarak görülmektedir.

Oryantasyon Programı: Oryantasyon programları, organizasyonun politikalarını, prosedürlerini ve kültürlerini tanıttığı için yeni işe alınanlar için oldukça önemlidir. Tüm bu oryantasyon süreci yapay zekâ araçlarıyla yürütülerek yeni işe alınanlara yardımcı olunabilir.

Kariyer Gelişimi: Çalışanlar her zaman motive edilmeye, yeni bilgiler ile donatılmaya, kariyer gelişimleri hakkında bilgi sahibi olmaya ihtiyaç duymaktadırlar. Yapay zekâ programları bu tür programları yürütmekte ve çalışanlara bireysel olarak koçluk yapmakta faydalı olabilir.

Çalışan İlişkileri: Çalışanlar iş yerlerinde çoğunlukla birçok soru sorarlar. Sorular, sigorta kapsamı, tatil izni, değerlendirme kriterleri ve ödeme bilgileri vb. olabilir. Bu sorulara İK sorumlularının cevap vermesi zamanlarının önemli bir kısmını alabilir. Yapay zekâ aracılığı ile bu tip sorulara cevap verilebilir.

Zamanlama: Bir toplantıyı planlamak, toplantı salonu için rezervasyon yaptırmak vb. işler

yöneticiler için zaman kaybına neden olabilir. Ancak yapay zekâ aracılığı ile bu tip rutin işler kolayca yapılabilir.

Yapay zekâ işe alım süreçlerinde çeşitli aşamalarda kullanılabilir.

Aday belirleme için kullanılan yapay zekâ tabanlı araçlar genellikle denetimli öğrenme algoritmaları içermektedir. Algoritmalar eğitim verileri ve doğru cevaplar sağlamaktadır. Görevi gerçek veriler kullanılarak elde edilen bilgileri, eğitim verilerine dayalı olarak öğrenmek ve uygulamaktır. Örneğin yapay zekâ tabanlı aday belirleme araçları yeni oluşturulan bir iş ilanı için, şirketin veri tabanındaki binlerce özgeçmişi incelemektedir. Aynı zamanda LinkedIn, Facebook gibi sosyal platformları ziyaret ederek önceden belirlenen anahtar kelimelerle eşleşen profilleri ortaya çıkarır ve işletmenin yaptığı iş tanımına en uygun kişileri işe alım görevlileri için en uygun hale getirir.

Aday seçimi için kullanılan yapay zekâ tabanlı araçlar da adaylarla video görüşmeleri yapmak, kaydetmek ve analiz etmek amacı ile kullanılmaktadır. Araç video görüşmelerini sorulan sorulara ve zaman aralığına göre küçük parçalara ayırmaktadır. Adayların yüz ifadelerinden, seslerine ve ses tonlarına kadar diğer adaylarla karşılaştırmaktadır. Böylece mülakatlarda da en uygun adayı seçme imkânı tanımaktadır (Kulkarni ve Che, 2019: 11-12).

İşe alımlarda yapay zekâ kullanan şirketler, kullandıkları yapay zekâ platformları ve işe alımda uygulama kullanımına ilişkin örnekler Tablo 2'de gösterilmektedir.

Tablo 2. Yapay Zekâ Araçlarını Kullanan İşletme Örnekleri

İşletmeler	Yapay Zekâ İşe Alım Platformu	İşe Alımda Uygulama Kullanımı
L'Oréal	Mya FirstJob	Mya, en iyi adayları yetiştirip işe alabilmek için özgeçmişten işe almaya kadar süreci otomatikleştirir.
Sony Music, Velcro, Maersk, Getty images, Drone Deploy, Lyft	Fetcher	Veri tabanını izlemek için dâhili bir ekip oluşturur ve kısa sürede nitelikli adaylara ulaşır. Otomatik e-posta merkezi, sağlam analitik kontrol paneli, ekip takibi ve bireysel performans metriği kullanır.
McDonald's, Exxon, Manpower, MolGroup, MARS	XOR	XOR bağlantısı, XOR başvurusu, XOR videosu ve kariyer fuarlarında canlı sohbetler sağlayan bir sohbet robotu ve işe alım asistanıdır. What's App, Slack, Messenger, Viber ve Telegram'da da iletişim kurma imkânı sağlamaktadır
Nike, Intel, continental, Ceridian, Novo Nordisk, Wayfair	Hiretual	İş akışına uygun gerçek zamanlı veriler ve yüksek çeşitlilikte işe alma sağlamaktadır.
Fortune500, Tata Communications, Nutanix, Dolby, Booking.com, Dexcom, Micron, Netapp, Bayer	Eightfold	Yapay zekâ destekli yetenek yönetimi, işe alma ve geliştirme platformu.
Colgate Palmolive, Kraft Heinz, Boston Consulting Group, McDonald's, PWC	Pymetrics	Pymetrics ortamındaki yetenek algoritmalarıyla tüm insan önyargı etkilerini silmek için davranış bilimi ve değerlendirmeyi kullanır.
McDonald's, Atos, Zillow Group, nestle, Atlas Sian, Micron	Textio	Cinsiyet, yaş ve yetenek önyargıları içermeyen yapay zekâ platformu.
Salesforce, greenhouse, zappier, pinpoint, formstack, Hubspot	My interview	İK Sistemine entegre edilebilir veya bağımsız bir ürün olarak kullanılabilir.
Swiss monkey, Inyore, Brady, Armoire, NexGent, Guide, The Klienbatch group	Humanly	Orta ölçekli şirketlerin aday taraması, takip ve referans kontrolleri için tasarlanmış yapay zekâ destekli sohbet robotu.
Wendy's, go wireless, Disney, McDonalds, Unilever	Paradox	İş başvurularını daha kolay, hızlı ve mobil hale getiren, farklı dillerde mülakatlar yapma imkânı veren program.
Amazon,Walmart,McDonald's, AI, iCollege, VXI, Adecco	Talkpush	Hem ses hem de sohbet için CRM destekli Chatbot kullanır.
Buster's, Fried Man, Real estate	AllyO	Yetenek kazanımı için Röportajları planlama ve yapma imkânı verir.
Bank of America, Trinity Health, Lockheed Martin, Amazon, Randstad	Loxo	CRM Platformundaki yapay zekâ işe alım otomasyon yazılımı, kişisel bilgileriyle 530 milyon kişiden oluşan bir veri tabanıyla zamanı ve maliyeti düşürüyor
Rover, VMware, Salesforce, X23, and me	Seekout	LinkedIn'den daha fazla arama yeteneği vardır ve yetenek pazarı akıllı çözümü olarak hareket eder

Kaynak: Oswal, Khaleeli ve Alarmoti akt. Kılıç Kırılmaz ve Ateş, 2021: 43-45.

5. SONUÇ

İnsan kaynakları yönetimi bir şirketin en önemli parçalarından biridir. Çalışanların verimli ve üretken olabilmeleri için doğru işe doğru insanların yerleştirilmesi önem taşımaktadır. Yapay zekâ teknolojileri insan kaynakları yönetimi alanında yaygın bir kullanım alanı bulunmaktadır. İnsan kaynakları yönetiminde kullanılan yazılım araçları teknolojik gelişmelerle birlikte hızla

değişmiş ve dönüşmüştür. Bilgi teknolojilerindeki hızlı değişimler ve gelişimler insan kaynakları alanında yetenek yönetimi için en uygun maliyetle, en hızlı ve objektif şekilde işe başvuran adayların belirlenmesi ve mülakatların yapılmasını gerekli kılmaktadır. Bu noktada da işe alım süreçlerinde yapay zekâ kullanımı birçok şirket tarafından gerçekleştirilmektedir. Farklı şirketler farklı yazılımlarla işe alım süreçlerinde yapay zekâ araçlarından faydalanmaktadır. Kimi yapay zekâ araçları cinsiyet ve yaş gibi alanlarda önyargıları içermemekte, kimisi ise sosyal platformlardan en uygun adayı seçebilmektedir. Bazı yapay zekâ araçları ise aday taraması takibinden mülakat sürecine ve referans kontrolüne kadar işlemleri hızlı bir şekilde gerçekleştirebilmektedir. Ancak yapılan çalışmalar sadece yapay zekâ araçlarının değil, yapay zekâ aracı ve insan kaynakları personelinin işbirliği içerisinde çalıştığı durumlarda verimliliğin en üst düzeyde olduğunu göstermiştir.

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PRODUCING ANTIOXIDANT AND ODORLESS DUCK SALTED EGG EXTENTION WITH (*Plectranthus amboinicus* SPRENG) ENRICHMENT

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ABSTRACT
Duck eggs are one of the animal functional food commodities rich in protein. The odor-smell of duck eggs is often the cause of the lack of public interest in consuming duck eggs. However, known to have a higher nutritional content than chicken eggs. One alternative is to use cumin (Plectranthus amboinicus) leaves. Cumin leaves can potentially eliminate the odor-smell of duck eggs due to their distinctive bioflavonoids, phenols, and volatile content. This substance can reduce fishiness in duck eggs, as a result of research which is then disseminated to the public to obtain the maximum benefit. The method used a sign test that sisted a pretest and posttest about their knowledge and skill of making salted eggs free of odor-smell by utilizing antioxidants from cumin leaves. These findings are they have not known about this innovation. It would be socialized to provide new business opportunities and product variants from existing ones. The service results showed a significant increase in knowledge before being given an extension. In addition, respondents like and be inspired by innovation.

Keywords: salted egg; herbal: antioxidan: odorless

(*Plectranthus amboinicus* SPRENG) ZENGİNLEŞTİRİLMESİ İLE ANTİOKSİDAN VE KOKUSUZ ÖRDEK TUZLU YUMURTA UZATMA ÜRETİM

ÖZET
Ördek yumurtası, protein açısından zengin, hayvansal fonksiyonel gıda ürünlerinden biridir. Ördek yumurtalarının kokusu, genellikle halkın ördek yumurtası tüketimine ilgi duymamasının nedenidir. Bununla birlikte, tavuk yumurtasından daha yüksek bir besin içeriğine sahip olduğu bilinmektedir. Bir alternatif kimyon (Plectranthus amboinicus) yaprakları kullanmaktır. Kimyon yaprakları, ayırt edici biyoflavonoidleri, fenolleri ve uçucu içeriği nedeniyle ördek yumurtalarının koku kokusunu potansiyel olarak ortadan kaldırabilir. Bu madde, maksimum faydayı elde etmek için daha sonra halka dağıtılan araştırmalar sonucunda ördek yumurtalarında balıklığı azaltabilir. Yöntem, kimyon yapraklarından elde edilen antioksidanları kullanarak tuzlu yumurtaları kokusuz-kokusuz hale getirme bilgi ve becerisine ilişkin ön test ve son testten oluşan bir işaret testi kullanmıştır. Bu bulgular, bu yenilik hakkında bilgi sahibi olmadıklarıdır. Mevcut olanlardan yeni iş fırsatları ve ürün çeşitleri sağlamak için sosyalleştirilecektir. Hizmet sonuçları, bir uzantı verilmeden önce bilgide önemli bir artış gösterdi. Buna ek olarak, yanıt verenler inovasyondan hoşlanır ve ilham alır.

Anahtar Kelimeler: Tuzlanmış yumurta, ördek; otlar, antioksidan, kokusuz

1. INTRODUCTİON

Many residents of the city of Tasikmalaya like to eat salted eggs, but do not like the fishy smell contained in salted eggs. Salted eggs circulating in the community are made from duck eggs. Housewives do this by taking ready-to-eat ones to meet their need for salted eggs. Very rarely they try to make salted eggs themselves. Usually salted eggs made by salted egg entrepreneurs are only given salt so that the salted eggs can only last for 3 days and the fishy flavor bites the nose. Meanwhile, students are a resource that can be empowered to specialize in agricultural technology. This could be for work or business in addition to their own needs.

The problem is that both students and the public still consume or produce ordinary salted eggs. In Taşmalaya, no breakthrough was made in salted egg products, especially fish and antioxidant-free salted egg products. Socialized research through community service can improve the well-being and health of the community and students if implemented and as a result of research. This is in line with core research and development based on product innovation with local wisdom that can be translated into entrepreneurial activities.

Like antioxidant salted eggs, cumin leaves can remove the fishy odor of salted eggs, and salted egg products are more stable than salt-only ones (Sundari et al., 2020). Apart from that, this cumin leaf turns out to be very good as a fish odor remover from animal food in general (Sundari at al., 2020, 2021), so it can contribute to the community economy and add value (Saepuloh et al., 2021; Sundari). at al., , 2017) and after analysis, this salted egg farming business is very profitable (Saepuloh at al., 2021; Sundari at al., 2017). This cumin leaf can also give processed foods a tastier taste.

Protein and cholesterol levels of poultry meat and eggs are usually indicated by the level of fishy odour. According to Matitaputty and Suryana (2010), the damage resulted from an oxidation reaction using air. The more fishy an ingredient is, the higher its nutrient content, especially protein. The fishy smell of duck meat and eggs comes from their fat and protein content (Prawoto, 2001), as a result, those who love it are not as great as consumers of chicken and eggs. The development of ducks potential, supported by both national and international poultry companies, is not as intense as the potential of chickens. A lot of work has been done to get rid of the fishy smell in fish or meat, such as vinegar, coriander, ginger, turmeric, lime, and tamarind, but the added ingredients are still left.

Cumin leaves are often referred to as the Mother of the Plant, as they are known to have great benefits for human health due to their antioxidant content. Total content of polyphenols, bacteria of a herb plant (Hii at al., 2009, Hasanah, 2016), viruses and fungi, anti-inflammatories

(Albab, 2014 and Muniroh, et al., 2013), and controlling the aroma or odor of a material. Forming bioflavonoids, organic acids, esters, capeic acids and phenolic acids, these polyphenols act as antioxidants that bind to free radicals. it can also damage the activity of proteolytic enzymes and inhibit the growth of spoilage bacteria, which makes food more durable (Silalahi, 2018). Polyphenols found in cumin leaves are essential oils consisting of bioflavonoids, phenols, phytosterols B, isoprofil-o-cresol, carvacrol, and thymol (Norazsida, et al. 2017). Specific substances found in cumin leaves are thought to be used as a flavor enhancer in a food ingredient to remove the fishy odor in eggs and duck meat without reducing the taste of raw materials. Experience shows that anything can suppress the fishy smell in duck eggs.

However, the addition of herbs containing high levels of antioxidants and antimicrobials such as cumin leaves (Plectranthus amboinicus) (Stratakos, et. al 2018; Kim & Rhee, 2016) as a component of research on fishy odor removal technology has not been widely used. Until recently, studies have been done on cumin leaves to remove odors. Fish showing caraway leaves even at low levels can eliminate fishy odors in fish and egg products (Sundari et al., 2020, 2021).

The purpose of this research is to disseminate the application of appropriate technology to the students and the public regarding salted egg products with cumin leaves and fishy antioxidant-free products. This can add to the repertoire of innovative knowledge and technology from the simple and inexpensive stuff, but is well worth it economically, social and environmental objectives to achieve sustainable development goals through innovative food diversification.

2. MATERİAL AND METHOD

The research drave to twenty respondents at the first but at the second organoleptic test, the respondents was sixteen left due to some reasons.

a. Pretest about knowledge about eggs, salted eggs and cumin leaves

b. Promote the cultivation of cumin leaves,

c. Prepare materials and equipment for processing salted eggs and egg shell fertilizer. The equipment needed is a scale, bucket, bowl, steam pot, stove, mortar or blender, spoon, strainer, stone, large jar, packaging, plastic bag, pot.

d. The materials used are cumin leaf seeds, planting media, eggs, cumin leaves, MBio, salt and lime or citric acid and egg shells.

e. Seedlings of cumin leaves are planted in the yard of each house or in pots.

f. Utilizing cumin leaves as an additive by grinding and filtering then taking the water according to the recommended dose in the results of the study, which is 50 grams for 50 duck eggs. MBio probiotics, salt, dissolved all the ingredients of the salted egg. Then itk eggs are put into the mixture of ingredients.

g. Soaking with these materials is done for 2-4 weeks.

h. Then removed from the marinade, washed and soaked again with citric acid or lime to remove the dirty color of raw salted eggs.

i. Steamed for 2 hours.

j. Salted eggs are ready to be packaged and served as an ingredient for fulfilling family or entrepreneurial nutrition.

k. Post test for knowledge, skill and organoleptic.

l. Then make the pre-test and post-test graphic.

3. RESULT AND DİSCUSSİON

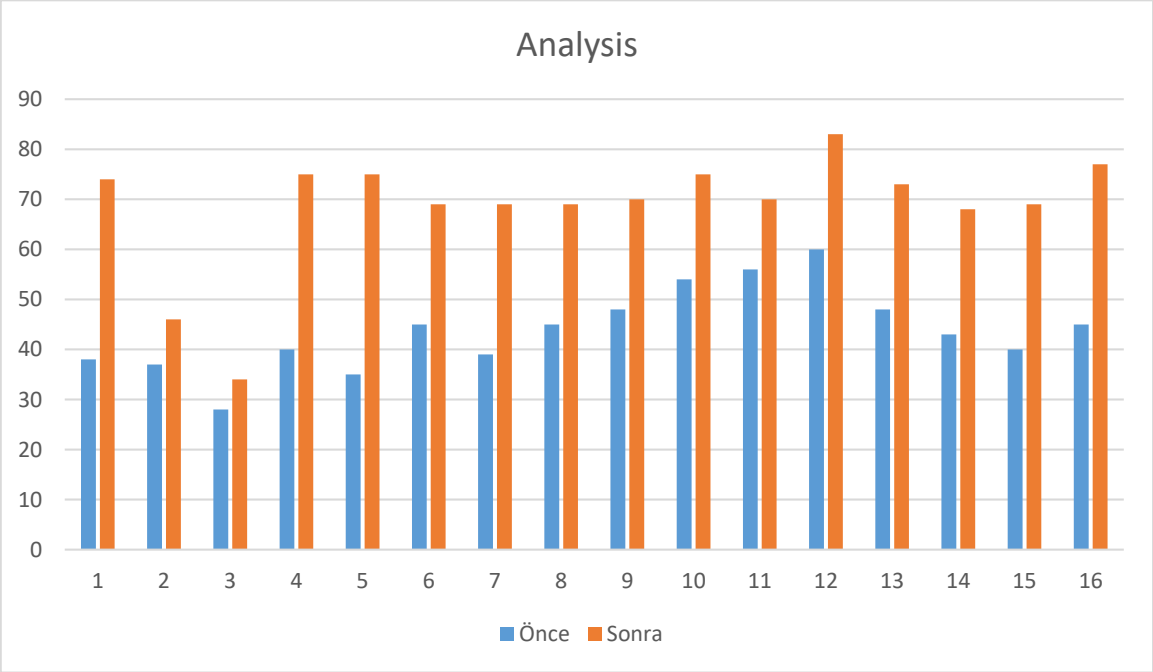
P4S Affiliate Partners Muara Hurip experienced a change of mind. Partners who knew only ordinary salted eggs on the market before. Be more enthusiastic about learning and making this new method of making salted eggs. There are also those who ask how to plant cumin leaves. The leaves of cumin, which are rich in benefits, are easy to reproduce, even the easiest reproduction is to use cuttings with cluster stems vegetatively. Roots will emerge from every node that touches the ground.

In times like this pandemic, food processing and food diversification (Azis at al., 2019) especially local food sources are crucial. In addition, it cultivates local superior goods so that they are more attractive to the community. This will strengthen minimal food security in the household by using raw materials available in Indonesia, especially cumin plants and duck eggs (Syahyuti at al., 2016). .

With this new innovation, making salted eggs free of fishy odor and healthy will add use value as well as economic value (Sundari et al., 2017) and is preferred by consumers as a higher preference (Sundari, Umbara, et al., 2019; Sundariet al., 2018; Sundari & Umbara, 2019) and partners provide positive attitudes and behaviors (Sundari at al., 2020; Sundari at al., 2019) towards food diversification made from cumin leaves and duck eggs. If a value-added analysis is made, it will be more clearly profitable (Syaputra at al., 2014). Using technology according to the tastes, situations and conditions of the society through processing and other resources will be very profitable as a business opportunity (Kotler, 2013, 2011, 2012a, 2012b; Kotler and

Keller, 2016).

In the process of making fish-free salted eggs, the function of soaking them in brine and cumin leaf water is to remove bacteria commonly found in eggs. Partners do not think that this salted egg is different from the usual, it is very tasty and does not smell fishy. The partners said that this new invention salted egg will be used as a household chore to generate additional income. Pretest and posttest evaluation toward respondents knowledge, skill and organoleptic results of P4S Muara Hurip group partners can be seen in the table below.



4. CONCLUSİON

This extension is very beneficial for the community and community empowerment. By making it a profitable and healthy business opportunity, it can contribute to well-being both internally and externally for the needs of the surrounding community. İt should continues to be developed as a manifestation of application research results.

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BIODIVERSITY OF TICKS ON GREEN AREAS AND PARKS OF BELGRADE DURING 2020

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ABSTRACT
Ticks are obligate haematophagous ectoparasites which have multiple adverse effects on the host organism. A particular problem is that they be reservoirs, vectors and/or transient hosts for the tick-borne pathogens. For these reasons, we continued the research of tick fauna in the green areas and parks area of Belgrade. Ticks were collected by flagging vegetation at numerous localities in the Belgrade in the period of March to November 2020. The tick species and sex/gender were identified by morphometric characteristics. During examination a total of 967 ticks were collected. From number of ticks great influence had differences in the type of vegetation at the investigated localities. Logically, the abundance of ticks was significantly greater at the wooded localities than at the parkland localities or parks. In the parklands and especially at city parks, the anthropogenic factor affects the low abundance of ticks, both directly (by grass cutting) and indirectly (trough alteration of microclimatic conditions). Relative abundance analysis revealed that the species *Ixodes ricinus* was absolutely dominant found at 53.01%, followed by *Rhipicephalus sanguineus* (36.72%), *Dermacentor marginatus* (9.54%) and *Dermacentor reticulatus* (2,3'2%). Overall, the female-male ratio during the course of our study was 62.02%: 37.98% in favor of females, Population dynamics of the established species of ticks was next: in March were found: *I.ricinus, R.sanguineus* and *D. marginatus*. In April, we observed the occurrence of the *D.recticulatus*, and species that reached maximum numbers were *D.marginatus. I.ricinus* reached maximum abundance in May. In June, the population peak is observed for *R.sanguineus* which is the most common types in July and August. In September, we saw an increase in the population of *I. ricinus* and *D.marginatus*, while in October we observed the emergence of the *R.sanguineus.*

Key words ticks, Belgrade, green area

INTRODUCTİON

Ticks are hematphag arthropods of the phylum *Arthropoda*, subclass Acari, suborder *Ixodia* and superfamily *Ixodidea* [Kapustin,1955,Jongejan and Uilenberg,2004, Pavlović et.al.2013]. Ticks are found all over the world and we find them on land and on islands, and there are even in Antarctica, where we find an edmic species on seabirds *Northern memoirs*. Like all arthropods began its rise in Devon, and its continued success through the next 136 million years. They fossils were found in coprolites in North America and fossilized in amber originating from the Dominican Republic and the Baltic. Based on them, we can see that the Paleozoic never experienced a greater morphological transformation, especially argasidne kind, and very reminiscent of today known species [Pomerancev,1950, Belozerow,1982, Milutinović et.al.,1996b].

Ticks are obligate haematophagous ectoparasites which have multiple adverse effects on the host organism. A particular problem is that they be reservoirs, vectors and/or transient hosts for the tick-borne pathogens like *Borelia burgdoferi,* Kyasanur forest disease, CCHF, *Ehrlichia sp., Anaplasma sp., Babesia sp., Thaileria spp,* Tick-born encephalitis, Q fever, arboviroses and etc. [Danie,1978, Dimitrić,1999, Milutinović et al.,1997,1998,2012, Pavlović et al.,2002a,b,2006,Terzin et al.,2006].

In Belgrade area the most frequent Ixod ticks are *Ixodes ricinus, Rhipicephalus sanguineus, Dermacentor marginatus* and others [Petrovi et al.,1996, Pavlović et al.,1999,2002a,2012,2013]. In the Belgrade area, tick control has been carried out every year since the mid-1990s, and in our work we present the results from 2020.

MATERİAL AND METHODS

Ticks were collected by flagging vegetation at numerous localities in the Belgrade in the period of March to November 2020. Ticks were colected at several different ecological types' wooded localities, parklands and parks of Belgrade (Ada Ciganlija, Košutnjak, Topčider, Miljakovac Forest, Zvezdara forest and central city parks – Kalemegdan, Manjež, Tašmajdan, and green areas (Ušće and Hajd park) All specimens were placed into glass specimen bottles which had a piece of hard paper inserted bearing the name of locality, name of host and date and hour of collection.

During examination a total of 967 ticks were collected. The tick species and sex/gender were identified by morphometric characteristics [Kapustim,1955, Kolonin,2009].

RESULTS AND DİSCUSSİON

During examination *Ixodes ricinus* was absolutely dominant found at 53.01%, followed by *Rhipicephalus sanguineus* (36.72%), *Dermacentor marginatus* (9.54%) and *Dermacentor reticulatus* (2,02%) (Figure1)

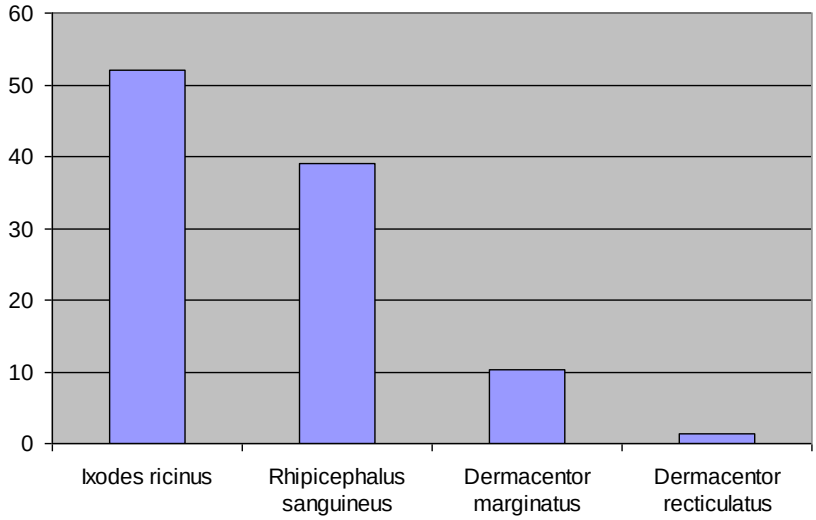


Figure 1. Prevalence of tick species in green areas of Belgrade

The sex ratio during our study was 62.02%: 37.98% in favor of females. Of the all species we established a larger number of females. For the two most commonly found species *Rhipicephalus sanguineus* and *Ixodes ricinus*, this ratio was 67.50%: 32.50% and 61.42% : 38.58%, respectively in favor of females.

The population dynamics of ticks was monitored from March to November 2020. Maximal abundance of ticks was recorded at the Ada Ciganlija locality in mid April, but at other localities during May (Košutnjak and Topčider in the first decade, Miljakovac and Zvezdara forest in the second, and city parks and green areas in the third).Unfavorable environmental conditions (temperature, relative air humidity, and precipitation) caused a decrease in abundance of the tick population in autumn.

The influence of microclimate is extremely important for the seasonal distribution of ticks. *Ixodes ricinus*, *Rhipicephalus sanguineus* and *Dermacentor marginatus* are subject to seasonal variation, which has two peaks - the spring and autumnal [Milutinović et al.,1996,1997,1998, Pavlović et al.1999]. It is spring dots per significant number of individuals, but it is depending on the winter hibernation and lows that have ticks in this period [Daniel,1978, Belozerow,1982, Dimitrić,1999] (Figure 2)

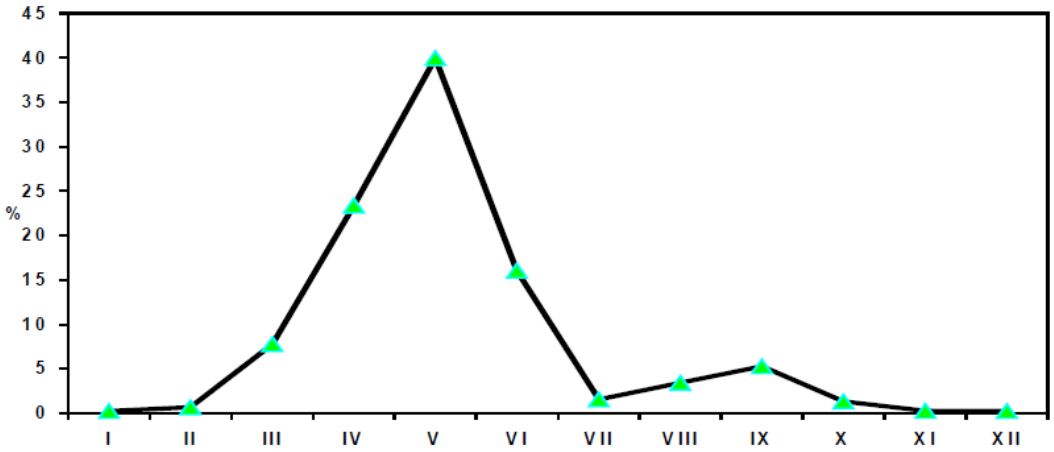


Figure 2. Season distribution of ticks in Belgrade area

From number of ticks great influence had differences in the type of vegetation at the investigated localities. While Zvezadara and Miljakovac Miljakovac and Zvezdara Forest represent typical wooded localities, Ada Ciganlija, Topčider and Košutnjak are a mixture of parklands and small wooded complexes and city parks are represented primary grassy area.

Logically, the abundance of ticks was significantly greater at the wooded localities than at the parkland localities or parks. In the parklands of Ada Ciganlija, Topčider and Košutnjak, and especially at city parks, the anthropogenic factor affects the abundance of ticks, both directly (by grass cutting) and indirectly (trough alteration of microclimatic conditions). Similar findings were reported by Milutinović et al. and Pavlović et al. [Milutinović et al.,1996a,1997, Pavlović et al.,1999, 2012,2016,2017]. The greatest number of ticks were recorded at the Topčider (338), followed by Miljakovac Forest (271), Košutnjak (199), and Ada Ciganlija (159). The number of ticks per 100 m^2 slightly varies between localities. In Figure 3 we presented distribution of ticks at various green areas in Belgrade.

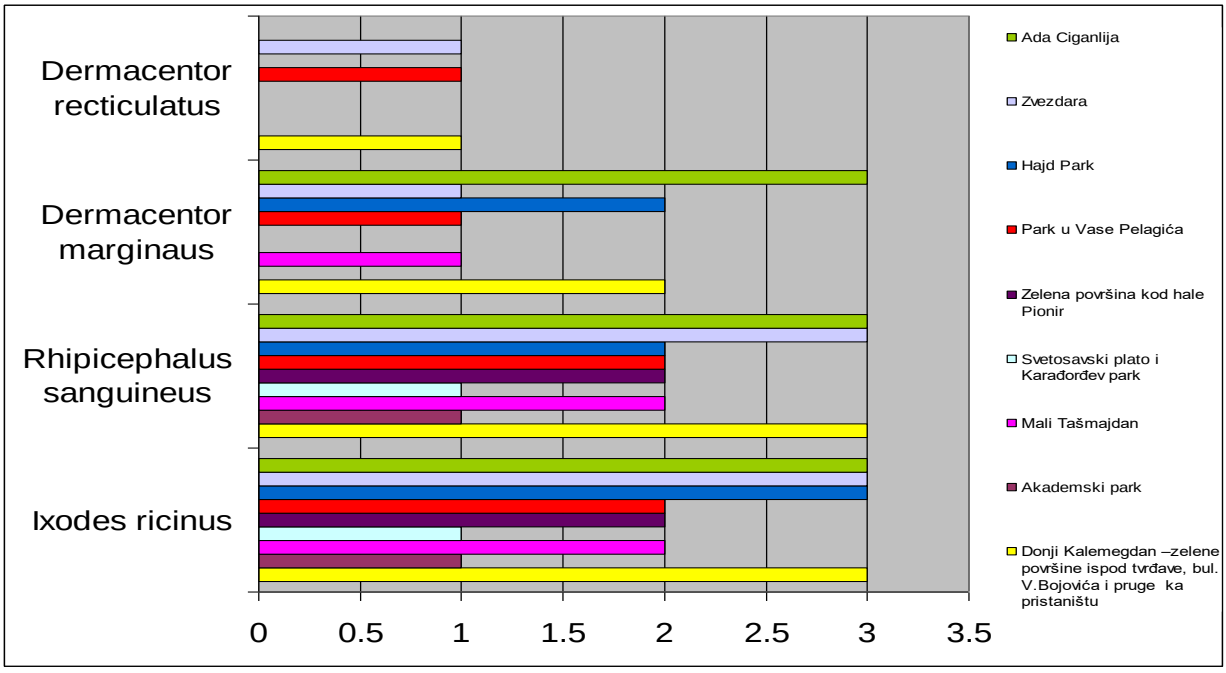


Figure 3. Distribution of ticks at various green areas in Belgrade

CONCLUSİON

Ticks belong to a group of arthropods that are of exceptional biomedical importance for the living world, primarily because of their role as vectors of various types of diseases, and the immediate harmful effects caused by the hemophagous diet. In the urban environment, like Belgrade, their habitats are parks, picnic areas and green areas where there is a large fluctuation of animals and people. During examination in the period of March to November 2020 abundance analysis revealed that the species *Ixodes ricinus* was absolutely dominant found at 51.01%, followed by *Rhipicephalus sanguineus* (39.74%), *Dermacentor marginatus* (8.24%) and *Dermacentor reticulatus* (1.01%). All these species are vectors of zoonotic agents *Borelia burgdoferi, Ehrlichia sp. and Anaplasma sp.* which were established in the Belgrade area, as well as Babesiosis in dogs. In order to control ticks in the area of central municipalities of the City of Belgrade during the 1990s was formed in the Secretariat for Environmental Protection Expert Group on protection of the population against infectious diseases in the area of pest control (mosquitoes, ticks and rodents).

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NUTRITIONAL DISEASES OF CAT AND DOGS

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ABSTRACT
Today, cats and dogs are at the forefront of the animal species that people are interested in as pets. The healthy and happy appearance of cats and dogs is strictly dependent on their adequate and balanced nutrition. Cats and dogs normally find and choose their food when left alone. But cats and dogs raised under human control do not have a choice in their food. The nutrition programs of cats and dogs are organized by humans. Therefore, the mistake that people make about feeding cats and dogs will negatively affect the health of the animal. Feeding errors can lead to many problems such as lack of muscle and skeletal development, immune system deficiency, and defective hair structure. One of the basic conditions of having a healthy cat or dog is its balanced and adequate nutrition.
Key words: cat feeding, dog feeding , nutritional diseases.

1.INTRODUCTION

The healthy and happy appearance of cats and dogs is strictly dependent on their adequate and balanced nutrition. Cats and dogs normally find and choose their food when left alone. But cats and dogs raised under human control do not have a choice in their food. Nutrition programs are organized by people. The mistake that people will make about feeding cats and dogs will negatively affect the health of the animal and may lead to many problems (such as lack of muscle and skeletal development, immune system deficiency, defective hair structure). One of the basic conditions of having a healthy cat or dog is its balanced and adequate nutrition. Although cats and dogs are classified as "carnivores = carnivores" among mammals according to their diet, cats are more dependent carnivores than dogs. Dogs can be called “omnivores = both carnivorous and herbivorous” animals because they can eat similar foods to humans (1, 2).

Cats are similar to their relatives in the wild in terms of diet. Therefore, they depend on their prey or food of animal origin. Protein, energy and water by consuming the meat of their prey; they meet their mineral needs by eating the bone (3). That's why cats are called "dependent carnivores = Strict carnivores". Cats' metabolism shows a ready-made pattern, as they get most of their needs from their prey. Likewise, the requirements of domestic cats are based on foods of animal origin and are more expensive than dog food (1). Shepherd dogs (coil) feeding is not expensive. They can be fed with 'Yal', a slightly solid consistency obtained by mixing whole wheat barley or wheat flour with hot water and cooling. However, it is natural that those who have a balanced diet will be larger and stronger (4).

2. NUTRITIONAL DISEASES IN CATS AND DOGS

2.1.GASTRO-INSTESTINAL DISORDERS

Insufficient or excessive diet applied to the animal results in various clinical disorders. We can list these ailments as follows.

2.1.1. Vomiting

Cat and dog vomiting can be a stomach disease on its own, or it can be a symptom of another disease. Vomiting is one of the body's defense mechanisms. Although there are many factors that can cause vomiting, the most important cause is acute gastritis. If vomiting ceases within 24 hours, small amounts of oral rehydrants are given. After vomiting starts, food delivery is stopped for 12-24 hours. Diets with low fat and cellulose content are then used. Chicken, fish, scrambled eggs, rabbit and rice porridge or prescription diets with low fat content are used.

When the animal shows full clinical recovery, it can be switched to a normal diet (5).

2.1.2. Gastric Dilation and Volvulus

Exercise, exercise following feeding, use of grain-based diets, stomach fullness, aerophagia, race predisposition, gastric wilting, gastric motility disorders and laxity of gastric ligaments are the main factors. Dog breeds such as Great Dane, Boxer, Doberman, Irish Setter, German Shepherd are predisposed to this disease. In the treatment of gastric dilatation and volvulus, gastric bloating and shock should be eliminated with fluid therapy urgently. Soaked food is given twice a day, grain-based diets are not given, and the amount digested is reduced by giving intense diets with high energy and digestibility. It is necessary to divide the daily amount of feed to be consumed in order to avoid exercising just before and after feeding and to protect the stomach from excessive fullness (6, 7, 8).

2.1.3. Diarrhea

A normal stool contains an average of 70% water, in case of diarrhea this amount rises to over 85%. Diarrhea is classified according to its mechanism of formation as osmotic diarrhea, increased permeability, secretory diarrhea and motilytic diarrhea. Acute enteritis is common in dogs because of a voracious eating behavior in cats. The most common cause of diarrhea in dogs is diet-related adverse events such as overeating, consumption of contaminated feed, or sudden food changes. No feed is given for 24 hours, the amount of vitamins is increased, a highly digestible, low-fat and low-cellulose diet is divided into 2-3 meals and given in small amounts (9, 10, 11).

2.1.4. Dietary Allergy

Food allergy is an abnormal or excessive immunological reaction to certain food antigens. A food intolerance is the body's adverse reaction triggered by a food or food component and does not involve the immune system. Since it is very difficult to diagnose food allergies, the term intolerance is preferred. Dogs of any age can be affected by the disease. It is less common in cats. For dogs, milk protein, soybean, wheat, beef, egg, horsemeat, chicken, pork and yeast have antigenic effect. In addition to these, some fish species are included in cats. Clinical signs appear within 7 days. Symptoms are generally in the form of dermatological manifestations and may be observed in cats such as pruritis, urticaria, otitis externa and miliary dermatitis. A single or limited protein source, gluten-free, highly digestible, hypoallergenic or allergen-eliminated diet is followed. Generally, chicken, lamb and rice are not allergenic to dogs. The cat and dog are starved for the first 48 hours and only given water. Gluten sensitivity in Irish Setters is specific and is a well-defined form of food allergy. In such cases, it should be noted that the

diet is gluten-free (12, 13).

2.1.5. Malabsorption

It is the name given to the disorders that occur in absorption in the intestines. Small intestinal malabsorption occurs in conditions such as lymphocytic-plasmacytic enteritis, eosinophilic enteritis, regional enteritis, villus atrophy and lymphosarcoma. The diets recommended for diarrhea are applied in the treatment. Energetic foods rich in carbohydrates such as rice and high levels of vitamins are given (14).

2.1.6. Caprophagia

Caprophagia means eating the animal's own feces. It is a physiological behavior that completes the digestion process in pigs and rabbits. On the other hand, it is an abnormal behavior in dogs, and its display is not desired, especially in house and garden dogs. Among the causes of caprophagia; The mother dog's effort to keep the nest clean, the puppy's curiosity to try food, hunger, the desire to attract attention, and keeping it in a closed and narrow environment for a long time. In addition, diseases such as anemia and digestive disorders and unbalanced nutrition are among the factors that lead to this behavior. It can occur in puppies at the age of 3 weeks. While vitamin and mineral deficiencies can cause caprophagia, it has been stated that it can also occur as a result of boredom in dogs living in kennels. It is checked for diseases that can cause coprophagia. High-energy diets and occasional high-cellulose diets are given. Antagonistic flavor compounds or emetics are mixed into the stool. Odor inhibitors such as low levels of organic phosphates can be added to dog diets such as boredom; It is important in treatment to keep the animal under observation to eliminate other factors that contribute to the progression of the problem (15).

2.1.7. Constipation

Constipation, in other words, constipation is a condition in which bowel movements are reduced compared to normal. Causes include bone feeding, as well as pain related to the colon, rectum, anus and anal glands, orthopedic disorders, prostatic hyperplasia, tumors, neurological problems caused by intravertebral disc lesions, drugs such as barium sulfate, antacids, codeine and diuretics, lack of exercise and hospitalization. A diet high in cellulose can be given, or ballast substances such as bran can be added to the diet (16).

2.1.8. Colitis

In general terms, colitis means a disease of the large intestines characterized by pus. Although rare in cats, it is common in dogs. In acute colitis, it is applied in diarrhea, in chronic colitis, a single or limited protein source, highly digestible, low-cellulose diet is applied. The use of a

single protein source such as chicken, lamb, fish or cheddar cheese limits the success of the treatment. Grain-based diets should be avoided (17).

2.1.9. Gas Formation (Flotus)

In case of deficiency of digestive enzymes or insufficient absorption of nutrients, fermentation of nutrients and subsequent gas formation are inevitable. Some feeds such as soybeans, legumes, potatoes, wheat, cabbage, milk and red meat when given in large quantities cause flotus. Soy, dairy, and vegetables are avoided while on a low-fat and fiber-high digestibility diet (18).

2.2. NUTRITION-RELATED DISEASES

2.2.1. Acute Pancreatitis

It is a sudden onset of pancreatic inflammation. High-fat diets, abdominal trauma and surgery, hypercalcemia, corticosteroids, drugs such as thiazide and azathioprine, hyperlipidemia, viral infections, thoracolumbal surgery, immune diseases and hereditary factors play a role in the etiology of acute pancreatitis. For 4 days peros nothing is given. A highly digestible low fat diet is then introduced with an enzyme supplement to aid digestion. High-carbohydrate feeds such as pasta, rice and potatoes are given (19).

2.2.2. Exocrine Pancreatic Insufficiency

It is a congenital disorder that is rare in cats and occurs in the first 3 years in dogs. German shepherd dogs have hereditary disposition. In more than 70% of cases, secondary infections develop due to excessive bacterial growth caused by undigested food in the intestines. A highly digestible, low-fat, low-cellulose diet is provided with an adequate supplement of enzymes. The diet is strictly controlled. Kitchen scraps should never be given (19).

2.2.3. Liver Diseases

The liver is an organ with many functions, and signs of failure appear when more than 70% of the tissue is damaged. Liver; It is a vital organ that plays an important role in protein, fat, carbohydrate, vitamin and mineral metabolism. Icterus, hepatomegaly, anterior abdominal pain, ascites, and ptyalism in cats are specific manifestations of liver disease. High digestibility, limited amount but high biological value protein, rich in vitamin B, high energy diets should be used. If there is an increase in ammonia level, protein restriction should be increased (20).

2.2.4. Glomerular Nephritis

Ascites, hydrothorax and subcutaneous edema occur when the albumin level falls below 15 g/lt. The presence of these symptoms may vary according to the degree of hypertension. In these cases, in addition to medications, it is necessary to prevent sodium and water retention, reduce

hypertension, increase serum albumin level, and keep blood urea level within normal limits. High biological value, low protein content, low sodium diets are applied. A high biological value protein source such as eggs can be added to the diet.

2.2.5. Congestive Heart Failure

In a broad sense, it means that the heart cannot pump the amount of blood necessary for the body. Diabetes mellitus predisposes to congestive heart failure. The purpose of diet application; maintaining body weight in a lean manner, reducing pulmonary edema and ascites, and keeping protein, vitamin and mineral levels at appropriate levels. Diets with low sodium content and high biological value but fortified in terms of average protein and vitamins are used (21).

2.2.6. Feline Lower Urinary System Disease

Struvite was found to be the most abundant mineral in 70% of cat uroliths. In addition, uroliths composed of calcium oxalate were also encountered. Diet; should increase the amount of urine, low Mg should be provided and acid urine formation should be provided. D-L Methionine (0.2-1.0 g/day) or ammonium chloride (20 mg/kg/day) given orally during feeding are important urinary acidifiers for cats (22).

2.2.7. Diabetes Mellitus

It occurs due to the fact that the insulin hormone cannot be produced at all in the living body, that it cannot be produced enough to meet the body's needs, or that the produced insulin does not have enough effect. It is usually seen in spayed females above middle age (over 8 years old). There are 3 types.

Type 1 Diabetes Mellitus

Type 2 Diabetes Mellitus

Type 3 Diabetes Mellitus

Type 1 Diabetes Mellitus: It is insulin dependent diabetes mellitus and is more common in small animals. Insulin levels are usually low, and glycosuria and ketonuria are present. Insulin therapy is required. Meals are reduced. Corn or cornstarch may be recommended.

Type 2 Diabetes Mellitus: Associated with obesity, resulting in insulin resistance, hyperinsulinism, and decreased insulin receptor numbers. It occurs in Cushing's disease and therapeutic applications of corticosteroids. Obesity is usually seen, and glycosuria and ketonuria are frequently detected.

Type 3 Diabetes Mellitus: It is having an abnormal glucose tolerance without showing clinical signs of diabetes. Diet and oral hypoglycemic drugs are used (5, 23,24, 25).

2.2.8. Hypocalcemia (Eclampsia)

It is an increase in calcium requirement due to depletion of body calcium stores during pregnancy or lactation. It is usually seen in 3-6 years old females who are breastfeeding large puppies within 3 weeks after birth. It is common in small breeds and rare in cats. Intravenous calcium borogluconate should be given when clinical signs are severe. If clinical symptoms are milder, oral calcium supplements are used. Care of the lactating female is important. When puppies are 3 weeks old, their demand for mother's milk should be reduced by forcing them to consume solid foods. Although hypercalcemia is rare in cats and dogs, it is a clinically important electrolyte disorder. Normal serum Ca value is 7-12 mg/dl in dogs and 8-11 mg/dl in cats. Animals exceeding this value are considered hypercalcemic. If the serum Ca value rises above 18 mg/dl, the animal is considered critically ill (21, 26).

2.2.9. Obesity

Obesity is one of the most common food-related health problems in dogs and cats. It is reported that 25-30% of dogs brought to veterinary clinics are obese or have a tendency to obesity. Obesity is defined as a syndrome characterized by excessive accumulation of fat in the body. This adversely affects the health of dogs as it causes problems such as diabetes mellitus, cardiovascular and musculoskeletal diseases, dermatoses, decreased immune response, exercise intolerance, and decreased reproductive functions. When the amount of calories taken from food is more than the amount of energy expended, the excess energy is stored as fat. It is stated that every 1% extra calorie taken regularly in dogs causes 25% weight gain in middle age. The etiology of obesity in dogs and cats is low feeling of satiety, social pressure, dietary factors, sterilization and body energy expenditure. A diet at the level of 40-60% of the survival rate is applied for the target weight in dogs (27).

2.3. THE IMPORTANCE OF NUTRITION IN THE BONES

Rapid growth and development is a bridge in the formation of bone diseases. Large breed dogs are at greater risk as they are already genetically developing rapidly. A large breed dog exhibits the same growth in its first year as a human in its first 14 years. This genetic potential is negatively characterized by factors such as excessive exercise, overfeeding and unbalanced mineral supplementation. Although diet is not the main cause, energy (calorie) intensive nutrition, increasing minerals and vitamins cause skeletal development and general body weight to increase. In case of overfeeding of puppies, it should not be overlooked that the symptoms of osteochondrosis are seen in bones and joints together with rapid growth. In addition, if weight gain occurs faster than skeletal development, the underdeveloped skeleton cannot withstand

this extra weight. On the other hand, the occurrence of hip dysplasia has increased greatly in recent years. Food given to dogs is of great importance as nutritional control is easier. Unbalanced nutrition in their developmental period affects their health negatively in the later stages of their lives. Today, special foods have been formulated that control the development of large breed puppies in a balanced way. Dog owners are supposed to add calcium to their puppies' food in order to prevent these so-called diseases and turn the situation exactly the opposite of what they expected. Calcium is a common mineral that can be easily obtained from many nutrients (bone, milk, cheese, etc.). For this reason, skeletal diseases caused by too much calcium deficiency are more common. During the developmental period of the offspring, it stores all the calcium it takes nutritionally in its bones, causing negative development. Although adult dogs can balance the calcium taken into the body, young dogs store this mineral in their metabolism (28).

2.3.1. Osteochondrosis

In osteochondritis, the ossification of the growth plate cartilage is impaired. Shoulders, elbows, knees, hips and vertebrae are affected areas. In dogs younger than two years old, the cartilage thins and separates from the underlying tissues, causing arthritis. If the cartilage is severed from the head of the cartilage area, a condition called osteochondrosis dissecans (OCD) and requiring surgery occurs (28).

2.3.2. Hip Dysplasia

Hip dysplasia, or hip dysplasia, results from poor and maladaptive development of the calf joint. The upper part of the leg cannot adapt to the calf socket. As a result, the articular cartilage and joint capsule are damaged. Pain and claudication begin to be observed within the first year of disease development. Later, the pain may decrease until degenerative joint disorders appear (28).

3. GERIATRIC

Geriatrics examines the problems and treatments of diseases that develop with old age, which is a combination of the words geras and iatros (medicine). The World Health Organization has defined geriatric as middle-aged people between the ages of 49-59, old people between the ages of 60-74, and the oldest being over 75 years old. Diseases in geriatric animals; Decreased organ function may occur depending on the age of the patient. Physiological events and hemostatic mechanisms in geriatric animals are constantly slowed down. For this reason, even non-serious injuries such as scratches in animals may be at risk of death. A disorder that may occur in the old age is very important and its treatment can take a very long time (4).

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MEADOWS, PASTURES AND THEIR ROLES IN DISEASE CONTAGION

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ABSTRACT
The quality roughage required for the ration in ruminant feeding is obtained in two ways. The first is meadow pastures, and the second is forage crops agriculture. Access to economical and quality roughage is very important in animal production. Grasslands cover about 25% of the world's land. In Turkey, this rate is 18.8%. The presence of these areas in our country is 11.7 million hectares as of 2019. However, it loses its effectiveness due to intensive grazing, failure to perform maintenance and drainage operations on time. As a matter of fact, meadow pasture forage plants, which have high nutritional value and are consumed by ruminants, disappear over time. The 'Pasture Law' should be implemented clearly and without compromise in order to protect grassland and pasture areas, and an increase in animal product production can be achieved by educating and raising awareness of breeders on forage crops agriculture. Changes in productivity, nutrient content of meadows and pastures, plant poisoning, contamination of meadows and pastures with infectious and parasitic factors, and the impact of spreading diseases are reflected in the health and production performance of animals.

Keywords: Pasture, ruminant feeding, contamination

INTRODUCTION

The basic principle in animal nutrition is healthy, continuous, clean and balanced nutrition. In nutrition, the most important source is animal protein. Animal proteins have a very important place in the nutrition of societies. While approximately 33 g of a person's daily protein needs should be met from protein of animal origin, this rate is almost 13-17 grams in our country (Cevheri and Polat, 2009). The amount and quality efficiency of animal protein in the nutrition of the increasing country population, which is a linear response to the world population, is indisputable; The effect of animal proteins on the growth of a healthy generation is obvious. By increasing the number of animals and the unit amount of animal product per animal in our country, the animal protein requirement of the increasing population can be supplied from within the country. For this purpose, agriculture and livestock policies must be predictive, continuous, need-oriented, accelerating and sustainable. However, these targets for our country have not been realized yet.

Quality roughage, which is essential for the ration in ruminant feeding, is obtained in two ways. The first is meadow pastures, and the second is forage crops agriculture. Meadow pastures, where quality and abundant roughage is provided, which forms the basis of economic livestock; It has many important functions such as having natural vegetation flora, being a source of gene for biodiversity and endemic species, a habitat for wildlife, increasing land productivity, and protecting and developing water resources. (Açıkgöz, 2001). Animal husbandry in Turkey is mainly based on pasture and low nutritional value feeds that are rich in fillers such as straw. However, the most applicable form of feed supply is to grow forage crops (Kuşvuran et al., 2011).

Access to economic and quality roughage is very important in animal production. In this regard, the most important roughage sources are meadow-pasture and grassland areas in the forest. The existence of these areas in our country is 11.7 million hectares as of 2019 (Ministry of Agriculture and Forestry, 2020). However, they lose their effectiveness due to reasons such as intensive, not paying attention to temporal changes and unconscious grazing, as well as not being able to perform maintenance and drainage operations on time. As a matter of fact, meadow pasture forage plants, which have a high nutritional value and are consumed by ruminants, disappear over time (Kuşvuran et al., 2011;Budak, 2013). For the protection of meadow pasture areas, the 'Passure Law' should be applied clearly and uncompromisingly, and an increase in animal product production can be achieved by training and raising the awareness of breeders for forage crops agriculture.

Meadows and pastures of Turkey have a roughage production potential of 8.7 million tons/year. However, these production values could not show themselves in practice over time. For this reason, the ineffectiveness of measures and incentives that increase the efficiency of pasture lands, such as preventing excessive and early grazing, alternating grazing, pasture improvement and the use of non-agricultural lands as artificial pasture, or the failure of sustainability policies cause us not to benefit from our cheap and abundant natural resources. In addition, the potential for use of plant production residues and by-products, which are released during the production phase of plant products in our country, as an alternative forage source should be professionally examined. Feed sources with high roughage potential should be expanded by using microbial fermentation (such as silage making, fermented feeds), physical and chemical applications, and biotechnological methods (Yaşar and Yıldız, 2022).

DISEASES DUE TO THE COMPOSITION OF MEADOWS AND PASTURES

Meteorismus is formed in ruminants that graze suddenly in meadows and pastures rich in legumes such as alfalfa and clover (Holmes, 1994). Nitrates in non-protein nitrogenous compounds, which constitute 15-25% of the total crude protein CP at the beginning of vegetation in pasture grasses, are toxic for ruminants when the meadow grass dry matter (DM) is at the level of 0.07%, and lethal at the level of 0.22% (Churc, 1991). In the spring, the nitrate in the pasture grasses is reduced to nitrite in the rumen and passes into the blood in the animals that are taken to the pasture without applying the acclimatization period. Nitrite combines with hemoglobin to convert iron from ferrous state to ferri state, thus forming methemoglobin, a brown pigment that has no oxygen-carrying capacity to body tissues. It can cause chronic poisoning symptoms such as tremor, staggering, increased respiratory rate, and death in animals (Cheeke, 1991).

There is free cyanic acid in the structure of pasture plants such as sorghum and clover. In cases where the structure or tissue integrity of the plant is impaired, such as fertilization type, frost, rain, hail, wilting, and wilting, cyanic acid turns into cyanide and has negative effects on animal health. In acute events, animals die within minutes from anoxia. In chronic events, the evaluation of protein, vitamin and mineral substances decreases, animals weaken, atrophy, goiter and diabetes mellitus occur in the adrenal glands. There are different amounts of estrogenic substances in plants such as meadow clover, underground clover, clover, red clover. While estrogens in pasture grasses have a positive effect on milk yield in spring, they can cause abortion, prolapse of the uterus and infertility in pregnant animals. On the other hand, ovulation, mating and conception rates may decrease in sheep grazed on estrogenic pastures (Ergün et al.,

1999).

With the ingestion of some substances found in pasture grasses, redness, eczema and dermatitis are formed in the light-colored and non-pigmented areas of the skin under the influence of sunlight. It is usually seen in ruminant animals and rarely in horses. These symptoms are mostly seen on the skin of the face, ears, eyelids, nose tip, mammary lobes, nipple, vulva, perineum and testis of animals. At the beginning of the plants with this effect are buckwheat, perforated sword grass and some types of truffles. In addition, such effects are also encountered in animals grazing in mown clover, clover fields, vetch and millet fields (Aytuğ et al., 1991).

Meadows and pastures contain some minerals in insufficient levels due to various factors and create an environment for many diseases, especially hypocalcemia and hypomagnesemia. (Holmes, 1994). Although rare, plants containing poisonous substances can be found among pasture grasses. Animals generally recognize these herbs and do not consume them directly. However, when it is eaten unconsciously among other herbs, it creates negative effects on animals and even causes death. The prevalence of animal diseases such as brucellosis, anthrax, leptospirosis, intestinal and lung nematodiasis, and coccidiosis is expressed in many studies (Umur and Arslan, 1998; Aydın et al., 2000).

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STRESS TYPES AND ANTIOXIDANT ENZYMES IN PLANTS

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ABSTRACT
Since plants are immobile, they are exposed to undesirable environmental conditions. Drought, extreme temperature, salinity, radiation, magnetic and electrical fields, metal toxicity, pollution and pathogens adversely affect plant growth, development and crop yield. All stress factors lead to production of reactive oxygen species (ROS) in plants, causing oxidative stress in the plant. Plants are faced with the phenomenon of synthesizing various reactive oxygen species (ROS) by reducing the molecular oxygen in the cell in as a result of all the metabolic activities that they encounter in photosynthesis, respiration and growth-development processes. With the effect of these oxygen derivatives, lipids, proteins and nucleic acids suffer oxidative damage and as a result, serious problems occur in metabolism. In order to survive and cope with stress, plants under stress develop various antioxidative defense mechanisms that provide control and detoxification of ROS in response to oxidative stress. It is possible to classify antioxidants developed against the harmful effects of free oxygen radicals in plants in two groups as enzymatic and non-enzymatic antioxidants. The main protective enzymatic antioxidants in the plant cell are superoxide dismutase, peroxidase, catalase, ascorbate peroxidaseglutathione reductase and glutathione peroxidase.

Keywords : Plants, Abiotic , Biotic Stress, Antioxidant Enzymes

1. INTRODUCTION

A large number of adverse, but not immediately lethal, conditions that occur constantly or occasionally in an environment are known as stress. In the another word any unsuitable situation or substance that affects or inhibits metabolism, growth and development in plants is considered stress (Gürel and Avcıoğlu, 2001). Any increase or decrease in optimum environmental conditions limits the growth and development of the plant. Stress factors that cause many regressions resulting in low yield in the plant are classified in two ways as abiotic and biotic. Abiotic physical factors; drought, temperature, radiation, mechanical effects while abiotic chemical factors are air pollution, heavy metals, toxins, salts and pH. Biotic factors are wild plants, insects, microorganisms (virus, bacteria and fungi), animals and diseases (Lawlor, 2002; Kacar ve ark., 2009). All stress factors lead to production of reactive oxygen species (ROS) in plants, causing oxidative stress in the plant. Active radicals such as hydrogen peroxide (H2O2), superoxide radical ($O2^{\bullet-}$) and hydroxyl radical (OH•), are reactive oxygen species (ROS) and are produced as a result of oxidative reactions occurring in chloroplasts, mitochondria and peroxisomes in plant cells. Free radicals are chemical products that carry an unshared electron in their outer orbital. They are formed by removing an electron from a non-radical atom or molecule or by adding an electron to an atom or molecule. They are formed by removing an electron from a non-radical atom or molecule or by adding an electron to an atom or molecule (Halliwell and Gutteridge 1989, Arasimowicz et al., 2009). ROS are constantly produced and degraded during daily metabolic events in the cell. Exceeding the threshold value of ROS causes oxidative stress in the cell and helps the plant to provide stress tolerance by starting the oxidative signaling pathway. ROS attack lipids, proteins, and nucleic acids in the cell and hinder growth by preventing new cell formation (de Azevedo Neto et al., 2006). In order to survive and cope with stress, plants under stress develop various antioxidative defense mechanisms that provide control and detoxification of ROS in response to oxidative stress. It is possible to classify antioxidants developed against the harmful effects of free oxygen radicals in plants in two groups as enzymatic and non-enzymatic antioxidants (Scandalios et al., 2005, Rymen ve ark., 2007). Non-enzymatic antioxidants include metabolites such as carotenoids, xantafil, phenolics, flavonoids, tocopherols, ascorbic acids and reduced glutathione (Baskin etal., 1997). In this review stress types and antioxidant enzymes in plants are discussed.

2. COMMON STRESS TYPES IN PLANTS

2.1. DROUGHT STRESS

Severe drought is seen in most of the wetlands where crop production is made in the world. Drought stress is defined as the reduction of water or turgor potential in the tissues of the plant to levels that will negatively affect optimum development (Kramer, 1980). In addition, according to agronomists, drought is defined as the amount of moisture in the soil at the wilting point of the plant. The drought occurring in the dry period varies depending on the water holding capacity of the soil and the evapotranspiration rate (Levitt J., 1980; Kozlowski and Pallardy, 1997; Gürel and Avcıoğlu, 2004). In general drought can be divided into three main groups severe drought (acute), continuous drought (chronic) and physiological drought (Eriş, 1990). Severe (acute) drought; caused by intense sunbathing and wind. In these cases, young plants and seeds dry up, old plants wither, shoot tips dry and yields decrease, growth slows down and stops (Çırak and Esendal, 2006).Chronic drought occurs as a result of the decrease in the ground water level in the soil. Plants become vulnerable to diseases and pests (Eriş, 1990; Smirnoff, 1993; Kalefetoğlu and Emekçi, 2005). In physiological drought, although there is sufficient water in the soil, the plant cannot benefit from this water due to various reasons (Çırak and Esendal, 2006). Drought stress affects vegetative growth, yield, water relations and photosynthesis in plants (Farooq et al., 2009).The stage where drought first poses a problem in plant development is the germination stage (Harris et al.,2002, Gülser et al., 2018).

2.2. SALT STRESS

Soil salinity is one of the most important sources of abiotic stress in the world agriculture. Salinity is a fundamental environmental factor that limits the growth of plants and the amount of products (Allakhverdiev et al., 2000: Ashraf et al., 2008). Low rainfall, inappropriate and insufficient irrigation, excessive and incorrect fertilization cause salt stress in plants. Low rainfall, inappropriate and insufficient irrigation, excessive and incorrect fertilization cause salt stress in plants. Salinity is a factor that affects the entire metabolism of the plant, including its morphology and anatomy (Levitt, 1980). Soil and water resources contain large amounts of salt in most arid and semi-arid regions of the world. Excess salt causes osmotic effects, specific ion toxicity and oxidative stress in plants and their products (Munns, 2002). High salt concentrations in the soils cause great reductions in the yields of various crops all over the world (Sekmen et al., 2005, Gülser et al., 2010). Salt stress occurs frequently in most crops such as barley, maize and rice (Sairam and Tyagi, 2004).

2.3. HEAT STRESS IN PLANTS

High temperature limits the productivity of many important agricultural crops. High temperature stress is one of the abiotic stress conditions that limits growth and development, especially with an increase in optimum growth temperature of 1.5 - 6°C, causing arrest of photosynthesis, damage to cell membranes and cell death due to senescence (Shanshan et al., 2020). Many agricultural products are exposed to high temperature stress at some stages of their life cycles. At this point, each plant species has an optimum temperature range in which it functions optimally, and outside this range, cellular metabolism and therefore plant growth are adversely affected. Plant varieties differ from each other in that they respond differently to increasing temperatures. These genotypic differences are very important in breeding studies in terms of environmental stresses. The development of suitable and rapid test systems is essential for evaluating the high temperature tolerance of genotypes (Yu et al., 2012, Shanshan et al., 2020).

2.4. COLD STRESS IN PLANTS

Cold damage occurring at low temperatures above freezing is the physical and/or physiological changes triggered by the plant's exposure to cold. Physiological changes can be divided into primary (primary) and secondary (secondary) damage. Primary damage is the first rapid response to plant dysfunction. However, this dysfunction is reversible and can be easily corrected as the temperature rises to normal conditions. Secondary damage is the dysfunction that occurs as a result of the primary damage and may not be reversible. Visual signs of characteristic frostbite are caused by secondary frostbite. The most negative effect of cold on plants is that it causes cell membrane damage.This damage occurs mainly due to dehydration. The content of cell membrane lipids is important in the cold sensitivity or tolerance of the plant (Raison et al., 1980, Sangwan et al., 2002).

2.5. HEAVY METAL STRESS IN PLANTS

Heavy metals are defined as metals with a density higher than 5 g/cm^3 and some of them are biologically important. Among the heavy metals, Zn, Ni, Cu, V, Co, tungsten (W), and Cr are non-toxic elements with low concentration. Ag, Hg, As, Sb, Cd, Pb and aluminum (Al), which have no known functions, such as food, are less or more toxic to plants and microorganisms (Beak, et al., 2006). In plants with excessive amounts of heavy metals, toxicity symptoms may occur due to several interactions at the cellular level (Hall, 2002). Heavy metals can bind to the sulfhydryl groups of proteins, leading to activity inhibition or degradation of the structure (Van Assche and Clijster, 1990). Metal interaction of enzymes with ligand groups largely identifies

toxicity, and inhibition of enzymes can result from masking or protein denaturation of catalytically active groups (Das et al., 1997). Also, it stimulates the formation of excessive amounts of heavy metal-free radicals and reactive oxygen species (Dietz et al., 1999, Fornazier et al., 2002). Oxidative stress occurs in plants exposed to high metal concentrations.

2.6. DISEASE STRESS IN PLANTS

Plants, which are food sources for many organisms such as bacteria, fungi, viruses and nematodes, cannot be isolated from pathogens, but they have developed appropriate defense strategies in the course of evolution to detect and counter the inevitable pathogen attacks. Although these defense mechanisms act as a deterrent for some pathogens, they are ineffective for some pathogens. As a result, diseases occur. Biotic stress induces the production of oxygen derived radicals such as H2O2 (hydrogen peroxide), superoxide molecules, hydroxyl, and/or oxygen radicals that are the first lines of defense for a stressed plant (Nanda et al. 2010). However, certain plant hormones (salicylic acid, jasmonic acid, ethylene) and substances like hydrogen peroxide and oxygen radicals often play role in the initiation and control of phytodefense activities including trigger the production of phytoalexins, callose depositions, cell wall thickening, metabolite production. protein synthesis. These defense proteins (enzymes) are remarkable in the protection of the plant by the reaction processes they catalyze.

3. ENZYMATIC ANTIOXIDANTS

Metabolisms have many defense mechanisms to prevent free oxygen and the damage they cause under adverse physiological conditions. These defense mechanisms are called "antioxidants".There are enzymes such as superoxide dismutase (SOD), ascorbate peroxidase (APX), catalase (CAT), glutathione peroxidase (GSH-Px) and glutathione reductase (GR) among the elements of enzymatic defense mechanisms developed by cells, (Choudhury et al., 2017).

Superoxide dismutase (SOD), performs the dismutation of O.- to H_2O_2, similar to animal organisms. Fe-SOD in chloroplast stroma, Mn-SOD in mitochondria and CuZn-SOD in the cytoplasm and chloroplasts (Alscher et al., 1993).

Ascorbate peroxidase (APX) detoxifies lipid peroxide products. Ascorbate peroxidase and monodehydroascorbate reductase provides the oxidation of NAD+ from NADH, which is necessary for metabolism, and inactivation of H_2O_2 that may leak from peroxisomes (Mehlhorn et al., 1996).

Catalase (CAT) to neutralize hydrogen peroxide as an intermediate in plants forms H_2O_2 compound; second step while producing H_2O and O_2 in the reaction enzyme is released (Gechev et al.2003).

Glutathione peroxidase (GSH-Px) plays a protective role by catalyzing the H_2O_2 using glutathione and by coordinating possible damage to plants under stress conditions (Noctor et al., 2002).

Glutathione reductase (GR) plays a role in the ascorbate-glutathione cycle. It forms an important part of the defense against ROS by feeding the reduced glutathione pool. Although GR is predominantly found in chloroplasts, it has also been observed in mitochondria and cytoplasm (Creissen et al., 1994).

4. CONCLUSION

It is accepted that plant species and genotypes that increase antioxidant capacity are relatively more resistant under stress conditions. Since, these species and genotypes better defend themselves against oxidative damage caused by salt stress. For this reason, it is tried to improve the antioxidant capacity of economically important plants by using classical breeding techniques and molecular techniques. Studies on the changes in the enzymatic and non-enzymatic components of the antioxidant system in plants under stress conditions will be beneficial in terms of more accurate breeding studies and reducing product losses.

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CHEMICAL AND ORGANIC FERTILIZATION IN ORNAMENTAL PLANTS

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ABSTRACT
The flower, which started as used for aesthetic purposes centuries ago, is used for purposes urbanization, satisfying the longing for nature of people who are away from nature, making cities more livable environments on today. Ornamental plants provide interior and exterior decoration in residential areas, make people feel that they are in a natural environment visually, and contain a wide variety of groups and species, and also have a certain commercial value. The development of the ornamental plants sub-sector in our country started in İstanbul and its surroundings in the 1940s, when urbanization accelerated, similar to the countries of the world, and then spread in the Aegean and Mediterranean Regions with suitable climates. Giving too much of some nutrients in ornamental plants is just as harmful as giving them less, and in some cases, may be even more, making it difficult to take some other nutrients. Matters to be considered in fertilizing ornamental plants can be listed as follows; i) Soil acidity of the cultivated soil which should be adjusted first, ii) in fertilization, the type and mixture ratios of the growing medium should be taken into account, iii) after fertilizing, the plant should be well watered and iv) fertilizing should be done in the shade and the application should be in the evening.

Keywords: Ornamental plants, chemical, organic fertilization, nutrients

1. INTRODUCTION

The flower, which started as used for aesthetic purposes centuries ago, is used for purposes urbanization, satisfying the longing for nature of people who are away from nature, making cities more livable environments on today. Ornamental plants are defined plant as provide interior and exterior decoration in residential areas, make people feel that they are in a natural environment visually, and contain a wide variety of groups and species, which have a certain commercial value. The development of the ornamental plants sub-sector in our country started in İstanbul and its surroundings in the 1940s, when urbanization accelerated, similar to the countries of the world, and then spread in the Aegean and Mediterranean Regions with suitable climates. Ornamental plants are produced in approximately 145 countries around the world countries such as Colombia, Ecuador, Ethiopia and Kenya. It has become important production areas due to low cost and favorable climatic conditions. But the Netherlands is a world ornament.It is the first country in the world in the production and trade of plants. According to 2019 data, ornamental plants worth 35.500 billion € are produced in the world. According to production values, the regions with the highest production in the world are Asia/Pacific Countries, European Union Countries and China (http://www.susbitkileri.org.tr/images).

The amount of ornamental plants production increased by 2.9% in 2021 compared to the previous year in Türkiye. In the production of ornamental plants, cut flowers have a share of 62.3%, and other ornamental plants have a share of 37.7%. Cut flower production increased by 5.2%, indoor ornamental plants production increased by 11.4%, while outdoor ornamental plant production decreased by 1.8% (TUIK2021). The most common classification of ornamentals plants in different sources is the classification made according to the purposes of use and this classification approach has been adopted in our country such as Indoor (Potted) Ornamental Plants, Outdoor Ornamental Plants, Cut Flowers and Natural flower bulbs (http://www.susbitkileri.org.tr/images).

2. GENERAL ENVIRONMENTAL REQUIREMENTS OF ORNAMENTAL PLANTS

General environmental requirements of ornamental plants can be associated with temperature proportional humidity and water light , soil reaction ventilation. The physical, chemical and biological characteristics of the growing medium should be in a quality that will fulfill the demands of ornamental plants. When preparing a good growing environment, attention should be paid to good drainage and aeration, low soluble salts, water range, sufficient nutrients, and

not causing toxic effects in the fight against diseases and pests. It should have the appropriate pH level.

3. MATTERS TO BE CONSIDERED IN FERTILIZING ORNAMENTAL PLANTS

Ornamental plants can be healthier and longer-lasting with the right fertilization. While ornamental plants, like many other plants, exhibit a rapid development period in summer and spring, they start to maintain dormancy period in winter. It would not be right to choose the winter months for fertilizing process The periods in which the most requests for food will come are the spring and summer months when they show rapid development. Soil acidity of the soil will be cultivated should be adjusted first .In fertilization, the type and mixture ratios of the growing medium should be taken into account. Fertilizing should be done in low concentration and little by little. Excessive use of fertilizer damages the capillary roots of the plant. After fertilizing, the plant should be well watered. Fertilizing should be done in the shade and the application should be in the evening.Fertilizing under the sun can cause burn marks on the leaves._The nutrient solution formed by dissolving compound fertilizers in 1 liter of water should be given by dividing into 8-10 pots, not just one pot at a time. Before fertilizing, you should make sure that the nutritional values contained in the fertilizer match the nutritional values your flower needs. Nitrogen-rich fertilizers are preferred for fertilization for young plants._For plants that are in bloom, the fertilizer should contain phosphorus and potassium (https://www.ufuktarim.com/sus-bitkisi-yetistiriciligi).

Giving too much of some nutrients in ornamental plants is just as harmful as giving them less, and in some cases, may be even more, making it difficult to take some other nutrients. Nitrogen deficiency, which provides shoot and leaf development in ornamental plants, first appears itself in old leaves. In these leaves, a greenish yellow color occurs before the dark green color disappears. Other leaves will also be smaller than normal. Then all leaf colors turn yellow and leaves begin to fall. In case of nitrogen deficiency, shoot formation slows down and shoots harden. If nitrogen is given excessively, a loose structure on the leaves and shoots, stem, growth, darkening and development of leaves, and a regression in flower yield are observed. In the absence of phosphorus, which ensures root development, flower bud and color pigment formation, abundant flowering and long-lasting flowers in ornamental plants; The first symptoms begin on the old leaves, the leaves lose their shine and become dull. Then, gray, yellow, violet-colored, red spots are observed between the veins under the leaves. Young leaves become smaller, old ones fall, development and lateral branch formation in plants weaken. The

flowers are reduced, bloom late, and the flowers remain small. Giving too much phosphorus makes it more difficult to take some other elements. Potassium, which provides sufficient hardening of the shoot and stem in ornamental plants, gives the plant resistance, prevents the acceleration of leaf crumpling, curling and shedding caused by feeding, and makes the flowers smell better, is manifested in the yellowing of the leaves starting from the tips to the edges, and then turning into brown and falling off. arises. The flowers remain pale and small. Excess potassium makes it difficult to take nitrogen and calcium. The leaves turn yellow before their time (Kacar and Katkat, 2007). In addition, different researchers (Nkongolo,et al.2007, Farzad et al.2008,Gülser et al.2010) reported that organic fertilizers such as compost pigeon manure and barn manure promote flowering and plant growth in ornamental plants.

4. CONCLUSION

The flowers for aesthetic purposes are generally used for purposes urbanization, satisfying the longing for nature of people who are away from nature, making cities more livable environments on today. Ornamental plants provide interior and exterior decoration in residential areas, make people feel that they are in a natural environment visually, and contain a wide variety of groups and species, and also have a certain commercial value. Giving too much of some nutrients in ornamental plants is just as harmful as giving them less, and in some cases, may be even more, making it difficult to uptake some other nutrients. Factors considered in fertilizing ornamental plants can be listed as follows; soil acidity of the soil to be cultivated should be adjusted first; in fertilization, the type and mixture ratios of the growing medium should be taken into account; after fertilizing, the plant should be well watered; fertilizing should be done in the shade and the application should be in the evening.

Before fertilizing, the nutritional values contained in the fertilizer must match the nutritional values needed by the flower. Knowing the salinity, pH, water holding capacity and nutrient content of the growing medium is essential for choosing the right fertilizer and determining the application dose.

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PARÇACIK BOYUTU DAĞILIMININ MEKÂNSAL TAHMİNİNDE ÇOK KATMANLI ALGILAYICI YAPAY SİNİR AĞI MODELİNİN PERFORMANSI

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ÖZET
Büyüklükleri farklı olan mineral parçacıkların oransal ifadesi olan tekstür, toprakta su ve besin elementlerinin bağlandığı ve mikroorganizmaların aktif olduğu yüzey alanı belirleyen en temel genetik özelliktir. Tarımsal uygulamalar ile değişmeyen toprak tekstürünün mekânsal değişkenliğinin doğru belirlenmesi, hassas tarımın temeli olan değişken düzeyli girdi uygulamalarının başarısı için gerekli bir işlemdir. Bu çalışma, Kuzey Irak'ın Amediya bölgesinde yaklaşık 20 km^2 genişliğindeki bir arazide gerçekleştirilmiştir. Çalışma alanı, 500 m x 500 m genişliğindeki kare gridlere ayrılmış ve gridlerin köşe noktalarından toplanan 80 adet yüzey (0-20 cm) toprak örneklerinin kum, silt ve kil içeriklerinin mekânsal modellenmesinde Çok Katmanlı Algılayıcılı Yapay Sinir Ağı (ÇKAYSA) yaklaşımı kullanılmıştır. Toprakların parçacık büyüklük dağılımına ait tahmin modelinin oluşturulmasında, örneklerin coğrafi koordinatları girdi verileri olarak kullanılmıştır. Örneklerin %70'i (56 adet) eğitim ve %30'u test (24 adet) amaçlı kullanılmıştır. ÇKAYSA mimarisinin nöron sayısı (gizli düğüm sayısı) en düşük Kök Ortalama Kare Hatası (RMSE) değerine göre belirlenmiştir. Toprak kum, kil ve silt içeriklerine ait tahmin modeli en düşük RMSE değerleri 7.54%, %2.16 ve %2.99 olup optimal nöron sayıları sırası ile 29, 28 ve 26 olarak elde edilmiştir. Tahmin modellerinin doğruluğunun değerlendirilmesinde kullanılan ortalama mutlak yüzde hatası (MAPE) değerleri, ÇKAYSA-silt modelinin (MAPE:%5.55) yüksek doğruluğa sahip olduğunu ve çok iyi tahmin edici model olduğunu ortaya koymuştur. Benzer şekilde, ÇKAYSA-kum (MAPE: %12.06) ve ÇKAYSA-kil (MAPE:%10) modellerine ait MAPE değerleri, modellerin sırası ile orta derecede doğru ve iyi tahmin edici olduklarını ortaya koymuştur. Sonuçlar, ÇKAYSA modellerinin geniş alanlara ait toprakların kum, kil ve silt içeriklerinin tahmini ve haritalanmasında güvenilir bir şekilde kullanılabileceklerini ortaya koymaktadır.

Anahtar Kelimeler: Yapay Sinir Ağları, Tekstür, Tahmin, MLP, Modelleme, Toprak

PERFORMANCE OF MULTILAYER PERCEPTRON ARTIFICIAL NEURAL NETWORK MODEL IN SPATIAL ESTIMATION OF PARTICLE SIZE DISTRIBUTION*

ABSTRACT

Texture, which is the proportional expression of mineral particles of different sizes, is the most basic genetic property that determines the surface area where water and nutrients are adsorbed and microorganisms are active in soils. Accurate determination for the spatial variability of soil texture, which does not change with agricultural practices, is a necessary process for the success of variable-level input applications, which are the basis of precision agriculture. This study was carried out in an approximately 20 km^2 land located in the Amediya region of Northern Iraq. The study area was divided into square grids of 500 m x 500 m width and the Multilayer Artificial Neural Network (MLANN) approach was used in the spatial modeling for sand, silt and clay contents of 80 surface (0-20 cm) soil samples collected from the corner points of the square grids. The geographical coordinates of the soil samples were used as input data in the estimation model of soil particle size distribution. Seventy percent of samples (56) were used for training and 30% for testing (24 samples). The number of neurons (hidden nodes) of the MLANN architecture was determined according to the lowest Root Mean Square Error (RMSE) value. The lowest RMSE values for sand, clay and silt contents of the estimation models were 7.54, 2.16 and 2.99%, and optimal neuron numbers were 29, 28 and 26, respectively. The mean absolute percent error (MAPE) values used to evaluate the accuracy of the prediction models revealed that the MLANN-silt model (MAPE: 5.55%) had highest accuracy and is a very good predictive model. Similarly, the MAPE values of MLANN-sand (MAPE: 12.06%) and MLANN-clay (MAPE: 10%) models revealed that the models were moderately accurate and well predictive, respectively. The results reveal that the MLANN models can be used reliably for the estimation and mapping of sand, clay and silt contents of soils in large areas.

Keywords: Artificial Neural Network, Texture, Estimation, MLP, Modelling, Soil

GİRİŞ

Su tutma kapasitesi, havalanma, drenaj, besin elementlerinin miktarı ve yarayışlılığı ve bitki gelişimini etkileyen en önemli toprak fiziksel özelliği olan parçacık büyüklük dağılımının mekânsal değişkenliğinin tahmini ve haritalanması, bitkisel üretimin planlanması ve girdi kullanımının yönetimi için faydalıdır (Dharumarajan ve Hegde, 2022). Geleneksel olarak toprak tekstürünü, arazide ıslatılan toprağın parmaklarımız arasında bıraktığı hisse ve oluşturulan ince şeritlerin uzunluğuna göre kabaca belirlemek mümkündür. Laboratuvarda ise, toprak agregatları kalgon (Na-hegzametafosfat) ile dağıtıldıktan sonra, pipet (Gee ve Or, 2002) veya hidrometre (Gee ve Bauder 1986) yöntemi ile kum, silt ve kilin yüzde miktarları belirlenebilmektedir. Arazide belirlenen tekstür sınıfı, kum, silt ve kil içeriğinin belirli aralıklarda tahminin yapılması için uygundur. Ancak, özellikle tarımsal yönetimli aküfer doldurma-Ag-MER (Ganot ve Dahalke, 2021), toprak organik karbonu (Swetha ve Chakraborty, 2021), ürün evapotrasprasyonu (Amazirh ve ark., 2021) gibi modelleme çalışmalarında gerekli olan daha hassas değerler için laboratuvar analizlerine gereksinim vardır. Diğer birçok toprak analizine kıyasla daha düşük bir maliyet ile laboratuvar analizlerinin yapılması mümkün olsa da geniş araziler için gerekli olan örnek sayısı ve analizler için harcanacak zaman çok sayıda veri toplamayı zorlaştırmaktadır. Son yıllarda popülaritesi giderek artan yapay sinir ağları, makine öğrenmesi ve derin öğrenme gibi tekniklerinin toprak sınıfları (Taghizadeh-Mehrjardi ve ark., 2020), toprak tekstürü (Dharumarajan ve Hegde, 2022; Keshavarzi ve ark., 2022), toprak organik karbonu (Keskin ve ark., 2019), toprak pH'sı ve karbonat miktarı (Lu ve ark., 2023) ve omurgasız toprak canlılarının miktarı (Tajik ve ark., 2019) gibi çok çeşitli özelliklerin tahmininde ve sayısal toprak haritalarının hazırlanmasında başarılı bir şekilde kullanılabilecekleri ortaya konulmuştur.

Sayısal toprak haritalama, arazide veya laboratuvarda yapılan toprak ölçümleri ile çevresel veriler arasındaki niceliksel ilişkilere dayanan coğrafi referanslı toprak veri tabanlarının üretilmesidir ve ayrı sınıflar veya sürekli toprak özellikleri olarak temsil edilebilir (Thompson ve ark., 2020). Sayısal toprak haritalamada, kil, kum ve silt içeriği gibi toprak özellikleri veya toprak sınıfları, topografyaya ait parametreler, iklim parametreleri, arazi kullanımı, arazi örtüsü ve ana materyaller gibi veri tabanlarında yer alan ve kolaylık elde edilebilen yardımcı değişkenlerin bir fonksiyonu olarak başarılı bir şekilde tahmin edilebilmektedir (Dharumarajan ve Hegde, 2022).

Toprak tekstür sınıflarının tahmin edilmesinde çeşitli makine öğrenmesi yönteminin etkinliği test edilmiştir. Hindistan'ın Andhra Pradesh eyaletinde rastgele (Random Forest) sınıflandırma

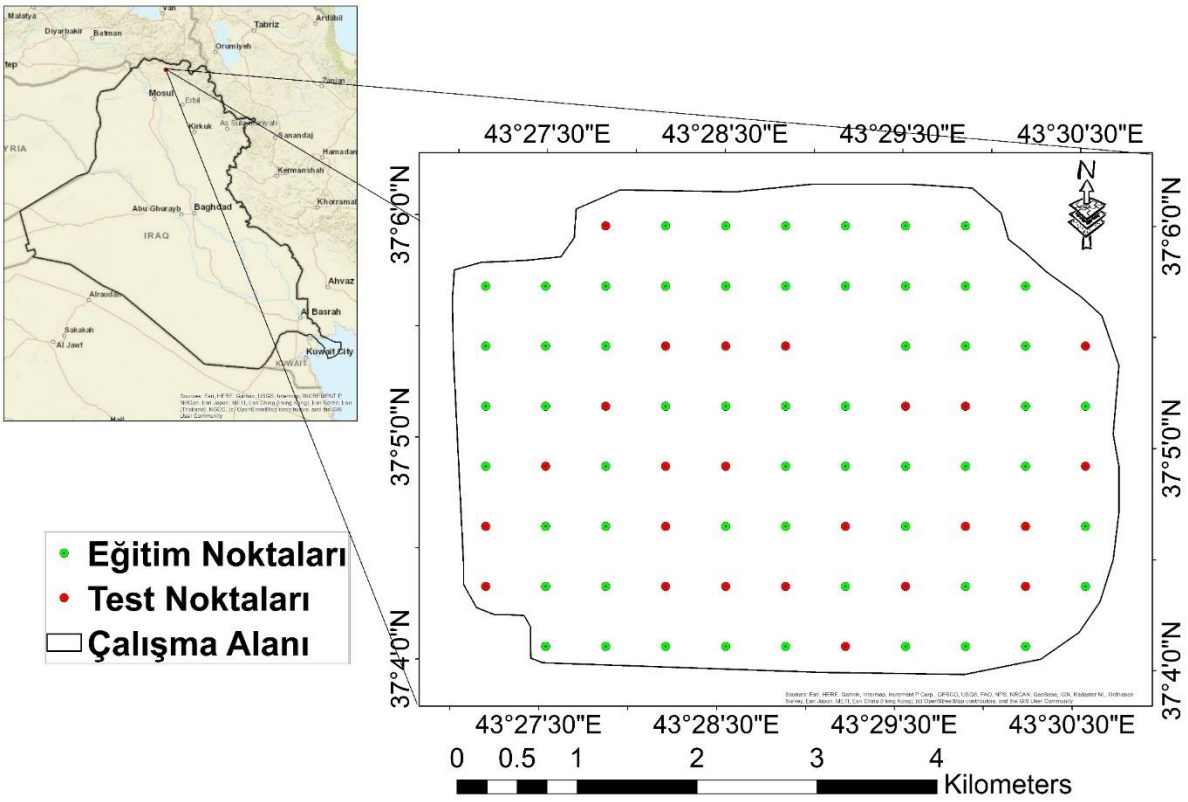
algoritmalarını kullanan Dharumarajan ve Hegde (2022), 2 m derinlikteki farklı katmanlara ait toprak tekstürü haritalarını yüksek çözünürlüklü (250 m) olarak elde etmişlerdir. Farklı derinliklerdeki tekstür sınıfları tahmin doğruluğunun hesaplanan genel doğruluk oranı (%50-65) ve kappa katsayına (%37-47) göre orta düzeyde olduğunu bildirmişlerdir. Tahminin, birbirinden farklı tekstür sınıfları için daha iyi ve birbirine yakın tekstür sınıfları için zayıf olduğu ifade edilmiştir. Türkiye'nin Kuzeybatısında Fluvisol ve Vertisol toprak ordolarına ait toprakların yoğun olarak yer aldığı bir alanda, toprak tekstür sınıflarının tahmininde, karar ağacı (Decision Tree), rastgele orman ve destek vektör makinesi (Support Vector Machine) algoritmalarının etkinliğini araştıran Kaya ve ark. (2022), tekstür sınıflarının tahmininde Landsat 8 OLI Science görüntüsü ve sayısal yükseklik modelini (DEM) kullanmışlardır. Araştırmacılar, test edilen 3 algoritma içerisinde tekstür sınıflarının tahmininde en başarılı yöntemin genel doğruluk değerlendirmesi %63 ve kappa indeks değeri %14 olan rasgele orman algoritması olduğunu bildirmişlerdir. Çalışma alanında toprak tekstür sınıflarının tahmininde en önemli belirleyici, topografik ıslaklık indeksi olduğu rapor edilirken ve bunu uydu verilerinden üretilen diğer indekslerin izlediği belirtilmiştir.

Bu çalışmada, Kuzey Irak'ın Amediya bölgesinde yaklaşık 20 km^2 genişliğinde bir arazide yer alan toprakların kum, silt ve kil içeriklerinin tahmininde Çok Katmanlı Algılayıcılı Yapay Sinir Ağı algoritmasının etkinliği test edilmiştir.

MATERYAL VE METOT

Çalışma Alanı

Çalışma alanı Irak'ta Duhok ilinin 70 km kuzeyinde, 37° 40'-37°60' Kuzey enlemleri ile 43° 27'- 43° 30' Doğu boylamları arasında Amediya bölgesinde yer almaktadır (Şekil 1). Çalışma alanının yükseltisi 1400 m olup büyüklüğü 20.06 km^2'dir. Amedia ilçesinde yağışlar genellikle kış aylarında görülmektedir ve yaz mevsimi oldukça kuraktır. Amedia havzasının kuzey, kuzeydoğu ve kuzeybatısından güney ve güneydoğuya doğru yağış miktarı artmaktadır (Amen, 2020).



Şekil 1. Model eğitim ve test noktaları ve çalışma alanı coğrafi konumu

Toprak Örneklemesi ve Laboratuvar Analizleri

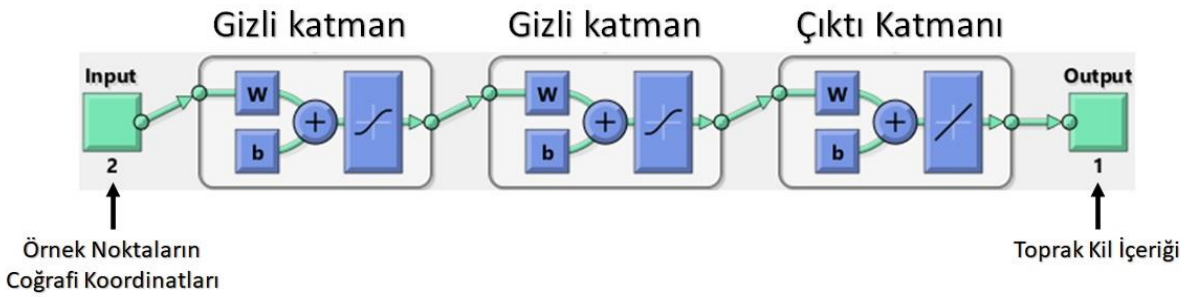
Çalışma alanı 500 x 500 m kare karelere bölünmüş ve yaklaşık olarak her bir grid noktasının köşelerinden örnekler toplanmıştır (Şekil 1). Her bir örnekleme noktasında 0-20 cm derinlikten toprak örnekleri alınmıştır. Eğim, kentsel alan, yol, nehir vb. nedenlerle toprak örnekleme lokasyonuna ulaşılamadığında, mümkün olduğunca yakın alternatif bir lokasyon seçilmiş ve lokasyonun yeni koordinatları Global Konumlandırma Sistemi (GPS) kullanılarak kaydedilmiştir.

Bozulan toprak örnekleri hava kurusu haline getirilmiş olup laboratuvar analizi için 2 mm elekten geçirilmiştir. Partikül boyutu dağılımı, sodyum hegzametafosfat ile çökelme silindirinde hidrometre yöntemi kullanılarak belirlenmiştir (Gee and Bauder, 1986).

Mekânsal Model Yaklaşımı

Tüm veri seti ArcGIS 10.8 yazılımının jeoistatistik araç kutusu kullanılarak %70 eğitim, %30 test olarak iki parçaya ayrılmıştır. Ardından ortak değişkenler -1 ile 1 arasında normalleştirilmiştir (Konakoğlu, 2020). Mekansal model yaklaşımı olarak Çok Katmanlı Algılayıcılı Yapay Sinir Ağı (ÇKAYSA) benimsenmiştir. ÇKAYSA model mimarisi Matlab 2010a'da tasarlanmıştır. Mimariyi oluşturan gizli katman sayısı ve düğüm sayısı, hata

istatistikleri göz önünde bulundurularak deneme yanılma yöntemine göre belirlenmiştir (Cemek et al., 2022). Hiperbolik tanjant sigmoid (tansig), girdi katmanı ile gizli katmanlar arasında transfer fonksiyonu olarak belirlenmiştir. Öte yandan, Doğrusal (purelin) gizli katmanlar ile çıktı katmanı arasında transfer fonksiyonu olarak kullanılmıştır. Eğitim veri setinde örneklem noktalarının coğrafi koordinatları ortak değişken olarak kullanılarak ÇKAYSA Levenberg–Marquardt eğitim algoritması ile eğitilmiştir. Model performansını değerlendirmek için test veri seti kullanılmıştır. Toprak kil, kum ve silt içeriği için 2 gizli katmana sahip 3 farklı ÇKYSA model tasarlanmıştır. Örnek olarak toprak kil içeriğine ait model mimarisi Şekil 2'de görülmektedir.



Şekil 2. Toprak kil içeriği ÇKAYSA model mimarisi

Doğruluk Değerlendirmesi

Model başarısını değerlendirmek için kullanılan istatistiksel hata metrikleri Kök Ortalama Kare Hatası (Root Mean Square Error: RMSE) (Denklem 1), Ortalama mutlak hata (mean absoulate error; MAE) (Denklem 2), Ortalama mutlak yüzde hata (Mean absoulate percentage error; MAPE) (Denklem 4) ve belirleme katsayısı (R^2)'dır.

$$RMSE = \sqrt{\frac{1}{n}\sum_{t=1}^{n}(M_i - E_i)^2} \quad (1)$$

$$MAE = \frac{1}{n}\sum_{i=1}^{n}|M_i - E_i| \quad (2)$$

$$MAPE = \frac{1}{n}\sum_{t=1}^{n}\left|\frac{M_i - E_i}{M_i}\right| X100 \quad (3)$$

Denklem 1, 2, 3 ve 4'de M*i*, E*i* ve n sırasıyla tahmin edilen, ölçülen toprak özellikleridir ve n örnek sayısıdır (Somaratne ve ark., 2005).

BULGULAR VE TARTIŞMA

Tanımlayıcı İstatistikler

Çalışma alanı topraklarının kil, silt ve kum içeriklerine ait tanımlayıcı istatistikler Tablo 1'de verilmiştir. Kil içeriği %8.33 ile %44.49 arasında değişmekte olup ortalama %25.08'dir. Kum içeriği minimum, maksimum ve ortalama değerleri sırasıyla %26.20, %88.86 ve %55.15'dir. Silt içeriği ortalama %19.78 olup minimum ve maksimum değerleri sırasıyla %1.31 ve %41.55'dir. Eğitim ve test örnek noktalarının sayısı 56 ve 24'dür. Eğitim ve test veri setinin tüm veri seti ile tanımlayıcı istatistikleri oldukça benzerdir. Dolayısıyla, eğitim ve test veri seti tüm veri setini temsil etmekte olup bu ayrım modelin eğitimi ve doğruluk değerlendirmesi açısından elverişlidir (Xie ve ark., 2022).

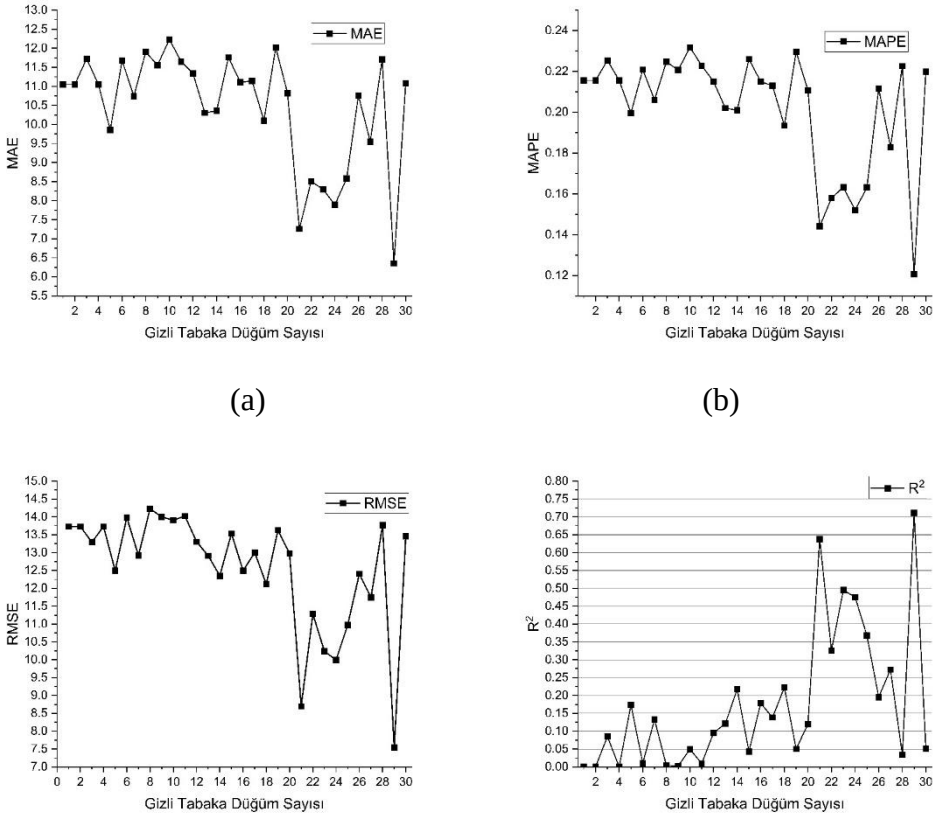
Tablo 1. Eğitim, test ve tüm veri setine ait tanımlayıcı istatistikler

		Veri Setleri		
		Eğitim	**Test**	**Tüm**
Kil (%)	**Minimum**	8.33	10.37	8.33
	Maksimum	44.49	38.94	44.49
	Ortalama	25.07	25.10	25.08
	Standart Sapma	8.80	7.01	8.30
	Varyasyon Katsayısı	35.09	27.95	33.11
Kum (%)	**Minimum**	26.20	33.22	26.20
	Maksimum	86.86	82.78	86.86
	Ortalama	55.08	55.30	55.15
	Standart Sapma	16.67	13.73	15.84
	Varyasyon Katsayısı	30.26	24.82	28.73
Silt (%)	**Minimum**	1.31	6.86	1.31
	Maksimum	41.55	41.55	41.55
	Ortalama	19.85	19.60	19.78
	Standart Sapma	11.18	9.26	10.64
	Varyasyon Katsayısı	56.33	47.25	53.82

Çok Katmanlı Algılayıcılı Yapay Sinir Ağı Mimarisi ve Doğruluk Değerlendirmesi

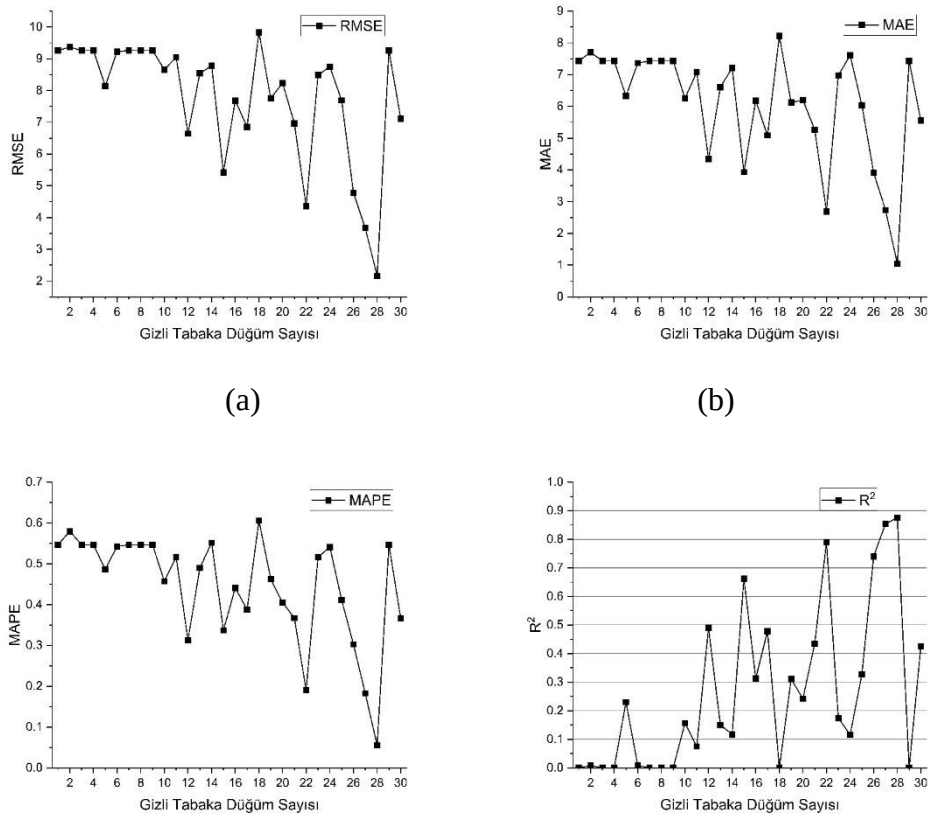
Çok Katmanlı Algılayıcılı Yapay Sinir Ağı (ÇKAYSA) mimarisinin önemli bir parçası olan nöron sayısı (gizli düğüm sayısı) Sergeev ve ark. (2019)'nın önerdiği gibi RMSE değerinin en düşük olduğu değerler dikkate alınarak belirlenmiştir. Örnekleme noktalarının coğrafi koordinatlarına dayalı olarak tasarlanan ÇKAYSA-kum modelinin nöron sayısı değişimine bağlı olarak RMSE değerlerinin tepkileri Şekil 3'de görülmektedir. 1'den 30'a kadar nöron sayısı artırıldığında, toprak kum içeriğine ait tahmin modeli en düşük RMSE değeri (7.54%) 29 nöronda elde edilmiştir. Diğer hata istatistikleri de RMSE'ye benzer şekilde 29. Nöronda

optimal değerleri almıştır (Şekil 3).



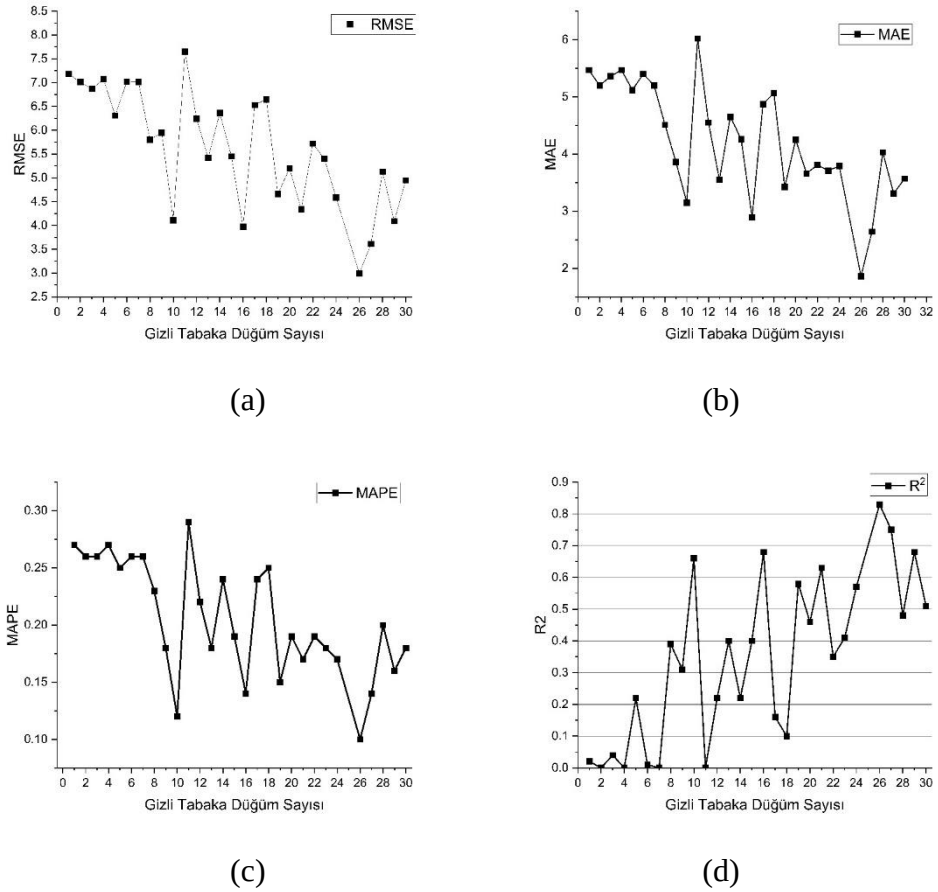
Şekil 3. ÇKAYSA-kum hata istatistiklerinin RMSE'ye gösterdiği tepkinin değişimi

ÇKYSA-silt modelinde hata istatistiklerinin nöron sayısı değişimine tepkisi Şekil 4'de görülmektedir. İki gizli katmana sahip olan ÇKYSA-silt modelinde her bir gizli katman için gizli düğüm sayısı 28 olduğunda RMSE değeri en düşük (2.16%) değerini almıştır. Benzer olarak R^2 en yüksek, MAPE ve MAE en düşük değerleri almıştır.



Şekil 4. ÇKAYSA-Silt modeli hata istatistiklerinin nöron sayısı değişimine gösterdiği tepkinin değişimi

ÇKAYSA-kil modelinin nöron sayısı artırılmasına bağlı olarak RMSE, MAE, MAPE ve R^2'nin gösterdikleri değişimlerin grafikleri Şekil 5'de görülmektedir. ÇKAYSA-kil modeli 2 gizli tabakaya sahip olup her bir gizli tabakanın nöron sayısı 26 olduğunda RMSE en düşük (2.99%) değerini almıştır. Diğer hata istatistikleri de RMSE'ye benzer olarak 29. Nöronda optimal değerlere ulaşmıştır (Şekil 5).



Şekil 5. ÇKAYSA-kil modeli hata istatistiklerinin nöron sayısı değişimine gösterdiği tepkilerin değişimi

Eğitilmiş ÇKAYSA yapısına ait parametre sonuçları ve doğruluk değerlendirmesi Tablo 2'de verilmiştir. ÇKAYSA-Kum modelinde gizli tabaka sayısı ve düğüm sayısı (nöron sayısı) sırasıyla 2 ve 29 olduğu koşullar hata istatistiklerine göre optimumdur. ÇKAYSA-Kum modelinde RMSE ve MAE değerleri sırasıyla %7.54 ve %6.35'dir. Test veri setine ait kum değerleri ile tahmin kum değerleri arasındaki doğrusal regresyonun belirleme katsayısı (R^2) 0.71'dir. Optimal parametrelere sahip ÇKAYSA-Silt modeli RMSE, MAE ve R^2 değerleri sırasıyla %2.16, %1.04 ve 0.87'dir. ÇKAYSA-Kil modeline ait hata istatistikleri ise RMSE, %2.99; MAE, %1.86 ve R^2 ise 0.83'dür. Bu çalışmada elde edilen ÇKAYSA mekânsal model sonuçları, Budak ve ark. (2018)'nın bulguları ile uyumludur. Budak ve ark. (2018), topraktaki kum, kil ve silt içerikleri mekânsal dağılımını ordinary kriging ile modelledikleri çalışmalarında R^2 değerlerini sırasıyla 0.93, 0.97 ve 0.73 olarak bildirmişlerdir. Dindaroğlu ve ark. (2022)'nın ortak değişken olarak yüksek çözünürlüklü multispektral görüntülerden elde edilen radyometrik indeksleri kullandıkları ÇKAYSA modelinde kum, silt ve kil modellerinin RMSE değerlerini sırasıyla %4.71, %3.61 ve %5.10 olarak; MAE değerlerini %3.76, %2.93 ve %4.96 olarak

bildirmişlerdir. Dindaroğlu ve ark. (2022)'nın bulguları ile sunulan çalışma ÇKAYSA mimarisi oldukça benzer olduğu göz önüne alınırsa, RMSE ve MAE değerleri literatür ile uyumlu olduğu görülmektedir. Modelin değerlendirmesinde kullanılan MAE hatanın göreceli boyutunu her zaman açık şekilde göstermeyebilir. Bu yüzden, bazen büyük bir hatayı küçük bir hatadan ayırt etmek zordur. Bu problemle başa çıkmak için ortalama mutlak hatanın yüzde cinsinden hesaplanması önerilmiştir (Watson, 2012). MAPE değeri %10'dan küçük ise model yüksek doğruluğa sahip (çok iyi tahmin edici), değer %10 ile %20 aralığında ise orta derecede doğruluğa sahip (iyi tahmin edici), %20 ile %50 aralığında ise düşük derecede doğruluğa sahip ancak kabul edilebilir. MAPE değeri %50'nin üzerinde ise tahmin değeri yok (kötü tahmin edici) olarak kabul edilmektedir (Lewis, 1982). ÇKAYSA-silt modelinin MAPE değeri %5.55 olduğu için çok iyi tahmin edicidir (Tablo 2). Öte yandan, ÇKAYSA-kil ve ÇKAYSA-kum modellerine ait MAPE değerleri %10 ve %12.06 olarak hesaplanmıştır. Böylelikle bu iki model Lewis (1982)'ye göre orta derecede doğruluğa sahip iyi tahmin edicidir.

Tablo 2. ÇKAYSA yapısı ve doğruluk değerlendirmesi sonuçları

Çıktı Parametresi	**Gizli Tabaka**		**Test Veri Seti**			
	Sayısı	**Düğüm Sayısı**	**RMSE (%)**	**MAPE (%)**	**MAE (%)**	**R^2**
Kum	2	29	7.54	12.06	6.35	0.71
Silt	2	28	2.16	5.55	1.04	0.87
Kil	2	26	2.99	10.00	1.86	0.83

SONUÇ

Bölgesel ölçekte toprak tekstürüne ilişkin bilgiler, toprak yönetimi ve tarımsal üretim planlanmasının etkin bir şekilde hazırlanmasında oldukça önemlidir. Bu bağlamda, Kuzey Irak'ın Amediya bölgesinde toprak parçacık boyutu dağılımlarının mekânsal tahmin modeli Çok Katman Algılayıcılı Yapay Sinir Ağı kullanılarak oluşturulmuştur. Girdi verileri olarak örneklem noktalarının coğrafi koordinatları kullanılarak oluşturulan tahmin modelleri MAPE değerlerine bağlı olarak değerlendirildiğinde; ÇKAYSA-silt, yüksek doğruluğa sahiptir ve çok iyi tahmin edicidir. ÇKAYSA-kum ve ÇKAYSA-kil modelleri MAPE değerlerine göre orta derecede doğru ve iyi tahmin edicidir. Öte yandan, ÇKAYSA-kil, ÇKAYSA-silt ve ÇKAYSA-kum modelleri; gelişmiş uzaktan algılama teknolojilerinden elde edilmiş verilere dayalı olan literatürdeki modellerin doğrulukları ile karşılaştırıldığında, benzer tahmin başarısı göstermiştir. Bu sonuç, kısıtlı verilerin olduğu koşullarda, ÇKAYSA'larının tatmin edici tahmin başarısına sahip olduğunu ve kriging gibi geleneksel olarak yaygın bir şekilde kullanılan jeoistatistik yöntemlere iyi bir alternatif olduğunu göstermektedir.

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YARI-KURAK BİR BÖLGEDE KİREÇ İÇERİĞİNİN MEKÂNSAL DAĞILIMININ MODELLENMESİNDE KLASİK JEOİSTATİSTİK VE MAKİNE ÖĞRENMESİ TEKNİKLERİNİN KARŞILAŞTIRILMASI

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ÖZET
Küresel bir sorun olan arazi bozulması, çoğunlukla kurak ve yarı bölgelerdeki tarım arazilerini tehdit etmektedir. Bozulma riski olan bir arazinin en iyi yönetimi, toprak özelliklerinin mekânsal yapısının belirlenmesi ve mekânsal değişikliklerin haritalanması ile yapılabilir. Bu çalışmanın amacı, yarı-kurak bir iklimde yer alan Irak'ın Amediya bölgesi arazilerinin kireç içeriğinin mekânsal dağılımının jeoistatiseksel yöntemlerden ordinary kriging ve son yıllarda yaygınlaşan makine öğrenmesi tekniklerinden uyarlanabilir bulanık çıkarım yapay sinir ağı (ANFIS) kullanılarak modellenmesi ve haritalandırılmasıdır. Bu amaçla, çalışma alanı 500 m x 500 m genişliğinde kare gridlere ayrılmış, gridlerin yaklaşık köşelerine denk gelen 80 noktada 0-20 cm derinlikten bozulmuş toprak örnekleri alınmış ve toprak örneklerinin kireç ($CaCO_3$) içerikleri belirlenmiştir. Çalışma alanında kireç içeriği %4.87 ile 19.5 arasında değişmekte olup, ortalama kireç içeriği %13.62 ve örneklenen noktalar içindeki değişkenliği (varyasyon katsayısı: CV) ise %20.03 idi. Mekânsal dağılım modellerini eğitmek için verilerin %70'i ve tahmin başarısının doğruluğunu test etmek için %30'u rastgele ayrılmıştır. Kireç içeriğinin tahmininde en iyi performans ANFIS için doğrusal modelde, test veri seti kullanılarak 5*5 üyelik fonksiyonu sayısında elde edilmiştir. Taylor diyagramı sonuçları, ANFIS modelin ordinary kriginge göre %19.6 daha başarılı tahmin yaptığını ortaya koymuştur.

Anahtar Kelimeler: ANIFIS, Ordinary Kriging, Kireç, Amediya, Makansal değişkenlik, makine öğrenmesi

COMPARISON OF CONVENTIONAL GEOSTATISTICS AND MACHINE LEARNING TECHNIQUES FOR MODELING SPATIAL DISTRIBUTION OF LIME CONTENT IN A SEMI-ARID REGION

ABSTRACT

Land degradation is a global problem, and mostly threatens agricultural lands in arid and semi-regional regions. The best management of a land which is under a severe degradation risk can be carried out by determining the spatial structure of soil properties and mapping the spatial variability. The aim of this study was to model and map the spatial distribution of lime content in the Amediya region of Iraq, which is located in a semi-arid climate, using ordinary kriging that is the most commonly used geostatistical method, and adaptive fuzzy inference artificial neural network (ANFIS), which is one of the machine learning techniques that recently has become widespread. The study area was divided into 500 m x 500 m square grids and disturbed soil samples were collected from 0-20 cm depth at 80 points corresponding to approximately the corners of grids, and lime ($CaCO_3$) content of soil samples were determined. The lime content in the study area ranged from 4.87% to 19.5%, the average lime content was 13.62% and the variability (coefficient of variability; CV) within the sampled points was 20.03%.Seventy percent of the data was randomly allocated to train spatial distribution models and 30% to test the accuracy of estimation success. The best performance in the estimation of lime content was obtained in the linear model for ANFIS, using the test dataset at the number of 5*5 membership functions. The results of Taylor diagram revealed that the estimation success of ANFIS model was 19.6% higher than the ordinary kriging.

Keywords: ANIFIS, Ordinary kriging, Lime, Amedia, Spatial variability, Machine learning

GİRİŞ

Yeryüzünün üst kısmında bitkiler için yetişme ortamı olan toprak, gıda ve su güvenliği, enerji üretiminin sürdürülebilirliği, iklim değişikliğinin önlenmesi, biyoçeşitlilik ve çeşitli ekosistem hizmetlerinin sunumu ile insanların yaşam kalitesini etkileyen en önemli doğal varlığımızdır (McBratney ve ark., 2014). Kurak ve yarı-kurak bölgelerde, bitki besin elementlerinin yarayışlılıkları üzerine etki eden en önemli kimyasal özelliklerden bir tanesi kireç içeriğidir. Yüksek olması durumunda çoğunlukla besin elementlerinin yarayışlılıklarını olumsuz etkileyen kireç içeriğinin mekânsal olarak değişimine ait doğru bilgi arazi içinde gübreleme programlarının etkinliğini arttırabilmek adına son derece önemlidir.

Sayısal toprak haritalama, sayısal yükseklik modeli gibi arazi özelliklerinden elde edilen yardımcı veriler ile sahada ve laboratuvarda yapılan ölçümlerle uydu görüntüleri arasındaki nicel ilişkilere dayalı olarak coğrafi olarak referanslı toprak veri tabanları oluşturmada kullanılan oldukça etkin bir tekniktir (Costa ve ark., 2018). Sayısal toprak haritası (STH), her pikselin belirli bir coğrafi konuma sahip olduğu ve toprak verilerini içeren bir ızgarada düzenlenen iki boyutlu hücrelerden oluşan bir rasterdir. STH, toprak özelliklerinin veya sınıflarının mekânsal dağılımını gösterir ve tahmininin belirsizliği hakkında bilgi sahibi olmayı mümkün kılar. Ayrıca, sayısal toprak haritalama tekniği, araziye çıkmadan önce toprak etüd haritalarının oluşturulması, mevcut arazi etütlerinin iyileştirilmesi veya güncellenmesi, spesifik arazi yorumları yapabilmek ve riskleri değerlendirmek için de kullanılabilmektedir (Carre ve ark., 2007).

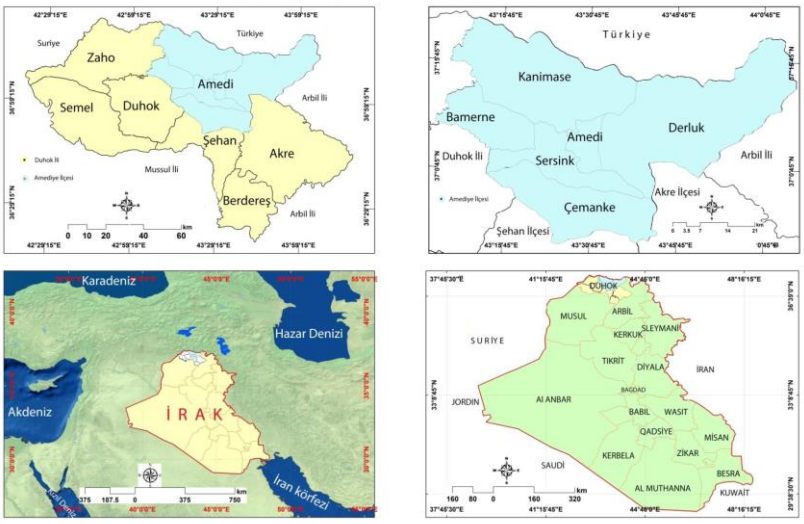
Geleneksel olarak kullanılan toprak haritalama yöntemleri, esas olarak arazi gözlemlerine dayalı bilgiye dayandığından, arazi boyunca istenen çözünürlükte toprak özelliklerinin mekânsal dağılımı hakkında yeterli bilgi üretmemektedir (McBratney ve ark. 2003). Son zamanlarda, çevresel değişkenler kullanılarak, arazide örneklenmemiş noktalardaki toprak özelliklerini tahmin etmek için çeşitli veri madenciliği yöntemleri kullanılmıştır (McBratney ve ark., 2003). Bu kapsamda en yaygın olarak kullanılan metotlardan bazıları regresyon ağaçları (Padarian ve ark., 2019), rastgele ormanlar (random forests) (Kılıç ve ark., 2022; Pouladi ve ark., 2019), destek vektör regresyonu (Taghizadeh-Mehrjardi ve ark., 2021) ve yapay sinir ağları (ANN) (Dindaroglu ve ark., 2022) gibi yumuşak hesaplama tekniklerini kullanmaktadır. Diğer bir yaklaşım, bulanık mantık ve yapay sinir ağlarını bütünleştiren *uyarlanabilir nöro-bulanık çıkarım sistemi*dir (ANFIS). Bulanık sistem, girdi ve çıktı değişkenleri arasında bir ilişki sağlarken, ANFIS'de üyelik fonksiyonlarının parametrelerinin sinir ağları tarafından optimize edilmesi önemli avantajlar sağlamaktadır (Liu ve ark., 2015).

Bu çalışmanın amacı, günümüze kadar toprak kaynakları ile ilgili yeterli çalışmanın yapılamadığı Irak'ın kuzeyinde yer alan Amediye bölgesini içine alan çalışma alanında özellikle bitki besin elementlerinin yarayışlılığı üzerine oldukça etkili olan kireç içeriğinin mekânsal tahmininin yapılarak, haritasının hazırlanmasıdır. Bu amaçla, arazide örneklenmeyen noktalarda kireç içeriğinin tahmininde başlangıçta sayısal toprak haritalamada yaygın olarak kullanılan jeoistatistiksel yöntemlerden kriging ile son yıllarda yaygınlaşmaya başlayan yapay sinir ağlarının öğrenme ve en uygununu bulma yeteneği ile bulanık mantığın insan gibi karar verebilme ve uzman bilgisi sağlama özelliklerini birleştiren bulanık-sinir hibrid sistemlerinden "uyarlanabilir nöro-bulanık çıkarım sistemi" (ANFIS) kullanılmıştır.

MATERYAL VE METOT

Çalışma Alanı

Amedi ilçesi Irak'ın Duhok ilinin 70 km kuzeyinde yer almaktadır. İlçenin rakımı 1400 m civarındadır. Çalışma alanının konumu 37°05'33″K enlem ile 43°29′14″ Doğu boylam arasındadır (Şekil 1). Amedi ilçesinin dağlık ve engebeli doğası nedeniyle, ilçenin %77'si yüksek kaya parçası örtüsü ile karakterize edilen sığ (30-50 cm) açık kahverengi Lithosollerden oluşmaktadır (Tahaa, 2014). Yüksek eğim nedeniyle erozyonun hakim olduğu litosoller, genellikle sığ veya sığa yakın toprak derinliklerine sahiptir. Bölgedeki Lithosollerin bir kısmı, arazinin en aşınmış kısmında meydana gelir ve 10 cm'den daha az kalınlıktadır. Çalışma alanında ikinci en yaygın topraklar kestane renkli topraklar olup, bunu kolüviyal, kırmızı Akdeniz toprağı (Terra Rosa) ve kırmızı kestane renkli topraklar ve Rendzina izlemektedir (Ameen, 2020).



Şekil 1. Çalışma alanı

Toprak Örneklenmesi ve Laboratuvar Analizi

Çalışma alanına ait topografik haritaların (1:25000) ön etütlerinden sonra GPS kullanılarak çalışma yeri tayin edilmiştir. Jeoistatistiksel analiz için çalışma alanı 500 x 500 m kare gridlere bölünmüş ve her grid noktasının yaklaşık olarak köşelerinden toplam 80 noktada 0-20 cm derinlikten toprak örneklemesi yapılmıştır. Kentsel alan, yol, nehir vb. nedenlerle örneklem noktasına erişilmemesi durumunda, mümkün olduğunca yakın alternatif bir yer seçilmiştir. Toprak örneklerinin $CaCO_3$ içerikleri Scheibler kalsimetresi yöntemiyle belirlenmiştir (Allison ve Moodie, 1965).

Mekânsal Tahmin Model Yaklaşımları

Kriging

Birbirine yakın gözlemlerin uzak olanlardan daha fazla benzer olduğu (uzaysal otokorelasyon) bir mekânsal yapının varlığı, jeoistatistiğin uygulanması için bir ön koşuldur (Goovaerts, 1997). Deneysel variogram, örneklenmemiş değerler ile yakındaki bir veri değeri arasındaki ortalama farklılık derecesini ölçer ve böylece çeşitli mesafelerde otokorelasyonu gösterebilir. h'lik bir ayırma mesafesi (gecikme olarak adlandırılır) için deneysel variogramın değeri, z(xi)'deki değer ile z(xi+h)'deki değer arasındaki ortalama kare farkının yarısıdır (Lark, 2000; Robinson ve Metternicht, 2006):

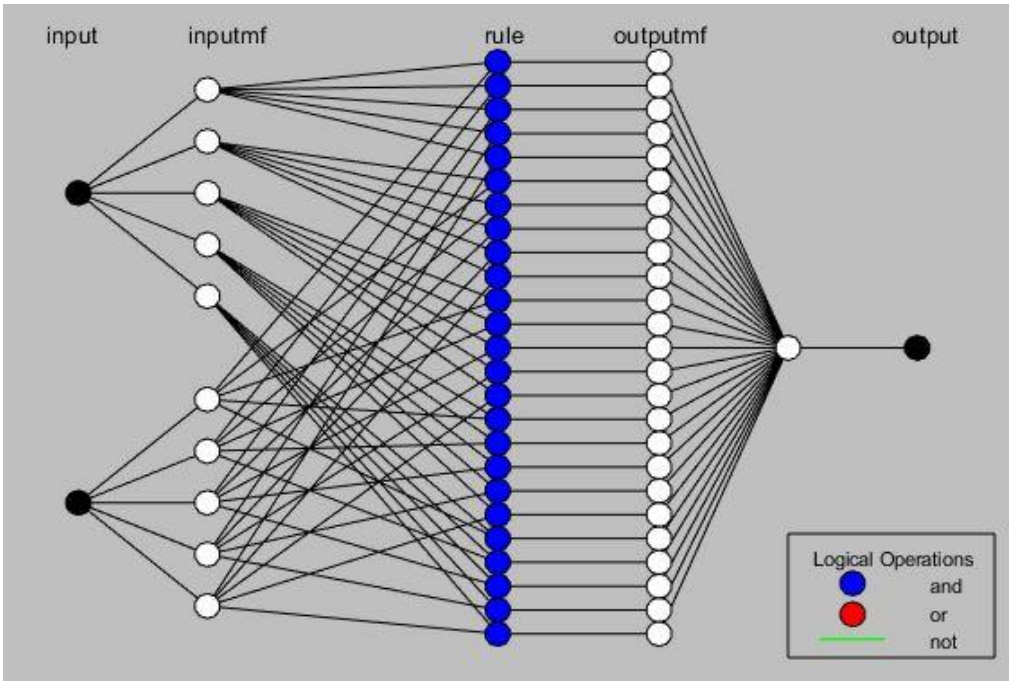
$$\gamma(h) = \frac{1}{2N(h)} \sum_{i=1}^{N(h)} [(z(x_i + h) - z(x_i)]^2 \quad (1)$$

Burada: N(h), belirli bir mesafe ve yön sınıfındaki veri çiftlerinin sayısıdır. Eğer z(xi) ve z(xi+h)'deki değerler otokorelasyona sahipse, Denklem (1)'in sonucu korelasyonsuz bir nokta çiftine göre küçük olacaktır. Deneysel variogramın analizinden, daha sonra, genellikle ağırlıklı en küçük kareler ile uygun bir model uydurulur ve daha sonra parametreler (örneğin, aralık, külçe ve eşik) kriging prosedüründe kullanılır.

Uyarlanabilir nöro-bulanık çıkarım sistemi (Adaptive neuro-fuzzy inference system: ANFIS)

Yapay sinir ağlarının öğrenme ve en uygununu bulma yeteneği ile bulanık mantığın insan gibi karar verebilme ve uzman bilgisi sağlama özellikleri birleşerek bulanık-sinir hibrid sistemleri ortaya çıkmıştır (Şenol, 2010). Böylelikle sistemlerin verilere dayalı olarak optimize edilmesi, sistem performansını olumlu yönde etkileyecektir. Bulanık sinir ağı (Şekil 2), uygun üyelik fonksiyonları ile if-then kurallarını belirleyerek öğrenen, hem geri yayılım öğrenme algoritması hem de onun hibrit yaklaşımları ile ağı optimize edebilen sinir ağı ve bir bulanık sistem birleşimidir (Azamathulla ve ark., 2009; Egrioglu ve Bas, 2021). Şekil 2'de input olarak temsil edilen ortak değişkenler örneklem noktaların X ve Y koordinatlarıdır. Inputmf ise Gaussmf

üyelik fonksiyonudur. Üyelik fonksiyonu sayısı 5 olarak belirlenmiştir. Test veri setinde en az hata ile tahmin elde edilecek şekilde: üyelik fonksiyonu türü, sayısı ve modelin doğrusal ya da sabit olması deneme yanılma yöntemiyle belirlenmiştir. Çalışmamızda kullandığımız ANFIS mimarisi Matlab R2010 a kullanılarak oluşturulmuştur.



Şekil 2. Sunulan çalışmada kullanılan ANFIS mimarisi

Doğruluk Değerlendirmesi

Örnekleme noktaları iki gruba ayrılmıştır: noktaların 70%'i (n=56) ANN modelini eğitmek için ve 30%'u (n=24) doğrulama için kullanıldı. Bu bölümleme ArcGIS 10.8'de Geostatistical Analyst'in "create subset" işlevi kullanılarak rastgele yapılmıştır.

Seçilen her model yaklaşımın tahmin doğruluğu, hata kareler ortalamasının karekökü (RMSE), kareler ortalaması (ME) ve mutlak hata kareler ortalaması (MAE) hata metriklerine göre değerlendirilmiştir.

RMSE (Denklem 3), ME (Denklem 4) ve MAE (Denklem 5); Gözlemlenen değerler ile model tahminleri arasındaki farkları göz önüne alarak ağ performansını değerlendirmektedir. (Somaratne et al., 2005);

$$RMSE = \sqrt{\frac{1}{n}\sum_{t=1}^{n}(M_i - E_i)^2} \quad (3)$$

$$ME = \frac{1}{n}\sum_{i=1}^{n}[M_i - E_i] \quad (4)$$

$$MAE = \frac{1}{n}\sum_{i=1}^{n}|M_i - E_i)| \quad (5)$$

Eşitlikte; Ei, Mi ve n sırasıyla tahmin edilen, ölçülen değerler ve n örnek sayısıdır.

BULGULAR VE TARTIŞMA

Tanımlayıcı İstatistikler

Çalışma alanı toprak kireç içeriğine ait tanımlayıcı istatistikler Tablo 1'de verilmiştir. Tüm veri setine ait örnek sayısı 80 adettir. Tüm verinin %70'i (56 adet) mekansal dağılım modellerini eğitmek; %30'u (24 adet) tahmin başarısının doğruluğunu değerlendirmek için rastgele ayrılmıştır. Tüm veri setinde, toprak kireç içeriğinin minimum, maksimum, ortalama, standart sapma ve varyasyon katsayısı değerleri sırasıyla %4.87, %19.50, %13.62, %2.73 ve %20.03 olarak bulunmuştur. Eğitim veri setinde, toprak kireç içeriğinin minimum, maksimum, ortalama, standart sapma ve varyasyon katsayısı değerleri sırasıyla %5.57, %19.50, %13.87, %2.65 ve %19.14 olarak bulunmuştur. Test veri setinde, toprak kireç içeriğinin minimum, maksimum, ortalama, standart sapma ve varyasyon katsayısı değerleri sırasıyla %4.87, %19.50, %13.06, %2.81 ve %21.55 olarak bulunmuştur. Eğitim ve test veri setine ait tanımlayıcı istatistikler tüm veri setine oldukça benzer olduğundan tüm veri setini temsil etmektedir. Bu yüzden mekânsal dağılım modellerinin eğitilmesi ve test edilmesi için güvenilir bir şekilde kullanılabilir (Xie et al., 2022). Tüm veri setinde toprak kireç içeriği dağılımının ortalama etrafındaki simetriden ne kadar saptığını gösteren çarpıklık değeri -0.481 olarak sola çarpıktır. Tüm veri setinde basıklık değeri 1.20'dir ve normal dağılıma göre daha sivridir. Kolmogorov-Smirnov normal dağılım testi sonuçlarına göre önem değeri (0,082) 0.05'den büyük olduğu için verilerin %5 anlamlılık düzeyinde normal dağılım gösterdiği kabul edilmiştir.

Tablo 1. Tüm, eğitim ve test veri setlerinde kireç içeriğine (%) ait tanımlayıcı istatistik parametreleri

Veri Seti	Minimum	Maksimum	Ortalama	Standart Sapma	Varyasyon Katsayısı
Tüm	4.87	19.50	13.62	2.73	20.03
Eğitim	5.57	19.50	13.87	2.65	19.14
Test	4.87	19.50	13.06	2.81	21.55

Toprak Kireç İçeriğinin Mekânsal Dağılımı

Amed bölgesinin topraklarının kireç içeriğinin mekânsal dağılımı Uyarlanabilir bulanık çıkarım yapay sinir ağı (ANFIS) kullanılarak modellenmiştir. Modellerin ortak değişkenleri örnekleme noktalarına ait X ve Y koordinatlarıdır. Sabit ANFIS modelinin hata istatistikleri tahmin başarısının istenilen seviyede olmadığını işaret ettiği için Doğrusal ANFIS modeli ile mekânsal dağılım model süreci yürütülmüştür. ANFIS optimal üyelik fonksiyon türü ve sayısı deneme

yanılma yöntemiyle belirlenmiştir. Gaussmf üyelik fonksiyonu diğerleri arasından en az hata üretmiştir. ANFIS için en iyi performans doğrusal modelde 5*5 üyelik fonksiyonu sayısında test veri seti kullanılarak elde edilmiştir (Tablo 2).

Bu çalışmada 3 farklı ANFIS modeli oluşturulmuştur. Farklı ANFIS modelleri öngörü doğruluğunu ölçümünde kullanılan hata istatistikleri Tablo 2'de verilmiştir. Hata kareler ortalaması (ME), mutlak hata kareler ortalaması (MAE) ve hata kareler ortalamasının karekökü (RMSE) ANFIS 3 modelinde en az değerleri alarak sırası ile -0.42, 1.85 ve 2.38 olarak hesaplanmıştır. Böylelikle, ANFIS 3 çalışma alanı toprakları kireç içeriğinin mekânsal tahmin modeli olarak seçilmiştir. Mitran ve ark. (2021), insansız hava aracı ile elde ettikleri yansıma spektroskopisi verilerini doğrusal regresyonla değerlendirerek toprak kireç içeriğini tahmin ettikleri araştırmalarında ME, MAE ve RMSE değerlerini sırasıyla 4, 9.25 ve 11 olarak bildirmişlerdir. Çalışmamızda tanımlayıcı istatistikler ve ordinary kriging model doğruluk değerlendirme sonuçları (Tablo 1 ve Tablo 3) göz önüne alındığında sunulan çalışmanın ANFIS modeli ile Mitran ve ark. (2021)'in hata metriklerinde görülen farklılık, çalışma alanlarının iklim, topografya ve ana materyal gibi kireç içeriğine etki eden toprak oluşum faktörlerinin farklılığının yanında veri setleri ve ortak değişkenlerin farklılıkları ile ilişkilendirilebilir.

Tablo 2. ANFIS kullanılarak farklı üyelik fonksiyon ve sayıları ile toprak kireç içeriği tahmini için geliştirilen modellerin test veri seti performanslarının karşılaştırılması

Ortak Değişken	Model	Üyelik Fonksiyon Sayısı	Üyelik Fonsiyon Türü	ME	MAE	RMSE
X, Y	ANFIS 1	3*3	Gaussmf	-0.81	2.19	2.94
	ANFIS 2	4*4	Gaussmf	-0.59	1.97	2.42
	ANFIS 3	**5*5**	**Gaussmf**	**-0.42**	**1.85**	**2.38**

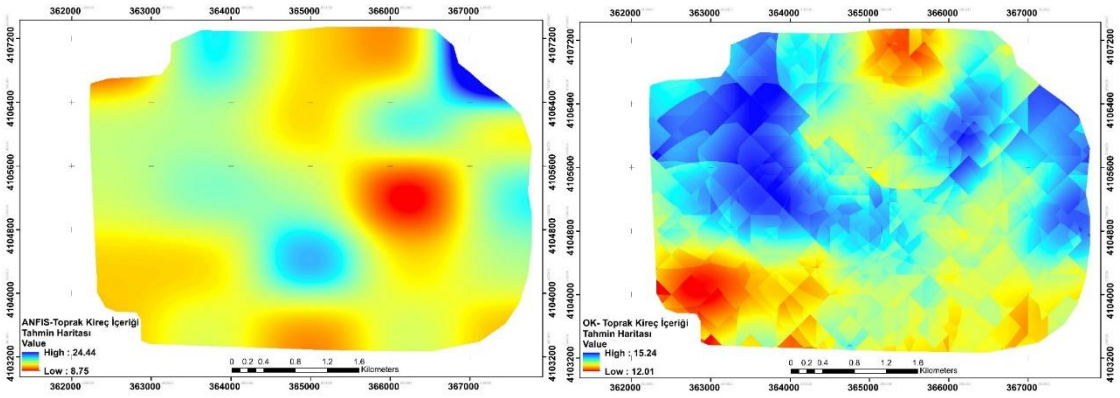
Çalışma alanında toprak kireç içeriği mekânsal tahmini için kullanılan bir diğer model yaklaşımı olarak ordinary kriging (OK) olmuştur. Ordinary kriging modelinde de ANFIS için kullanılan eğitim veri seti ile model eğitilmiş ve test veri seti ile modelin doğruluğu test edilmiştir. Ordinary krigingde test veri seti için elde edilen minimum hata dikkate alınarak oluşturulan optimal modele ait parametreler Tablo 3'de verilmiştir. Nugget/Sill oranı, toprak kireç içeriğinin uzamsal bağımlılık düzeyini tanımlamak için kullanılmıştır. Cambardella ve ark. (1994)'na göre: nugget/sill oranı ≤ 25% ise, değişkenin uzamsal olarak güçlü bir şekilde bağımlı olduğu; 25%-75% arasındaysa, değişken orta düzeyde uzamsal bağımlı ve oran > 75% ise, değişken uzamsal olarak zayıf derecede bağımlı olduğu kabul edilmektedir. Bu çalışmada, nugget/sill oranı, 85.18% olarak bulunmuştur. Nugget/sill oranına göre kireç içeriği çalışma alanında zayıf uzamsal bağımlılığa sahiptir (Tablo 3). Sarmadian ve ark. (2010), spherical

model ile yürüttükleri kriging enterpolasyon çalışmasında RMSE değerini 4.54 olarak bulmuşlardır. Çalışmamız veri setinin standart sapması söz konusu çalışmadan daha düşük olduğu göz önüne alındığında ordinary kriging modeline ait sonuçların literatür ile uyumluduğu kabul edilmiştir.

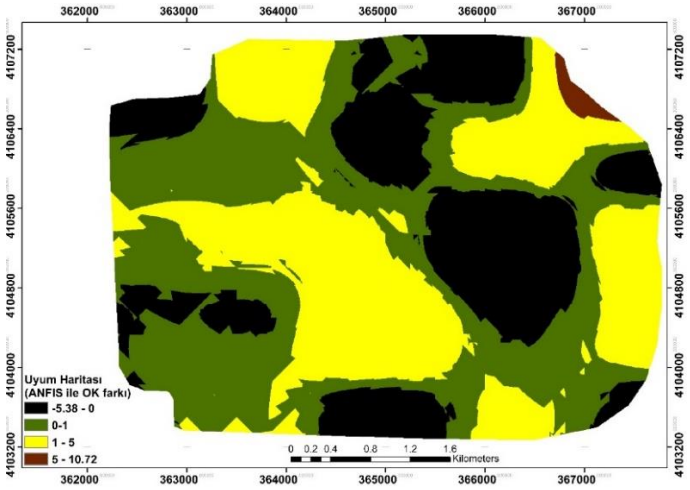
Tablo 3. Ordinary Kriging modeline ait optimal parametreler ve test veri seti için hata metrikleri

Model	**Major Range (km)**	**Nugget**	**Sill**	**Nugget/Sill**	**ME**	**MAE**	**RMSE**
Hole effect	1.675	6.115	7.179	85.18	-0.84	2.12	2.96

Mekânsal dağılım modelleri ile üretilen toprak kireç içeriği haritaları Şekil 3'de verilmiştir. ANFIS modeli tahmin sonuçları ile üretilen kireç içeriği mekânsal dağılım haritası Şekil 3a'da görülmektedir. Tahmini toprak kireç içeriği minimum %8.76, maksimum %24.45, ortalama %13.60 ve standart sapması %1.70'dir (Şekil 3a). Ordinary kriging modeline göre toprak kireç içeriğinin çalışma alanındaki tahmin sonuçları; minimum kireç içeriğinin %12.02, maksimum kireç içeriğinin %15.24, ortalamanın %13.93 ve standart sapmanın %0.62 olduğunu göstermektedir (Şekil 3b). Uyum haritası, ANFIS ile ordinary kriging yöntemleri ile üretilen kireç içeriği tahmin sonuçları arasındaki farkı göstermektedir. Uyum haritasında yeşil renkli görülen ve alana dağılmış bölgelerde kireç içeriğine ait tahmin sonuçları uyumludur. Siyah ile temsil edilen alanlarda ise ANFIS, ordinary kriging mekansal dağılım modeline göre kireç içeriğini 0 ile %5.38 daha yüksek tahmin ettiğini göstermektedir (Şekil 3c). Çalışma alanının sadece kuzey doğusunda küçük bir alanda ANFIS modeli, ordinary kriginge kıyasla kireç içeriğini %5 ile %10.75 arasında fazla yüksek tahmin yapmıştır.



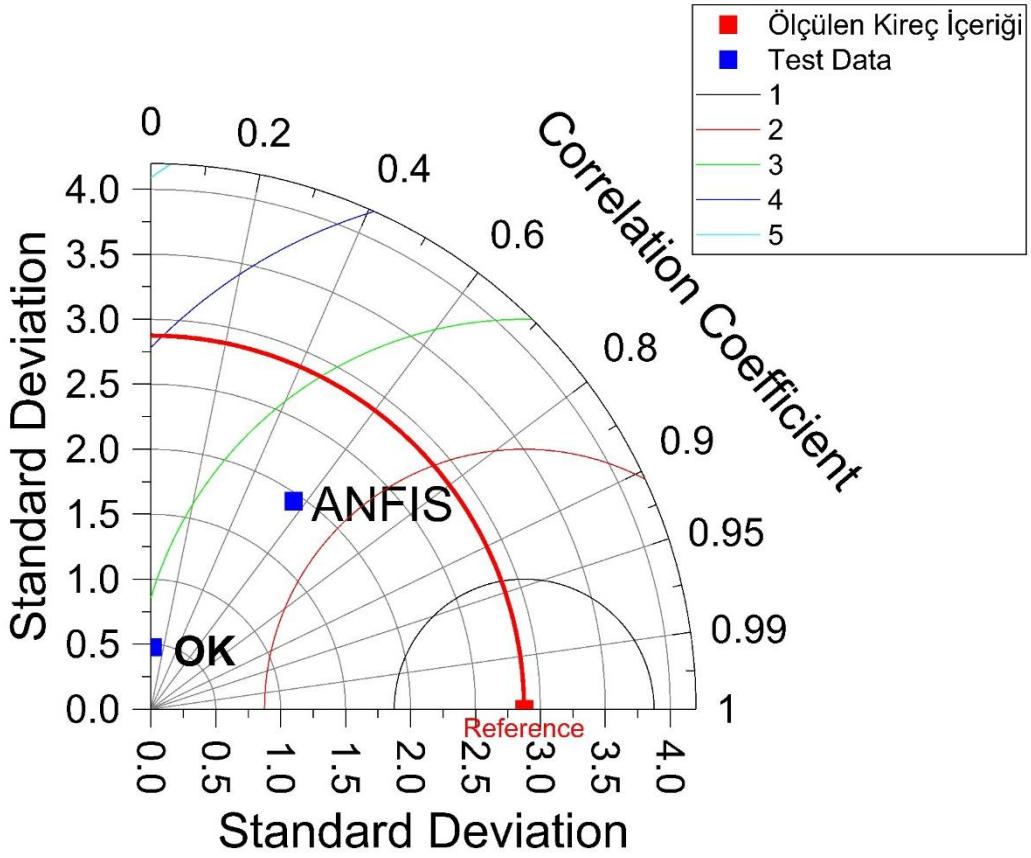
(a) (b)



(c)

Şekil 3. Çalışma alanında tahmini mekânsal kireç haritaları (a) ANFIS modeli haritası, (b) Ordinary kriging haritası ve (c) uyum haritası

Toprak kireç içeriğinin farklı mekânsal tahmin modellerindeki başarısını 2 boyutlu uzayda hata istatistikleri ile değerlendirmeye olanak sağlayan Taylor Diyagramı Şekil 4'de görülmektedir. Taylor diyagramı, gözlem değerleri ile tahmin değerlerini standart sapma, Pearson korelasyon katsayısı (r) ve merkezlenmiş hata kareler ortalamasının karekökü (CRMSE) ile değerlendirmektedir (Taylor, 2005). Test veri setinde ANFIS ve ordinary kriging model tahminlerinin standart sapmaları, referans noktasını temsil eden kırmızı çizginin solunda yer aldığı için gözlem değerlerinden düşüktür. ANFIS ve ordinary kriging modelinin CRMSE değerleri kırmızı ile temsil edilen 2 ile yeşil ile temsil edilen 3 yarım dairelerinin arasında gözlemlenmektedir. ANFIS tahmin sonuçları ile gözlem değerleri arasındaki Pearson korelasyon katsayısı 0.4 ile 0.6 sektörünün arasında olup 0.6'ya yakınsamaktadır. Öte yandan, ordinary kriging tahmin sonuçları ile gözlem verileri arasındaki Pearson korelasyon katsayısı 0 ile 0.2 sektörü arasındadır. Taylor diyagramı sonuçları değerlendirildiğinde ANFIS modelinin ordinary kriging'a göre daha başarılı tahminde bulunduğu görülmektedir.



Şekil 4. Test veri setinde ANFIS ile OK tahmin sonuçlarının Taylor Diyagramı ile karşılaştırılması

SONUÇ

Sunulan çalışma, yarı kurak iklim koşullarının hâkim olduğu Amed Bölgesi topraklarının kireç içeriğinin mekânsal dağılımının modellenmesi ve haritalanmasında, klasik mekânsal enterpolasyon yöntemi olan ordinary kriging ile derin öğrenmenin iki farklı algoritmasının hibrid kullanılması yaklaşımı olan ANFIS modelinin mekansal tahmin algoritmasının karşılaştırılması amacıyla yapılmıştır. Optimal ANFIS parametreleri, sabit ve doğrusal modelde farklı üyelik fonksiyonları ve sayılarına göre değerlendirilmiştir. ANFIS üyelik fonksiyonu Gaussmf ve üyelik fonksiyonu sayısı 5*5 olan doğrusal yapıda, RMSE değeri 2.38 olarak bulunmuştur. Ordinary kriging mekânsal enterpolasyonda Hole Effect modeli optimal parametrelerinde RMSE değeri 2.96 bulunmuştur. Sonuçta, ANFIS modeli ordinary kriginge göre %19.6 daha başarılı tahminde bulunmuştur. Örneklem sayısının az olması, uzamsal olarak ilişkilinin yeterli olmadığı koşullarda, ordinary kriging sınırlı enterpolasyon doğruluğuna sahiptir. Öte yandan, ANFIS derin öğrenme modeli krigingle aynı ortak değişkenleri yani örneklem noktaların koordinatlarını kullanarak bu dezavantajı gidermede etkili olmuştur.

Literatürde çok fazla emek ve para gerektiren toprak özelliklerinin mekânsal olarak tahmin edilmesinde ortak değişken olarak kullanılan toprak kireç içeriği genellikle kriging yöntemiyle öngörü modellerine dahil edilmiştir. Bu durum, araştırmacıları kireç içeriği tahmininde spektroskopi verilerine erişimin olanaksız olduğu veya multispektral optik uydu görüntülerinin yetersiz mekânsal çözünürlük sunduğu durumlarda, sadece örneklem noktaları ile enterpolasyon yapan kriging modellerini tercih etmeye yöneltmiştir. Bu bağlamda, sunulan çalışma, örneklem noktaları koordinatları ile toprak örneklerinin yapay zeka enterpolasyonunun, krigingden daha güvenilir sonuçlar verdiğini, veri setinde var olan varyasyonu tematik toprak özelliği haritasında temsil etme yeteneğine sahip olup mekansal heterojenliğin korunduğunu; toprak kalitesi, sağlığı ve yönetimi gibi toprak özelliklerinin minimum ve maksimum değerlerinin önemli olduğu uygulamalarda, derin öğrenme mekânsal enterpolasyonu daha güvenilir mekânsal toprak bilgisi elde edilebileceğini göstermiştir.

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LOESS REGRESYONU YÖNTEMİ VE UYGULAMASI

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ÖZET
Parametrik olmayan istatistik yöntemlerin, parametrik olan testle ilgili bir veya birden daha fazla varsayım sağlanmadığı durumlarda kullanılmak üzere alternatif bir yöntem olarak geliştirildiği bilinmektedir. Veriler her zaman normal dağılım göstermeye bilirler. Böyle durumlarda veriler farklı transformasyon uygulamaları ile normalleştirilmeye çalışılır. Fakat transformasyon sonucunda da parametrik testlerin ön şartları sağlanamadığında parametrik olmayan test yöntemlerine başvurulur. Örneğin, sağa eğik veya sola eğik dağılım gösteren verilerde ortalama yerine medyan üzerinden hesaplama yapılması daha doğru sonuçlar verebilmektedir. Parametrik regresyon analizinin varsayımlarından birinin veya birkaçının sağlanamadığı durumlarda parametrik olmayan regresyon yöntemlerinin uygulanması gerekir. Parametrik olmayan regresyonda, doğrusal regresyon analizinin aksine, ilişkinin düz bir çizgi ile temsil edildiğine dair bir varsayım yapılmaz. Parametrik olmayan regresyon x ekseni boyunca belirli bir konumdaki değeri yalnızca o civardaki noktalar tarafından belirlenen, bir eğri veya fonksiyon uydurma tekniğidir. Bu yöntem, ilişkinin biçimi hakkında herhangi bir varsayımda bulunmaz ve verilerin kendisi kullanılarak biçimin ortaya çıkmasına izin verir. Çalışmanın amacı parametrik olmayan regresyon yöntemlerinden olan LOESS (Yerel olarak tahmin edilen dağılım grafiği düzleştirme regresyonu) regresyonu hakkında bilgi vermek ve SAS programında çözümlerini göstermektir.

Anahtar Kelimeler: Parametrik olmayan regresyon, polinom, eğri, düzleme

LOESS REGRESSION METHOD AND IT'S APPLICATION

ABSTRACT
It is known that non-parametric statistical methods were developed as an alternative method to be used in cases where one or more assumptions about the parametric test are not provided. Data may not always show normal distribution. In such cases, the data is tried to be normalized with different transformation methods. However, when the prerequisites of parametric tests cannot be met as a result of the transformation, non-parametric test methods are used. For example, calculating over the median instead of the mean in data showing a right skewed or left skewed distribution may yield more accurate results. In cases where one or more of the assumptions of the parametric regression analysis cannot be met, non-parametric regression methods should be applied. In nonparametric regression, unlike linear regression analysis, no assumption is made that the relationship is represented by a straight line. Nonparametric regression is a curve or function fitting technique whose value at a particular location along the x-axis is determined only by points in that vicinity. This method makes no assumptions about the form of the relationship and allows the form to emerge using the data itself. The aim of the study is to give information about LOESS (Locally estimated scatterplot smoothening regression), which is one of the non-parametric regression methods, and to show its solutions in SAS statistical program.

Keywords: Nonparametric regression, polynom, curve, smoothing

1. GİRİŞ

Eğri uydurmak için iki genel uydurma stratejisi vardır: parametrik ve parametrik olmayan uydurma (Cleveland, 1993). Parametrik uydurmada, araştırıcının ilişkinin fonksiyonel biçimini önceden belirlemesi gerekir. Uydurma algoritması daha sonra, genellikle ikisi arasında en iyi uyumu sağlayan denklem katsayıları kümesini tahmin ederek, belirtilen form ile ampirik veriler arasındaki uyumu optimize eder. Parametrik olmayan uydurmada düzleştiriciler değişkenler arasındaki fonksiyonel ilişkinin önceden belirtilmesini gerektirmeden veri noktaları arasında düz bir eğri bulmak için kullanılırlar. Uydurma algoritması basitçe çizilen noktaların ampirik yığımını takip eder. Ortaya çıkan uygun "çizgi", bunun için gerekli olan eğrinin şekli ne olursa olsun, dağılım grafiğindeki veri bölgesinin en yoğun alanlarından geçmek zorundadır (Jacoby, 2000). En popüler parametrik olmayan düzleştirici LOESS yöntemidir (Cleveland ve Devlin, 1988; Cleveland, 1993). LOESS, çok değişkenli düzleştirme yoluyla verilere regresyon yüzeyi uydurma sürecidir: Bağımlı değişken, bir zaman serisi için hareketli ortalamanın nasıl hesaplandığına benzer şekilde, hareketli bir tarzda bağımsız değişkenlerin bir fonksiyonu olarak düzleştirilir (Cleveland ve Delvin, 1988). LOESS, bir bağımlı değişken ile bir veya daha fazla bağımsız değişken arasındaki ilişkinin grafiksel bir özetini sağlar. Bu yöntemin esas özelliği, “verilerin kendilerini olduğu gibi göstermelerine izin vermesidir”. LOESS parametrik yöntem değildir, bu nedenle uygun eğri, verilerde var olabilecek herhangi bir yapının doğası hakkında önceden sağlanması gereken varsayımlardan ziyade ampirik olarak elde edilir. Bu nedenle, LOESS ile güçlendirilmiş serpilme grafikleri genellikle, geleneksel istatistiksel modelleme prosedürleriyle kolayca gözden kaçabilen karmaşık ilişkileri ortaya çıkarır. Genel olarak, LOESS ampirik veriler içindeki sistematik yapıyı ayırt etmek için çok yararlı bir araçtır (Jacoby, 2000).

LOESS regresyonun bir çok uygulama alanları vardır. Bunlardan, Keith ve ark., (2016) yaptıkları çalışmada bootstrap örneklemesi ve LOESS regresyonu gibi parametrik olmayan yaklaşımları kullanarak toprak profillerini modellemiş ve arazi kullanımı ile arazi yönetimi arasındaki toprak özellikleri bakımından olan farklılıkları test etmişlerdir. Bu yöntemlerin seçimi arazi kullanımları arasındaki (veya arazi kullanım geçişleri arasındaki) doğrusal olmayan ilişkileri karşılaştırabilen ve belirli bağlamlarla sınırlandırılmayacak esnek bir yönteme olan ihtiyaçtan kaynaklanmıştır. Toprak derinliği profillerinde doğrusal olmayan ilişkileri modellemek için kullanılan bu yaklaşımın veriye dayalı ve herhangi bir dağılım varsayımını karşılaması gerekmediğinden diğer yöntemlerden daha iyi sonuç verdiğini belirtmişlerdir. Yöntem tam derinlik profili boyunca önemli farklılıkların net bir şekilde

incelenmesini sağlamıştır. Tate ve ark., (2005) yaptıkları çalışmada LOESS regresyonu ve dalgacık yönteminin matematik ve görüntü işlemede yaygın olarak kullanıldığını, ancak coğrafya ve CBS'de çok az kullanıldığını bildirerek, fiziksel coğrafyada sıklıkla karşılaşılan durağan olmayan uzamsal veri serilerinin analizi için kullanmışlardır.

Yapılan bu çalışmada LOESS tekniği ile ilgili teorik bilgiler verilerek tarım alanından elde edilen verilere bir örnek uygulama gösterilmiştir. İstatistik paket olarak çevrimiçi kayıt sistemine dayanan SAS on demand for Academics istatistik programı kullanılmıştır.

2. LOESS regresyonu (Yerel olarak tahmin edilen dağılım grafiği düzleme regresyonu)

Bazı veri kümeleri için, y bağımlı değişkeni ile x_1, ..., x_k bağımsız değişkenleri arasındaki ilişkiyi bir fonksiyon (örneğin, polinom veya üstel) ile açıklamak imkansız oluyor. Böyle durumlarda, parametrik olmayan regresyon modelleri kullanılmalıdır.

$$y = f(x_1, \dots, x_k) + \varepsilon \qquad (1)$$

Eş. 1'de f, parametrik olmayan bir fonksiyon, ε 'lar ise sıfır ortalama ve σ^2 sabit varyansa sahip bağımsız, özdeş olarak dağıtılmış rastgele hatalardır. ε'ların olasılık dağılımı ile ilgili herhangi bir varsayım yapılmamaktadır (Korosteleva, 2014). (1) fonksiyonunu sağlamış olan n gözlem kümesinin (x_1, ..., x_k, y) mevcut olduğunu varsayalım. Loess (locally estimated scatterplot smoothing) yöntemi, her veri noktasında f fonksiyonunu hesaplar ve dağılım grafiği üzerinde, uygun noktaları birleştiren parçalı bir polinom eğrisi çizer. İkiden fazla boyutta, loess regresyon yaklaşımı, uydurulan noktalardan geçen yassı yüzeyler (flat surfaces) oluşturur. Bu yöntem 1979 yılında Amerikalı istatistikçi olan William S. Cleveland (1943-) tarafından tanıtılmıştır (Cleveland, 1979).

Fonksiyonun veri noktalarındaki tahmini, her noktanın yerel komşuluğuna bir polinom regresyon fonksiyonu uydurularak yapılır. Komşulukların yarıçapı, düzgünleştirme parametresi adı verilen önceden belirlenmiş veri noktalarının fraksiyonu tarafından belirlenir. Polinomiyal regresyon (doğrusal veya kuadratik), merkezden daha uzaktaki noktalara daha az ağırlık verilerek, ağırlıklı en küçük kareler yöntemiyle uydurulur. Farklı bir deyimle, ilk olarak, düzleştirme parametresinin değeri örneğin, p/n olarak belirtilir. Bunun anlamı, belirli $x^0 = (x_1^0, \dots, x_k^0)$ noktası için yerel komşulukta p noktalarına doğrusal fonksiyon uydurulur $N_p(x^0)$. Bu doğrusal fonksiyon aşağıdaki şekilde tanımlanır:

$$l(x) = l(x_1, \dots, x_k) = \beta_0 + \beta_1(x_1 - x_1^0) + \cdots + \beta_k(x_k - x_k^0)$$
$$\forall\, x = (x_1, \dots, x_k) \in N_P(x^0)\ için.$$

Tahmin edilen ağırlıklı en küçük kareler doğrusu Eş. 2'de

$$\hat{l}(x) = \hat{\beta}_0 + \hat{\beta}_1(x_1 - x_1^0) + \cdots + \hat{\beta}_k(x_k - x_k^0) \qquad (2)$$

$$\sum_{x_i \epsilon N(x^0)} [y_i - l(x_i)]^2 \, w\left(\frac{\|x_i - x^0\|}{r(x^0)}\right) \qquad (3)$$

Eş.3' te minimuma indirir.

Burada $x_i = (x_{1i}, \dots, x_{ki}), i = 1, \dots, p$, $\|x_i - x^0\|$ Öklid uzaklığını (Eş. 4) gösterir:

$$\|x_i - x^0\| = \sqrt{(x_{1i} - x_1^0)^2 + \cdots + (x_{ki} - x_k^0)^2} \ , \qquad (4)$$

$r(x^0) = \max_{x_i \epsilon N_p(x^0)} \|x_i - x^0\|$ komşuluğun yarıçapı ve w(·) ise ağırlıktır.

Son olarak, f fonksiyonu x^0 noktasında $\hat{l}$ doğrusu üzerindeki uygun değer ile tahmin edilir, yani $\hat{f}\,(x^0) \;=\; \hat{l}\,(x^0) \;=\; \hat{\beta}0.$

Her veri noktasındaki bağımlı değişkenin LOESS tahmini tamamlandıktan sonra, LOESS eğrisi çizilir.

Dağılım grafiğinde önemli bir eğrisel ilişki görünüyorsa, l doğrusal fonksiyonu yerine ikinci dereceden fonksiyon (Eş. 5) kullanılır:

$$q(x_1, \dots, x_k) = \beta_0 + \beta_{1,1}(x_1 - x_1^0) + \beta_{1,2}(x_1 - x_1^0)^2 + \cdots + \beta_{k,1}(x_k - x_k^0) + \beta_{k,2}(x_k - x_k^0)^2 \qquad (5)$$

LOESS regresyon yöntemi için farklı ağırlık fonksiyonları tercih edilmektedir. Bunlardan en sık kullanılanlar aşağıdaki gibidir:

- Çiftkare (bisquare) fonksiyonu

$$w(x) = \begin{cases} (1 - \|x\|^2)^2, & eğer \quad \|x\| \le 1, \\ 0, & aksihalde \end{cases}$$

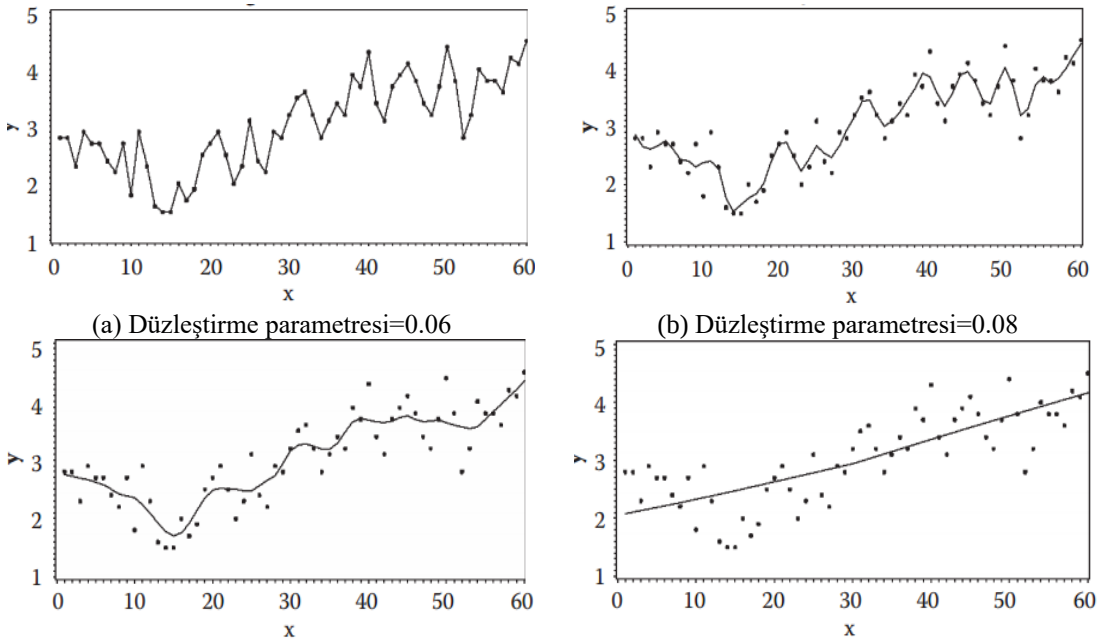
ve

- Üçlüküp (tricube) fonksiyonu

$$w(x) = \begin{cases} (1 - \|x\|^3)^3, & eğer \quad \|x\| \le 1, \\ 0, & aksihalde \end{cases}$$

Her iki durumda da ‖x‖, $x = (x_1, \dots, x_k), \|x\| = \sqrt{x_1^2 + \cdots + x_k^2}$ Öklid normunu ifade ediyor.

Şek. 1'de, düzleştirme parametresinin farklı değerleri için uygun LOESS eğrisi ile bir dizi dağılım grafiği gösterilmiştir. Düzleştirme parametresinin en küçük değerine sahip eğri, veri noktalarını birbirine bağlayan basitçe zikzaklar çizer. Düzleştirme parametresinin değeri arttıkça, uydurulan eğri daha düzgün hale gelir.



(a) Düzleştirme parametresi=0.06 (b) Düzleştirme parametresi=0.08

(c) Düzleştirme parametresi=0.15 (d) Düzleştirme parametresi=1

Şekil 1. Farklı düzleştirme parametrelerine göre x ve y dağılım grafiği

Düzleştirme parametresinin değeri sıfıra yaklaştıkça, polinomiyal regresyonu uydururken yerel komşuluğa yalnızca bir nokta atanır ve o da merkez olur. Böylece f'in tahmin edilen değeri gözlemlenen değerle çakışır ve LOESS eğrisi sadece gözlemlenen noktaları birleştirir. Diğer taraftan, düzleştirme parametresi bire eşit olduğunda, gözlemlenen tüm noktalar tüm komşuluklara dahil edilir ve bu nedenle, her zaman tüm noktalardan düz bir çizgi geçer. Bununla birlikte, uyum ağırlıklıdır, bu nedenle her zaman mükemmel düz çizgili LOESS eğrisi elde edilmeyebilir. Düzleştirme parametresinin değeri birden büyük seçilirse, LOESS eğrisi düz bir çizgi haline gelir. Bazı durumlarda, dağılım grafiği üzerindeki noktaların konfigürasyonuna bağlı olarak, LOESS eğrisi, düzleştirme parametresinin nispeten küçük değerleri için bile mükemmel şekilde düzgün görünebilir.

Şekil 1'de 0.06, 0.08, 0.15 ve 1 düzleştirme parametreleri için LOESS eğrileri çizilmiştir. Burada verilerdeki periyodikliği düzgün bir şekilde yakalamak için, düzleştirme parametresinin 0.08 ile 0.15 arasında bir değerinin kullanılması önerilebilir.

2.1. Düzleştirme Parametresi Seçim Kriteri

Veri kümesinde optimal düzleştirme parametresinin seçimi için birçok kriter mevcuttur. Bunlardan en sık kullanılan, yanlılık düzeltmeli Akaike bilgi kriteridir (AICC). Bu kriter ilk olarak 1974 yılında Japon istatistikçi Hirotugu Akaike (1927-2009) tarafından tanıtılmıştır.

Akaike Bilgi Kriteri 1989 yılında yanlılık düzeltilmiş versiyona genişletilmiştir (Hurvich and Tsai, 1989). Kriter, aşağıdaki eşitliği en aza indiren düzleştirme parametresini seçiyor:

$$AICC = ln\hat{\sigma}^2 + \frac{2(Trace(\mathcal{L})+1)}{n-Trace(\mathcal{L})-2} \quad (6)$$

burada $\hat{\sigma}^2$, Eş. (6)' daki ε rastgele hata varyansının tahminidir. $\mathcal{L}$ matrisi, $y = \mathcal{L}\hat{y}$ şartını sağlayan n × n düzleştirme matrisidir; burada y, gözlemlenen y değerlerinin vektörüdür ve $\hat{y}$, uygun olan tahmin edilen değerlerin vektörüdür. Matrisin izi ise, esas köşegen üzerindeki elemanların toplamı olarak tanımlanır.

2.2. SAS Uygulaması

SAS'ta, LOESS komutu parametrik olamayan eğrileri uydurmak için kullanılır (çok boyutluda ise yüzeyleri). Esas kod yazım şekli aşağıdaki gibidir:

PROC LOESS DATA= veri adı;
MODEL bağımlı değişken= bağımsız değişkenler listesi/
DEGREE=1 veya 2 CLM ALPHA=değer SMOOTH=değer;
ODS OUTPUT OutputStatistics=output stats veri adı
ScoreResults=score results veri adı;
SCORE DATA=points4prediction veri adı;
RUN;

DEGREE: yerel polinomların derecesini belirtir (doğrusal için 1, ikinci dereceden için 2). Varsayılan değer 1'dir.

CLM: gözlemlenen her yanıt değeri için güven aralığı üretir. Varsayılan olarak, %95 güven sınırları hesaplanır, ancak seviye ALPHA= kullanılarak değiştirilebilir.

SMOOTH: Varsayılan olarak SAS, en uygun düzleştirme parametresini seçmek için bias corrected Akaike Bilgi Kriteri'ni (AICC) kullanır. SMOOTH= seçeneği koda dahil edilmişse, düzleştirme parametresinin listelenen her değeri için ayrı bir LOESS regresyonu uydurulur.

ODS OUTPUT: OutputStatistics ifadesi, LOESS regresyon uydurmanın sonuçlarını içeren çıktı veri seti oluşturur. Burada ODS, "çıktı dağıtım sistemi" anlamına gelir. Çıktı veri seti, yanıtın bir sütunu olan SmoothingParameter adlı tahminde kullanılan düzleştirme parametresinin değerlerinin bir sütununu içerir.

SCORE ifadesi, tahmin edilen değerlerin elde edilmesinin istendiği noktalarla bir veri kümesini belirtir. Bu değerler ScoreResults komutunda verilen veri kümesine yerleştirilir ve bu dosya yazdırılarak görüntülenebilir. P yanıtı olarak adlandırılan, puanlama sonuçlarını içeren verilerdeki son sütun, tahmin edilen değerlerin sütunudur.

2.3. Uydurulmuş LOESS Eğrisinin Çizilmesi

İki boyutlu dağılım grafiği üzerinde uygun LOESS eğrisi çizmek için aşağıdaki komutlar uygulanır:

```
SYMBOL1 COLOR=black VALUE=dot; /*dağılım grafiğinde siyah noktalar*/
SYMBOL2 COLOR=black VALUE=none INTERPOL=join LINE=1;
/* tek parça olarak görüntülenen eğri*/
SYMBOL3 COLOR=black VALUE=none INTERPOL=join LINE=2;
/* LowerCL bandı kesikli olarak görüntüleniyor*/
SYMBOL4 COLOR=black VALUE=none INTERPOL=join LINE=2;
/*UpperCL bandı kesikli olarak görüntüleniyor*/
PROC GPLOT data=output veri adı;
BY SmoothingParameter;
PLOT (DepVar Pred LowerCL UpperCL)*predictor / OVERLAY
NAME=’graph name’;
RUN;
PROC GREPLAY IGOUT=WORK.GSEG TC=SASHELP.TEMPLT
TEMPLATE=template name NOFS;
TREPLAY 1:graph name 2:graph name1 ... ;
RUN;
```

BY ifadesi, kodda daha önce belirtilen düzleştirme parametresinin her değeri için uygun LOESS eğrisi ile dağılım grafiği üretmek için gereklidir. Karşılık gelen düzleştirme parametresinin değeri her grafikte görüntülenir.

PLOT komutundaki **OVERLAY** seçeneği, listelenen tüm verilerin (DepVar, Pred, LowerCL ve UpperCL) aynı grafikte görüntülenmesini ister.

PLOT ifadesindeki **NAME** seçeneği, her grafiğe bir ad atar. İlk grafik *graph_name* olarak adlandırılır. Ardışık tüm grafikler aynı ada sahip oluyor, fakat 1,2,3 gibi son ekler alıyorlar.

2.4. 3D Scatterplot’un Çizilmesi

3D scatterplot çizimi için kullanılacak kodlar aşağıdaki gibidir:

```
PROC G3D data= veri adı;
SCATTER 1.bağımsız değişken*2.bağımsız değişken=bağımlı değişken/ COLOR="reng";
RUN;
```

COLOR seçeneği 3D scatterplot için rengi belirler. Rengin adı çift tırnak içine alınmalıdır.

2.5. Uydurulmuş LOESS Yüzeyinin Çizilmesi

Yüzeyleri çizmek için yeterli 3B noktaları olmadıkça SAS, uydurulmuş LOESS yüzeyi vermez. Çözüm olarak, kılavuz noktaları olan bir veri seti oluşturulmalı ve LOESS prosedürünün SCORE seçeneğine dahil edilmelidir.

Aşağıdaki kodlar kullanılabilir:

DATA grid points veri adı;

DO 1.bağımsız değişken = min TO max BY increment;

DO 2.bağımsız değişken = min TO max BY increment;

OUTPUT;

END;

END;

RUN;

PROC G3D DATA=score results veri adı;

PLOT 1.bağımsız değişken*2.bağımsız değişken=P bağımlı değişken/ CTOP=color CBOTTOM=color;

RUN;

CTOP ve CBOTTOM komutları uydurulan yüzeyin üst ve alt taraflarını boyar.

Örnek: 2010-2021 yılları arasında Türkiye'de aylık süt üretim miktarına ilişkin istatistikler TÜİK'den (TÜİK, 2021) elde edilmiştir. Aşağıdaki kodlar, verilerin dağılım grafiğini oluşturarak ve bias corrected Akaike Bilgi Kriterine dayalı olarak düzleştirme parametresinin optimal değerleriyle bir LOESS eğrisi çizer.

LOESS regresyonu uygulamak için aşağıdaki SAS kodlarını oluşturuyoruz:

data süt_üretimi;

input Sut_miktari @@;

Aylik=_N_;

datalines;

494351 492360 594800 610599 654696 622359 610645 560309 526132 531445 503311 544004

561528 545628 627661 646642 699108 636494 591864 566044 537872 543655 530376 586867

634578 631521 715190 727769 782621 727805 695079 641380 599773 587149 575344 614276

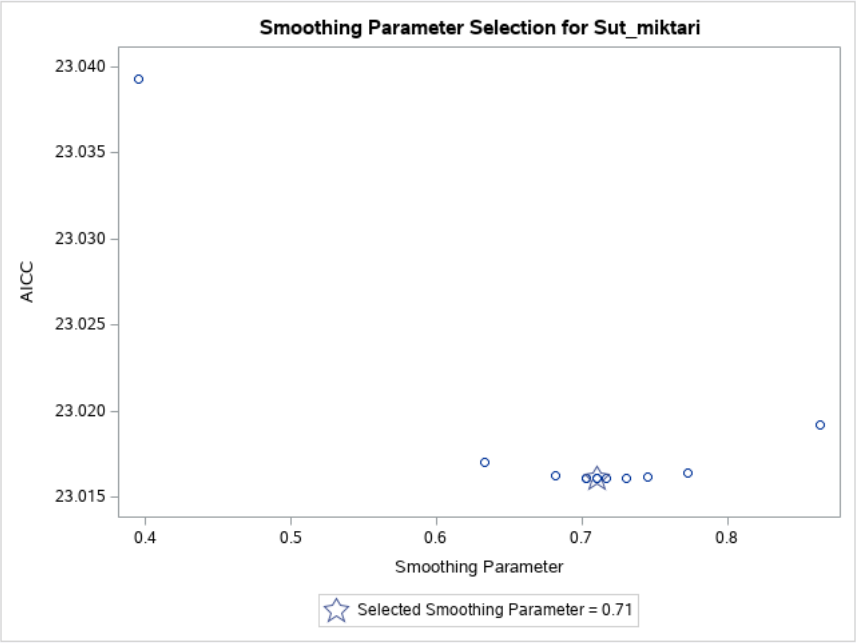
637956 622381 710712 733380 772785 692084 675158 628996 594456 605194 611918

```
653490
708555 681866 788988 793740 828420 766885 743245 697925 648631 648660 634067
684760
712942 698164 804210 816750 864101 791429 744380 722532 680990 695642 677056
728944
750402 752218 834329 810704 837592 808743 769722 756446 707584 731042 716617
738122
745578 702788 794235 765449 808916 750297 740977 755136 729491 756970 749772
812054
850091 814357 916867 907649 916453 848641 863013 840578 788339 774681 743427
770123
740460 751029 839056 848511 913442 837977 800524 781707 730943 753620 727917
780842
806748 792381 878593 873641 894990 864594 825131 820835 772673 787342 736961
787168
887275 779077 893626 889725 906504 880572 838940 823577 785162 803360 763413
;
proc loess data=süt_üretimi;
model Sut_miktari=Aylik/clm;
ods output OutputStatistics=results;
run;
proc print data=results;
run;
symbol1 color=black value=dot;
symbol2 color=black value=none interpol=join line=1;
symbol3 color=black value=none interpol=join line=2;
symbol4 color=black value=none interpol=join line=2;
proc gplot data=results;
by SmoothingParameter;
plot (DepVar Pred LowerCL UpperCL)*Aylık/ overlay;
run;
```

İlgili SAS çıktısı ise aşağıdaki gibi olacaktır:

The LOESS Procedure

Dependent Variable: Sut_miktari



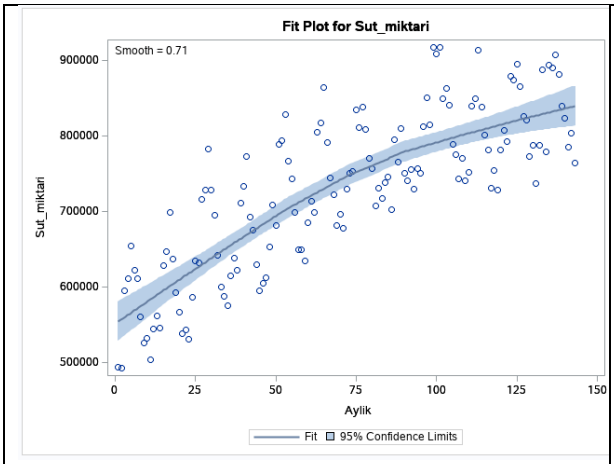
Şekil 2. Süt miktarı verisi için düzleştirme parametresinin seçimi

Şek. 2'de AICC kriterine göre optimal düzleştirme parametresinin seçimi gösterilmiştir. Tablo 1'de ise SAS programı ile LOESS eğrisinin uygulanması sonucu elde edilen uyum özeti verilmiştir.

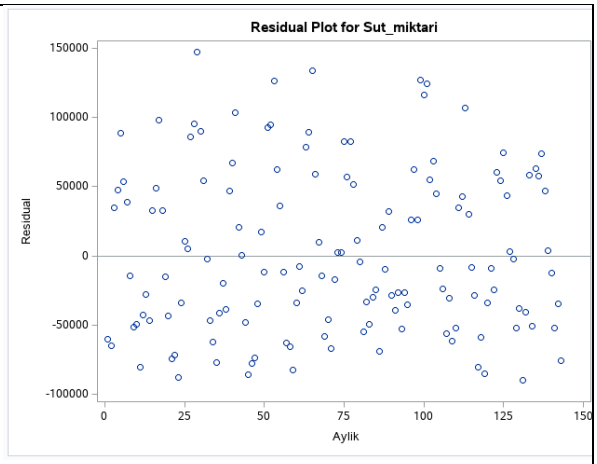
Tablo 1. SAS program çıktıları

Optimal Smoothing Criterion	
AICC	**Smoothing Parameter**
23.01608	0.70979

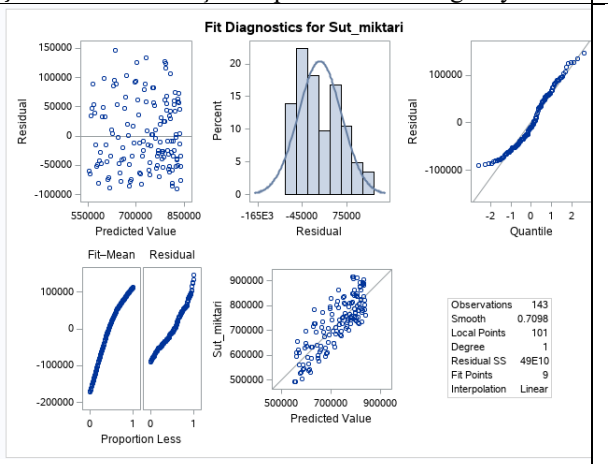
Fit Summary	
Fit Method	kd Tree
Blending	Linear
Number of Observations	143
Number of Fitting Points	9
kd Tree Bucket Size	20
Degree of Local Polynomials	1
Smoothing Parameter	0.70979
Points in Local Neighborhood	101
Residual Sum of Squares	4.9006E11
Trace[L]	3.21186
GCV	25078908
AICC	23.01608
AICC1	3291.31905
Delta1	139.41719
Delta2	139.12580
Equivalent Number of Parameters	2.84090
Lookup Degrees of Freedom	139.70918
Residual Standard Error	59288



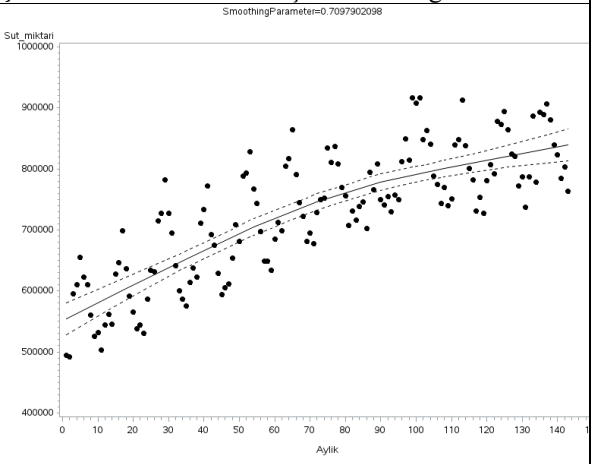
Şekil 3. 0.71 düzleştirme parametresi ile eğri uyumu



Şekil 4. Süt miktarı verisi için kalıntı dağılımı



Şekil 5. Süt miktarı verisi için uyum özeti



Şekil 6. 0.71 düzleştirme parametresi ve %95 güven aralığı ile LOESS eğri uyumu

Şekil 3: Şek.6'da LOESS yöntemi ile süt verilerine uydurulan 0.71 düzleştirme parametreli eğri, kalıntı analizi ve güven aralıkları görselleştirilmiştir.

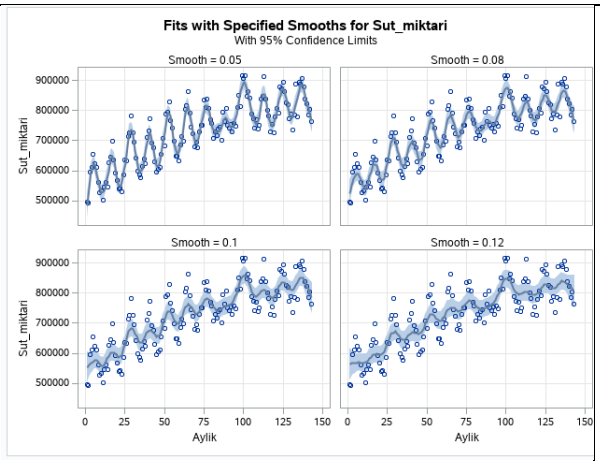
Tablo 2'de aylık gözlemlenen süt miktarları (DepVar), tahmin edilen süt miktarları (Pred), kalıntı (Residual) ve alt ve üst güven sınırları verilmiştir.

Tablo 2. 0.71 düzleştirme parametresi ile tahmin edilen süt verimi ve güven aralıkları

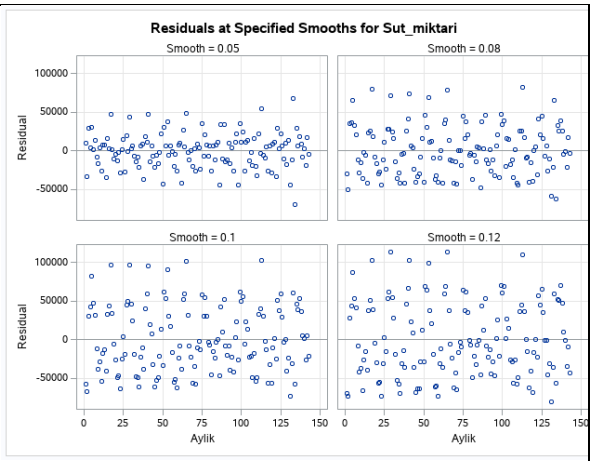
Obs	Smoothing Parameter	Obs	Aylik	DepVar	Pred	Residual	LowerCL	UpperCL
1	0.70979	1	1	494351	554289	-59938	527944	580634
2	0.70979	2	2	492360	557203	-64843	531381	583025
3	0.70979	3	3	594800	560117	34683	534814	585419
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
141	0.70979	141	141	785162	837100	-51938	811798	862403
142	0.70979	142	142	803360	838155	-34795	812334	863977
143	0.70979	143	143	763413	839210	-75797	812865	865555

Otomatik olarak uydurulan LOESS eğrisi, verilerdeki periyodik eğilimleri görmeyebilir. SAS'ta, MODEL ifadesinin SMOOTH seçeneğinde bu değerleri listeleyerek, düzleştirme parametresinin belirli değerleri için LOESS eğrilerine uyması istenebilir. Aşağıdaki kodları yazarak sonuçlar çizdirilir:

```
proc loess data=süt_üretimi;
model Sut_miktari=Aylik/ clm smooth=0.05 0.08 0.1 0.12;
ods output OutputStatistics=results;
run;
proc print data=results;
run;
proc gplot data=results;
by SmoothingParameter;
plot (DepVar Pred LowerCL UpperCL)*Aylik/ overlay name='graph';
run;
proc greplay igout=work.gseg tc=sashelp.templt template=l2r2 nofs;
treplay 1:graph 2:graph2 3:graph1 4:graph3;
run;
```



Şekil 7. Süt miktarı için farklı düzleştirme parametreleri ile eğri uyumu



Şekil 8. Süt miktarı için farklı düzleştirme parametrelerine göre kalıntı analizi

Şek. 7 ve Şek. 8'deki grafikler incelendiğinde, 0.05'e yakın düzleştirme parametresi değerinin verilerdeki periyodikliği en iyi şekilde tanımladığı sonucuna varılabilir. Fakat bununla birlikte, model AICC kriterine göre en iyi uyuma sahip olmayacaktır.

3. SONUÇ VE ÖNERİLER

Normal dağılım şartı sağlanmadığında parametrik testler yerine parametrik olmayan testler kullanılmaktadır. Yapılan bu çalışmada parametrik olmayan yerel olarak tahmin edilen dağılım grafiği düzleme regresyonu (LOESS) yönteminin tarım alanında uygulamasına yer verilmiş ve örnek çözülmüştür. LOESS, sürekli tahmin ediciler ve yanıt değişkenleri arasındaki karmaşık ilişkilerin görselleştirilmesi için kullanılan bir düzleştirme eğrisi yöntemidir. LOESS yalnızca bir serpilme grafiği düzleştiricisi olarak kullanıldığında, değişkenler arasındaki ilişkiler için fonksiyonel biçimlerin değerlendirilmesi, regresyon analizinde ise model varsayımlarının incelenmesi ve ampirik verilerde karmaşık yapıların gösterimi dahil olmak üzere bir dizi önemli araştırma için yardımcı olmaktadır. Aynı zamanda, LOESS gibi parametrik olmayan düzleştiriciler, geleneksel parametrik düzleştirme yöntemlerinin tamamlayıcısı olarak görülmektedir.

Çalışmada LOESS yöntemi teorik olarak açıklanmıştır. Daha sonra ele alınan yöntem veri setine uygulanarak SAS on Demand for Academics çevrimiçi programı ile analiz edilmiştir. Örnek olarak tarım alanından üretim verileri kullanılmıştır. LOESS yöntemi kategorik ve ordinal veriler için de uygundur. Bu nedenle anket yoluyla elde edilen örneklerde bu yöntemler uygulanırsa, açıklayıcı sonuçlar elde edilebilecektir. İlerideki çalışmalarda anket verileri üzerine uygulamalar yapılabilir.

AÇIKLAMA

Bu çalışma ilk yazarın yüksek lisans tezinin bir bölümünü oluşturmaktadır.

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TÜİK, (2021), Türkiye istatistik Kurumu veritabanı.

THIN-PLATE SMOOTHING SPLINE YÖNTEMİ VE UYGULAMASI

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ÖZET
Parametrik olmayan regresyonun uydurulmasında Thin-plate smoothing spline yöntemi de kullanılmaktadır. Bu yöntem, cezalı en küçük kareler tahmin tekniğine dayanır ve ince plaka düzleştirme eğrisi (thin-plate smoothing spline) yöntemi olarak adlandırılır. Yöntem adını, çizildiğinde düzleştirici bir eğri yüzeyinin bükülmüş bir metal plakaya benzediği için almıştır. İnce plaka spline'ları, sürekli bağımsız değişkenler ve bağımlı değişkenler arasındaki karmaşık ilişkilerin görselleştirilmesi için kullanılan bir düzleştirme spline türüdür. İnce plaka spline'ları, çok boyutlu görünümleri nedeniyle, iki sürekli bağımsız değişkenin tek bir sonuç üzerindeki birleşik etkisini incelemek için idealdir. Tek bir eğriden ziyade ince plaka spline'ları bükülebilir bir yüzey olarak temsil edilir. Her sürekli değişken, iki değişkenli, iki boyutlu bir yüzey yaratarak ayrı bir x ekseni üzerinde çizilir. Thin-plate smoothing spline ilk olarak 1970'lerin bilgisayar biliminde hesaplamalı geometrinin alt alanında kullanılmıştır. Modelleme yaklaşımı günümüzde mühendislik, antropoloji, ekoloji, tarım ve örüntü tanıma dahil olmak üzere birçok alanda sıklıkla kullanılmaktadır. Çalışmanın amacı parametrik olmayan regresyon yöntemlerinden olan Thin-plate smoothing spline (ince plaka düzleştirme eğrisi) regresyonu hakkında bilgi vermek ve SAS programında çözümlerini göstermektir.

Anahtar Kelimeler: Parametrik olmayan regresyon, yüzey, eğri, ince plaka

THIN-PLATE SMOOTHING SPLINE METHOD AND IT'S APPLICATION

ABSTRACT
Thin-plate smoothing spline method is also used in fitting non-parametric regression. This method is based on the penalized least squares estimation technique and is called the thin-plate smoothing spline method. The method got its name because when drawn, a flattening curved surface resembles a bent metal plate. Thin plate splines are a type of smoothing spline used to visualize complicated relationships through continuous independent variables and dependent variables. Thin plate splines are proper for testing the joint effect of two continuous independent variables on an only dependent variable because of their multidimensional view. Rather than an only curve, thin plate splines are represented as a pliable surface. Each continuous variable is plotted on a separate x-axis, creating a bivariate, two-dimensional surface. Thin-plate smoothing spline was first used in the subfield of computational geometry in computer science in the 1970s. The modeling approach is frequently used in many fields today, including engineering, anthropology, ecology, agriculture and pattern recognition. The aim of the study is to give information about Thin-plate smoothing spline regression, which is one of the non-parametric regression methods, and to show its solutions in SAS statistical program.

Keywords: Nonparametric regression, surface, curve, thin plate

1. GİRİŞ

İnce plaka düzleştirme eğrisi, çeşitli bilgisayarlı görüntüleme uygulamalarında koordinat dönüşümlerini modellemek için başarıyla kullanılan etkili bir araçtır (Donato ve Belongie, 2002). Yöntem, parametrik olmayan regresyon modeline uyması için cezalandırılmış en küçük kareler yöntemini kullanmaktadır. İnce plaka düzleştirme eğrisi (İPDE) yönteminde düzleştirme derecesini seçmek için genelleştirilmiş çapraz geçerlilik ölçütü (generalized cross validation) kullanabilmektedir. Düzleştiriciler, büyük veri kümeleri ile ince plaka spline modellerinin kullanımına izin verir, genellikle regresyon eğrileri veya cezalandırılmış regresyon eğrileri ile modellemeyi karmaşıklaştıran 'düğüm yerleşimi' ile ilişkili sorunlardan kaçınır, etkileşim terimlerini modellemenin mantıklı bir yolunu sağlar (Wood, 2003). Eğriyi hesaplamak için kullanılan düzleştirme parametresi λ, 0 ile 1 arasındadır. Düzleştirme çizgisinin belirlenmesi, veri noktaları kadar çok bilinmeyenli bir doğrusal sistemin çözümünü de içerir. Bu doğrusal sistemin matrisi dolu olduğu için, fazla veri noktası olduğunda iterasyonlu bir şema kullanılsa bile çözme uzun zaman alabilir. Bu iterasyonun yakınsama hızı, λ'dan büyük ölçüde etkilenir ve λ büyüdükçe yavaşlar.

Düzleştirme eğrileri Eş. (1)-(3) gibi modellerle tahminetme ve çıkarım için mükemmel ortalamalar bulmaktadır (Duchon, 1976; Wahba, 1990; Gu, 2002; Wood, 2003).

$$y_i = f(x_i) + \varepsilon_i, \quad (1)$$

$$y_i = f(x_{1i}, x_{2i}) + \varepsilon_i, \quad (2)$$

$$y_i = f_1(x_{1i}) + f_2(x_{2i}, x_{3i}) + f_3(x_{4i}) + \cdots + \varepsilon_i, \quad (3)$$

Burada, y yanıt değişkeni, x'lar kovaryanslar, f'ler düzleştirme fonksiyonları, ε'lar ise tesadüfi değişkenlerdir (farklı i'ler için bağımsızdırlar).

İPDE uygulamalarından birkaç örneği inceleyelim. Bookstein, (1991) yaptığı çalışmada İPDE tekniğinin, yalnızca biyomedikal atlasların (belirli yapıların veya parçaların konfigürasyonlarının ortalama veya normatif görüntüleri) üretilmesine değil, aynı zamanda bu atlaslar etrafındaki örnekten örneğe değişkenliğin anlaşılmasına da yardımcı olduğunu bildirmiştir. Çalışmada dokuz normal yetişkin insan beyninin midsagital MRI görüntülerindeki on üç dönüm noktasının istatistikleri özetlenmiş, bu istatistiklerin yardımıyla ortalama görüntüler üretilmiş ve değerlendirilmiştir. Sibson ve Stone, (1991) yaptıkları çalışmada ince plaka eğrilerini, düzlemde keyfi olarak aralıklı noktaların enterpolasyonu ve düzleştirilmesi için en uygun yöntem olarak göstermişlerdir. Çalışmada sistemi ön koşullandırmak için, ince plaka eğrilerinin kullanışlılığını büyük ölçüde artıran bir teknik önerilmiştir. İPDE yöntemi, birçok kısa dönemli yağış miktarı içeren nokta verilerinden yıllık ortalama yağışın mekansal

enterpolasyonu sorununa doğru, işlevsel olarak basit ve hesaplama açısından verimli çözümler sağlamıştır (Hutchinson, 1995). Boer ve ark., (2001) yaptıkları çalışmada Meksika'nın Jalisco Eyaletinde aylık maksimum sıcaklığı ve aylık ortalama yağış miktarını tahmin etmek için ince plaka düzleştirme eğrileri yöntemini kullanmışlar. Çalışma sonucunda üç değişkenli İPDE yönteminin en iyi sonucu verdiği açıklanmıştır. Rohr ve ark., (2001) yaptıkları çalışmada İPDE yöntemi ile 3 boyutlu anatomik nokta yer işaretlerinin lokalizasyonuna yarı otomatik bir yaklaşım getirmişler. İnsan beyninin 2 boyutlu ve 3 boyutlu tomografik görüntüleri için deneysel sonuçlar sunmuşlar.

Yapılan bu çalışmada İPDE tekniği ile ilgili teorik bilgiler verilerek tarım alanından elde edilen verilere bir örnek uygulama gösterilmiştir. İstatistik paket olarak çevrimiçi kayıt sistemine dayanan SAS on demand for Academics istatistik programı kullanılmıştır.

2. THIN-PLATE SMOOTHING SPLINE YÖNTEMİ

Cezalı en küçük kareler tahmin tekniğine dayanan ve ince plaka düzleştirme eğrisi (thin-plate smoothing spline) yöntemi olarak adlandırılan yöntem ilk olarak 1976 yılında Fransız matematikçi Jean Duchon (1949-) tarafından bir makalede önerilmiştir (Duchon, 1976). Yöntem adını, çizildiğinde düzleştirici bir eğri yüzeyinin bükülmüş bir metal plakaya benzediği için almıştır. Bu yöntemin teorik temeli aşağıdaki gibidir:

f fonksiyonunun standart en küçük kareler yaklaşımıyla tahmin edildiğini varsayalım. Bu, uydurulan fonksiyonun $\sum_{i=1}^{n} \varepsilon_i^2 = \sum_{i=1}^{n} \left(y_i - f(x_{1i}, x_{2i}, .., x_{ki})\right)^2$ kalıntı kareler toplamını en aza indirmek için seçildiği anlamına gelir ve uydurulan fonksiyonun şekli hakkında herhangi bir kısıtlama yapılmaz. Veri noktalarını doğrusal olarak bağlayan fonksiyon, kalıntı kareler toplamını sıfıra indirdiği zaman olası bir çözüm elde ediliyor. Bu tür çözümleri ortadan kaldırmak için, tahmin fonksiyonunun işlevsel formuna bir kısıtlama getirilmelidir. Düzleştirme cezası olarak ta adlandırılan bu kısıtlama, f'nin veri aralığı boyunca m-kat türevlenebilir bir fonksiyon olması gerektiğini zorunlu kılar; burada m, f fonksiyonunun düzleştirme derecesi olarak adlandırılır. Bu kısıtlama altında, f'nin cezalandırılmış en küçük kareler tahmincisi

$$\frac{1}{n}\sum_{i=1}^{n}\left(y_i - f(x_{1i}, x_{2i}, .., x_{ki})\right)^2 + \lambda J_m(f) \qquad (4)$$

Eş. 4'te en aza indirir. Burada λ, düzleştirme parametresi olarak adlandırılır ve Eş. 5'te

$$J_m(f) = \int_{-\infty}^{\infty} \dots \int_{-\infty}^{\infty} \sum \frac{m!}{\alpha_1!\alpha_2!\dots\alpha_k!} \left(\frac{\partial^2 f}{\partial_{x_1}^{\alpha_1} \partial_{x_2}^{\alpha_2} \dots \partial_{x_k}^{\alpha_k}} \right)^2 dx_1 \dots dx_k \qquad (5)$$

$\alpha_1 + \alpha_2 + \cdots + \alpha_k = m$. Örneğin, m = 2 için, $J_2(f)$'deki integral, ikinci mertebeden kısmi türevlerin kareleri toplamı artı karışık ikinci dereceden kısmi türevlerin kareler toplamının iki katıdır, yani Eş. 6' da,

$$J_2(f) = \int_{-\infty}^{\infty} \dots \int_{-\infty}^{\infty} \left[\left(\frac{\partial^2 f}{\partial x_1^2}\right)^2 + \cdots \left(\frac{\partial^2 f}{\partial x_k^2}\right)^2 + 2\left(\frac{\partial^2 f}{\partial x_1 \partial x_2}\right)^2 + \cdots + 2\left(\frac{\partial^2 f}{\partial x_{k-1} \partial x_k}\right)^2 \right] dx_1 \dots dx_k. \quad (6)$$

Örneğin, tek bir bağımsız değişkenin $x_1 = x$ olması durumunda (Eş.7),

$$J_2(f) = \int_{-\infty}^{\infty} \left(f''(x)\right)^2 dx, \quad (7)$$

ve $x_1$ve x_2 iki bağımsız değişkenin olması durumunda (Eş. 8),

$$J_2(f) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \left[\left(\frac{\partial^2 f}{\partial x_1^2}\right)^2 + 2\left(\frac{\partial^2 f}{\partial x_1 \partial x_2}\right)^2 + \left(\frac{\partial^2 f}{\partial x_2^2}\right)^2 \right] dx_1 dx_2. \quad (8)$$

2.1. SAS Uygulaması: Eğri Uydurma

Thin-Plate Smoothing Spline Yöntemi için SAS'ta TPSPLINE komutu kullanılır. Kodlar aşağıdaki gibi oluşturulacaktır:

PROC TPSPLINE DATA= veri adı;
MODEL response=(1.bağımsız değişken 2.bağımsız değişken ... k.bağımsız değişken)/
M=value ALPHA=değer;
OUTPUT OUT=*output_data_name* PRED LCLM UCLM;
SCORE DATA=point4prediction veri adı OUT=tahmin edilen veri adı;
RUN;

MODEL komutunda, tahmin edicilerin (bağımsız değişkenlerin) listesi parantez içine alınmalıdır. **M=** seçeneği, düzleştirme derecesinin varsayılan değerini değiştirir. Varsayılan değer max (2, $\frac{k}{2}$) olarak hesaplanır. Örneğin, k = 1,2,3 veya 4 olduğunda, M=2 olur.

PRED, **LCLM** ve **UCLM** seçenekleri belirtilirse, tahmin edilen yanıt için %95 güven aralığında çıktı veri setinin (*output_data_name*), tahmin edilen yanıtın (P_response), alt güven sınırının (LCLM_response) ve üst güven sınırının (UCLM_response) değer sütunlarını içerir.

SCORE ifadesi, tahmin edilen değerlerin elde edilmesinin istendiği noktalarla bir veri setini belirtir. Bu değerler çıktı veri setine yerleştirilir ve bu dosya yazdırılarak görüntülenebilir. Tahmin edilen değerler, P_response adı verilen sütundadır.

Düzleştirme parametresi λ'nın varsayılan değeri GCV-optimaldir. İlk olarak 1979 yılında önerilen GCV (generalized cross validation) kriteri (Craven ve Wahba, 1979), (Eş. 9)'daki gibidir.

$$\frac{n\hat{\sigma}^2}{\left(n - Trace(\mathcal{L})\right)^2} \quad (9)$$

2.2. SAS uygulaması: Uydurulmuş Eğrinin Çizimi

2D dağılım grafiğinde uydurulmuş eğriyi çizmek için aşağıdaki kodlar kullanılır:

```
SYMBOL1 color=black value=dot color=black;
SYMBOL2 color=black value=none interpol=join line=1;
SYMBOL3 color=black value=none interpol=join line=2;
SYMBOL4 color=black value=none interpol=join line=2;
PROC GPLOT data=output data name;
PLOT (response P response LCLM response
UCLM response)*predictor / OVERLAY;
RUN;
```

2.3. SAS Uygulaması: Uydurulmuş Eğrinin Yüzeyinin Çizimi

İlk olarak, kod kullanılarak grid noktalarına sahip bir veri seti oluşturulur:

```
DATA grid points data name;
DO predictor1=min TO max BY increment;
DO predictor2=min TO max BY increment;
OUTPUT;
END;
END;
RUN;
```

Ardından, **SCORE** ifadesi dahil edilerek **TPSPLINE** prosedürü çağrılır. SAS kodları aşağıdaki gibidir:

```
PROC G3D data=predicted data name;
PLOT predictor1*predictor2=P response;
RUN;
```

2.4. Örnek Uygulama

2010-2021 yılları arasında Türkiye'de aylık süt üretim miktarına ilişkin istatistikler TÜİK'den (TÜİK, 2021) elde edilmiştir. Süt üretim miktarına ilişkin veriler için, m=1 ve 2 düzleştirme dereceleriyle iki düzleştirici spline eğrisi uydurup karşılaştıralım. m=2 düzleştirme derecesi, SAS'ta varsayılan değerdir.

SAS kodları aşağıdaki gibi olacaktır:

```
data süt_üretimi;
input Sut_miktari @@;
Aylik=_N_;
```

```
datalines;
494351 492360 594800 610599 654696 622359 610645 560309 526132 531445 503311
544004
561528 545628 627661 646642 699108 636494 591864 566044 537872 543655 530376
586867
634578 631521 715190 727769 782621 727805 695079 641380 599773 587149 575344
614276
637956 622381 710712 733380 772785 692084 675158 628996 594456 605194 611918
653490
708555 681866 788988 793740 828420 766885 743245 697925 648631 648660 634067
684760
712942 698164 804210 816750 864101 791429 744380 722532 680990 695642 677056
728944
750402 752218 834329 810704 837592 808743 769722 756446 707584 731042 716617
738122
745578 702788 794235 765449 808916 750297 740977 755136 729491 756970 749772
812054
850091 814357 916867 907649 916453 848641 863013 840578 788339 774681 743427
770123
740460 751029 839056 848511 913442 837977 800524 781707 730943 753620 727917
780842
806748 792381 878593 873641 894990 864594 825131 820835 772673 787342 736961
787168
887275 779077 893626 889725 906504 880572 838940 823577 785162 803360 763413
;
proc tpspline data= süt_üretimi;
model Sut_miktari=(Aylik)/m=1;
output out=result pred lclm uclm;
run;
title 'm=1';
symbol1 color=black value=dot;
symbol2 color=black value=none interpol=join line=1;
symbol3 color=black value=none interpol=join line=2;
```

```
symbol4 color=black value=none interpol=join line=2;
proc gplot data=result;
plot (Sut_miktari p_Sut_miktari lclm_Sut_miktari uclm_Sut_miktari)*Aylik /overlay;
run;
proc tpspline data= süt_üretimi;
model Sut_miktari=(Aylik);
output out=result pred lclm uclm;
run;
title ’m=2’;
proc gplot data=result;
plot (Sut_miktari p_Sut_miktari lclm_Sut_miktari uclm_Sut_miktari)*Aylik /overlay;
run;
```

Program çıktıları aşağıdaki gibi olacaktır:

The TPSPLINE Procedure Dependent Variable: Sut_miktari

Tablo 1. SAS program çıktıları

Summary of Input Data Set	
Number of Non-Missing Observations	143
Number of Missing Observations	0
Unique Smoothing Design Points	143

m=1

Summary of Final Model	
Number of Regression Variables	0
Number of Smoothing Variables	1
Order of Derivative in the Penalty	1
Dimension of Polynomial Space	1

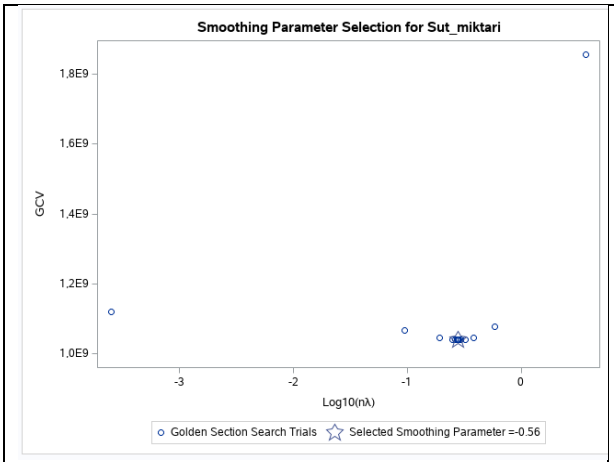
Summary Statistics of Final Estimation	
log10(n*Lambda)	-0.5554
Smoothing Penalty	144943413049
Residual SS	14308454224
Tr(I-A)	44.3684
Model DF	98.6316
Standard Deviation	17958.0671
GCV	1039397529.7

m=2

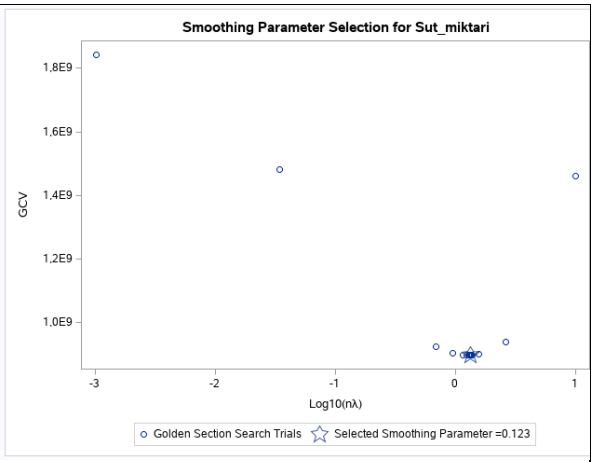
Summary of Final Model	
Number of Regression Variables	0
Number of Smoothing Variables	1
Order of Derivative in the Penalty	2
Dimension of Polynomial Space	2

Summary Statistics of Final Estimation	
log10(n*Lambda)	0.1235
Smoothing Penalty	26980428781
Residual SS	56659247063
Tr(I-A)	95.0653
Model DF	47.9347
Standard Deviation	24413.1820
GCV	896525809.33

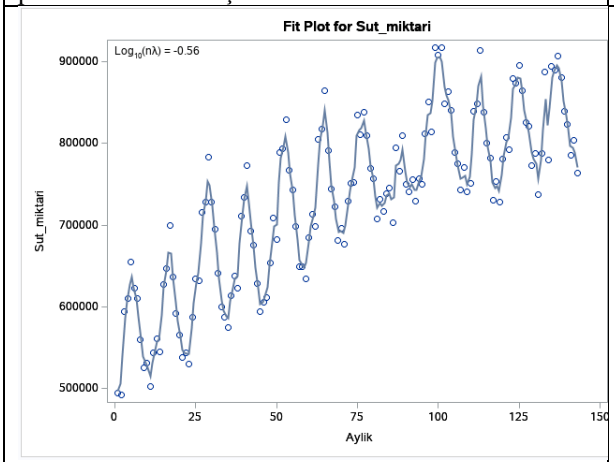
Tablo 1'den görüldüğü üzere m=1 düzleştirme derecesinde İPDE m=2'ye nazaran daha iyi sonuç vermiştir. Aşağıdaki Şekil 1 – Şekil 5 arasında m=1 düzleştirme derecesi ile elde edilen sonuçlar görselleştirilmiştir. Şekil 6 – Şekil 10 arasında ise m=2 düzleştirme derecesi ile elde edilen sonuçlar verilmiştir.



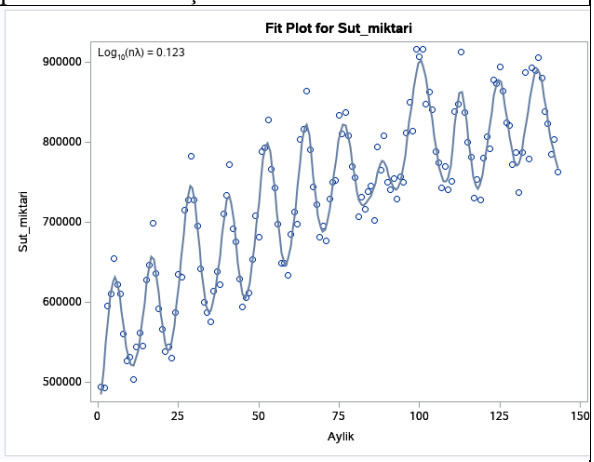
Şekil 1. Süt miktarı için farklı düzleştirme parametrelerinin seçimi



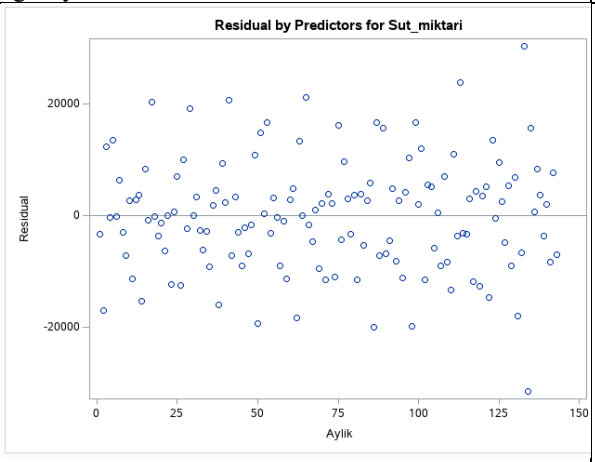
Şekil 6. Süt miktarı verisi için düzleştirme parametresinin seçimi



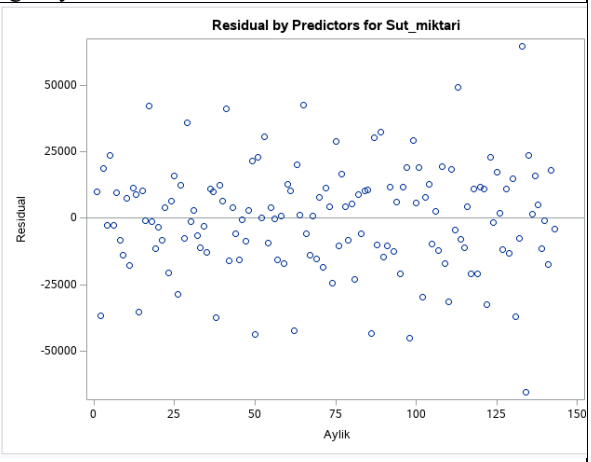
Şekil 2. Süt miktarı için -0.56 düzleştirme derecesi ile eğri uyumu



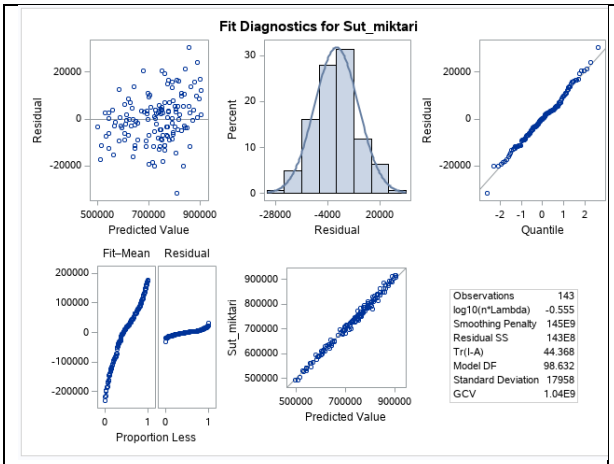
Şekil 7. Süt miktarı için 0.123 düzleştirme derecesi ile eğri uyumu



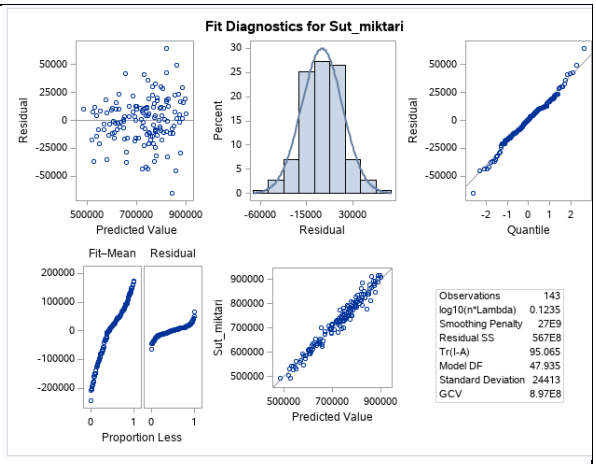
Şekil 3. Süt miktarı için kalıntı dağılımı



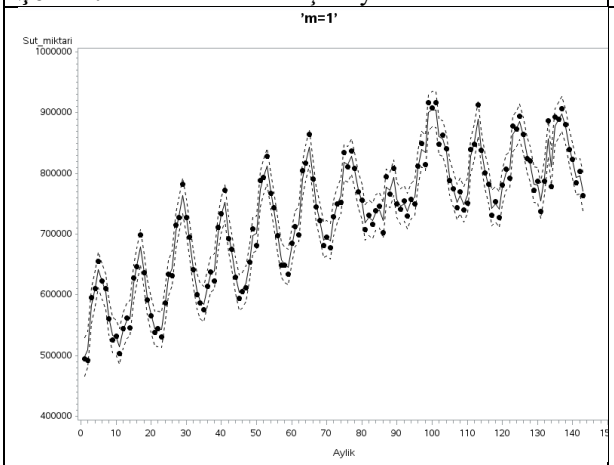
Şekil 8. Süt miktarı için kalıntı dağılımı



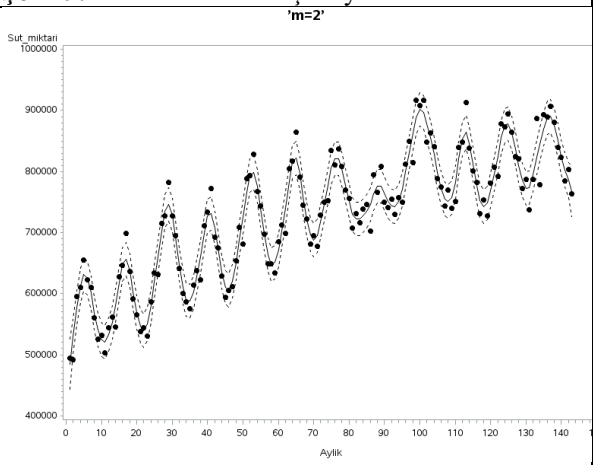
Şekil 4. Süt miktarı verisi için uyum özeti



Şekil 9. Süt miktarı verisi için uyum özeti



Şekil 5. m=1 olduğunda eğri uyumu



Şekil 10. m=2 olduğunda eğri uyumu

Grafiklerden de görüldüğü gibi ince plaka düzleştirici eğrisi m=1 düzleştirme derecesinde verilere daha iyi uyum sağlamıştır.

3.SONUÇ VE ÖNERİLER

Parametrik testlerin kullanılamadığı durumlarda parametrik olmayan istatistiksel testlerle analiz yapılmaktadır. Yapılan bu çalışmada parametrik olmayan ince plaka düzleştirici eğrileri yönteminin tarım alanında uygulamasına yer verilmiş ve örnek çözülmüştür.

İPDE, sürekli tahmin ediciler ve yanıt değişkenleri arasındaki karmaşık ilişkilerin görselleştirilmesi için kullanılan bir düzleştirme eğrisi yöntemidir. Bu yöntemin çok boyutlu görünümleri nedeniyle iki sürekli tahminedicinin tek bir sonuç üzerindeki birleşik etkisini incelemek mümkündür. Tek bir eğri yerine, ince plaka eğrileri bükülebilir bir yüzey olarak temsil edilir. Her bir sürekli değişken, iki değişkenli, iki boyutlu bir yüzey oluşturarak ayrı bir x ekseni üzerinde çizilir. Sonuç daha sonra y ekseninde, sürekli olarak bu iki değişkenli yüzey boyunca üç boyutlu olarak çizilebilir.

Çalışmada İPDE yöntemi teorik olarak açıklanmıştır. Daha sonra ele alınan yöntem veri setine uygulanarak SAS on Demand for Academics çevrimiçi programı ile analiz edilmiştir. Örnek olarak tarım alanından deneme verileri kullanılmıştır. İPDE yöntemi parametrik testlerin varsayımının sağlanamadığı verilerin yanı sıra kategorik ve ordinal veriler için de uygundur. Bu nedenle anket yoluyla elde edilen örneklerde bu yöntemler uygulanırsa, açıklayıcı sonuçlar elde edilebilecektir. İlerideki çalışmalarda anket verileri üzerine uygulamalar yapılabilir.

AÇIKLAMA

Bu çalışma ilk yazarın yüksek lisans tezinin bir bölümünü oluşturmaktadır.

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AZERBAYCAN'DA KÜTÜPHANELİK VE BİBİYOGRAFİ ALANINDA BELGE AKIŞININ ÇAĞDAŞ EĞİLİMLERİ

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ÖZET
Modern toplum bilgi kaynaklarından ayrılamaz. Bilgi ve iletişim teknolojilerinin etkin kullanımı, insan faaliyetinin çeşitli alanlarında bilişim alanındaki ileri başarıların başarılı bir şekilde uygulanması, bilgi kaynaklarını sistematik hale getirme yeteneği, teknik araç ve yöntemlerin kullanımı, bilgiye hızlı erişim herkesin talebidir. Başvuru sahibinin pozisyonu ne olursa olsun, gerekli bilgilerin hızlı bir şekilde edinilmesi ve kullanılması, belge akışının doğru yönetilmesine olanak tanır. Belge çalışmaları, genelleştirilmiş bir terim olarak 1940 yılında tarihi edimler ve belgeler kavramı olan "diplomasi" terimi yerine belgelerin incelenmesi olarak kullanılmıştır. Geçen yüzyılın ikinci yarısından itibaren, dokümantasyon ve arşiv çalışmalarının kazanımları kullanılarak, yönetim teorisinde iş belgesi dolaşımına ilişkin teorik konuların hayata geçirilmesinin arka planına karşı dokümantasyon çalışmaları terimi güçlenmiştir. Belge çalışmalarının oldukça bağımsız yönlerinin oluşum süreci, bir bilim olarak belge çalışmalarının yapısı hakkında bilgide bir değişikliğe yol açmıştır. Modern zamanlarda, belge çalışmaları disiplinler arası bir karaktere sahip bilimsel bir kompleks olarak kabul edilir. Spesifik olarak, belgesel çalışmaların bilimler sistemindeki yerinin tespiti uzun süredir tartışmalıdır ve uygulamada bu konu kesin olarak çözülememiştir. Karmaşık doğası nedeniyle, belgesel çalışmalarını bir bütün olarak sosyolojik ve sosyal iletişim bilimleri sistemine bağlama girişimleri bugün hala geçerlidir. Uzmanlar, belge çalışmalarının, belgelerle ilgilenen bilimlerin bir parçası olduğunu öne sürüyorlar - bibliyografik çalışmalar, kütüphane çalışmaları, arşiv çalışmaları, gazetecilik vb. Bilimsel konuların bileşimi ile ilgili olmalıdır. Bu bilgi alanlarının mesleki faaliyet açısından yakın nesnelerle ilgilendiğine ve bu nedenle birlikte sosyal iletişim sisteminde bağımsız olarak bir belge-bilgi bilimi alanı oluşturabileceklerine inanıyorlar. Sosyal doğası gereği günümüzde belge çalışmaları olarak kabul edilen bilim disiplini, belge, belge iletişimi, kütüphane-bibliyografya bilimlerinin kesiştiği noktada yerini alabilmiştir. Araştırmanın yeniliği Azerbaycan'da kütüphanecilik bilgi alanındaki bilgi talebinin belirlenmesi; Azerbaycan Cumhuriyeti'nde bu alandaki göstergelerin analizi; Azerbaycan'da kütüphanecilik eğitiminin geçmişten günümüze gelişimi; belge akışının ve elektronik bilgi kaynaklarının mevcut durumunu, evrimini ve özelliklerini içermektedir.

Anahtar kelimeler: kütüphane, bibliyografya, belge akışı, bilgi hizmeti

CONTEMPORARY TRENDS OF DOCUMENT FLOW İN THE FİELD OF LİBRARİANSHİP AND BİBLİOGRAPHY İN AZERBAİJAN

ABSTRACT

Modern society is inseparable from information resources. Effective use of information and communication technologies, successful implementation of advanced achievements in the field of informatization in various fields of human activity, ability to systematize information resources, use of technical means and methods, prompt access to information is the demand of everyone. Regardless of the position of the applicant, the quick acquisition and use of the necessary information allows for proper management of the document flow. Document studies, as a generalized term, was used in 1940 as the study of documents, instead of the term "diplomacy", which is the concept of historical acts and documents. Since the second half of the last century, using the achievements of documentation and archival studies, the term documentation studies has been strengthened against the background of the actualization of the theoretical issues of business document circulation in management theory. The process of formation of fairly independent directions of document studies led to a change in knowledge about the structure of document studies as a science. In modern times, document studies is considered a scientific complex with an interdisciplinary character. Specifically, the determination of the place of documentary studies in the system of sciences has been controversial for a long time, and this issue has not been definitively resolved in practice. Due to its complex nature, the initiatives to attribute documentary studies to the system of sociological and social communication sciences as a whole are still relevant today. Experts suggest that document studies is a part of the sciences that deal with documents - bibliographic studies, library studies, archival studies, journalism, etc. should be related to the composition of scientific subjects. They believe that these fields of knowledge deal with close objects in terms of professional activity, and therefore together they can independently create a field of document-information science in the social communication system. According to its social nature, the scientific discipline considered to be document studies today has been able to take its place at the junction of document, document communication, library-bibliography sciences. The novelty of the research is the determination of the information demand in the information field of librarianship in Azerbaijan; Analysis of indicators in this field in the Republic of Azerbaijan; The development of librarianship education in Azerbaijan from the past to the present; includes the current state of document flow and electronic information resources, their evolution and characteristics.

Keywords: library, bibliography, document flow, information service.

INTRODUCTION

Scientific novelty of the research: The scientific novelty of the research includes the following:

1. Determination of information demand in the information field of librarianship in Azerbaijan;
2. Analysis of indicators in this field in the Republic of Azerbaijan;
3. The development of library education in Azerbaijan from the past to the present;
4. Current state of document flow and electronic information resources, their evolution and characteristics.

Chronological limits of the research: The research mainly covers the period after the beginning of the 20th century and the modern period.

The methods of the research: Research historical logical approach, analysis, scientific abstraction, induction and deduction methods were used during the research.

Research goals and objectives. The main goal of the research is to solve the problem of information search in modern times, including the current state of document flow in this area, and to a lesser extent, with the help of information and communication technologies, information resources of the Internet. Despite the dynamic growth of electronic information resources, the problem of satisfying society's information needs cannot be considered completely solved today. Because in information networks, especially on the Internet, the values of the criteria of completeness, accuracy and reality of information are not always positive. In scientific literature, the term "information retrieval" was first used in English in 1952 by Kelvin Muyers.

The study of document flow in the field of library and bibliography becomes the object of scientific research in the following areas:

• compilation of a list of actual thematic problems;
• identification of authors and collective authors directly related to the development of the field;
• assessment of the development speed of the document flow in certain scientific directions;
• determination of the level of development of individual scientific activity of individual scientists, scientific organizations and enterprises engaged in the development of a certain problem;
• assessment of the role of specific specialists, research groups and organizations in solving scientific problems;
• forecasting the development trends of the studied area (Aghayeva, 2015).
• Document. Today, we can say that as a result of the efforts of a number of scientists in the

local bibliography, the essence of the document as one of the more general (initial) and fundamental concepts has been confirmed. First of all, it is necessary to consider two sides of the document - its ideal content and its material form.

• Both sides are necessary within the framework of bibliographic terminology, so both of them should be present in the designation of the document. In other words, there is a need to give two definitions of the same meaning of the document: first, from the point of view of the content of the document, and second, from the point of view of the form. These promotions are as follows:

1. In terms of content: a document is certain social information fixed (fixed) by a person in a certain material carrier for the purpose of protection, dissemination and use.

2. From the point of view of form: a document is a certain material carrier on which some social information is fixed (fixed) by a person for the purpose of protection, dissemination and use.

Taking into account all the above, the interest of specialists in the system of terminological derivatives consisting of the word "document" is completely clear. Therefore, there are different points of view. For example, the famous librarian Y.N. Stolyarov proposes to make a decision to propose the use of two main terminological derivatives of the word document (consisting of a document) and documentary (based on documents or based on documents) (Ismayilov, 2018). There are some reasons why document flow is the object of library-bibliography activity.

A. The existence of a common semantic relationship between documents is the basis for the functioning of the document flow. Document - event, process, object, etc. of research. It is the result of people's thoughts and ideas about the galaxy as a whole, understanding of the world. All objects in the universe are connected and ordered. There is no document in the world that is not related to others due to its subject, the object it reflects, the system of rents used or the object of study, and the research methods used (Ismayilov, 2009). The fundamental issue in the flow of documents is the content of documents, the existence of relations between its elements. At the same time, the fact that the documents have an interaction with each other is the main condition for the existence of the flow.

B. A document flow is a set of evolving elements. One of the main constraints for the development of the flow is its regular enrichment with new documents. A bibliographic information analyst must constantly monitor changes in the flow of documents within the scope of his functional duties (Ismayilov, 2018). For the development of the document flow, it is necessary to constantly enrich it with new content and balanced (discrete) development. A long-term break in the flow of documents disrupts its structure and creates interruptions in the

transmission of new information. In the last twenty years, the number of scientific workers in the world has increased 1.5 times. This is an indicator of the normal development of the document flow (Khalafov, 2010).

C. Movement is the main form of existence of document flow.

Movement is used in the same sense as the terms change, renewal, and development. Change is the transition of an object from one state to a qualitatively new one.

The elements of the flow change the previous form-chemical composition of the document as a result of mechanical movement, in the process of use, etc. The flow increases in volume, changes in value, becomes obsolete in terms of semantic meaning over time.

It has a stable content and functional relationship, it is an inseparable and real combination of elements based on one or other common characteristics.

Bibliographic sources also create a document flow module, allowing to determine its structure. The main job of a bibliographer is to know the issues related to the subject, types, purpose and purpose of documents. In the modern studies conducted by specialists in the field of literary studies, the flow of documents is distinguished according to language, chronological, type, and geographical features. The semantic structure of the document is the basis of the document flow.

The semantic structure of the document flow has gone through 4 stages.

1. Pre-writing stage
2. The stage of recording the names of documents, studying isnads, creating the first classifications
3. The stage of accurate and comprehensive discovery of the relevant document in accordance with the request
4. The stage of searching for knowledge about the subject

Semantic structure is the overt and hidden content relationship between documents that ensures the functioning of document flow and its active use in society.

The type structure of the document flow is the differentiation of the relationship between documents by type, genre, and type.

- Genetic structure of document flow
- Stream authoring structure
- Organization-firm structure

Geographic structure of the flow - classification of the document according to the place of its origin:

• Document flow language structure

• Stream publishing structure

• Chronological structure of the flow

Axiological structure is the change of relationships of documents with the same topic in the stream according to their value characteristics.

The format for detecting content links in a stream is as follows (Ismayilov, N, Rzayeva Z. 2021).

1. Subject collections
2. Bookshelves
3. Bibliographic indicators, databases, summary
4. Cited literature indicators
5. Library - bibliography classification indexes
6. Subject indicators of bibliographic resources
7. Anthologies
8. Nearby sites

CONCLUSİON

In our research work, the role of libraries in the formation of document flow on librarianship-bibliography remains an undeniable fact. Because libraries are the main public institution capable of preserving historical sources as an important part of culture. Its social science allows to create and form an effective state policy (Ismayilov, N, Rzayeva Z. 2021). The research shows that the solution to this issue should be based on the use and processing of documents collected in the scientific-theoretical field, which requires the activation of applied research on the study of documents in the field of library science and bibliography, by studying the development laws of library work. This should be done by determining the conditions for the formation of scientific communities in the field of librarianship and information, as well as their mission and types. During the research, it is determined that in recent decades, communities in the librarianship-bibliography space have been characterized by specialization to study certain areas of library and information science. The scientific community of the library and bibliography is a society of people dedicated to scientific activity. It is possible to study the flow of documents on librarianship-bibliography by studying scientific communities.

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ÜMUMTƏHSİL MÜƏSSİSƏLƏRİNDƏ TƏRBİYƏ İŞİNİN TƏŞKİLİ

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ÖZET
Məqalədə müasir dövrdə məktəbi idarəetmənin əsas istiqamətlərindən, məktəbdə həyata keçirilən tərbiyə işinin aktual problemlərindən bəhs edilir. Bununla yanaşı müəllim, şagird münasibətlərində yaranan mənəvi yaxınlığın şagirdlərdə əməksevərlik, xeyirxahlıq duyğularını formalaşdırması ön plana çəkilmişdir. Məktəbdə həyata keçirilən tərbiyə işinin idarə edilməsinin istiqamətləri məqalədə öz əksini tapmışdır. Şagirdlərin ictimai dəyəri olan fəaliyyət sahələrinə, xeyirli əməllərə cəlb olunmasını müəllif ən vacib əxlaqi keyfiyət adlandırmış və qeyd etmişdir ki, insanın insan kimi formalaşmasının təməli ailə və ictimai tərbiyədən, yəni uşaqlara ənənəvi zənginlik, vətəndaşlıq hissinin verilməsindən başlanır. O, haqlı olaraq qeyd etmişdir ki, hər bir insanın öz mənəvi inkişafını hiss etməsi üçün sosial mühit olmalıdır. Məqalədə müəllif ümumtəhsil müəssisələrində tərbiyə prosesinin idarə edilməsinin ən əlverişli mərhələlərini qeyd etmiş və onların elmi izahını vermişdir.

Açar sözlər: tərbiyə, idarəetmə, özünüdərk, kollektiv, humanist, eqoist, emosional tərbiyə, əməksevərlik, estetika, vətəndaşlıq

ОРГАНИЗАЦИЯ ВОСПИТАТЕЛЬНОЙ РАБОТЫ В ОБЩЕОБРАЗОВАТЕЛЬНЫХ

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РЕЗЮМЕ
В статье говоритса об основных направлениях управления школой в современную эпоху, актуальных проблемах воспитательной работы, проводимой в школе. Кроме того, на первый план выдвигается духовная близость, возникающая в отношентях учитель-ученик, формирование у детей трудолюбивых и доброжелательных чувств. Также в статье отражены этапы управления воспитательной работой, проводимой в школе, основные направления воспитательного процесса. Важнейшим нравственным качеством автор назвал приобщение учащихся к общественной деятельности и добрым традициям и отметил, что фундамент формирования человека как личности начинается с семейно-социального воспитания, т.е. придания детям чувства традиционного богатство и гражданство. Он справедливо отмечал, что у каждого человека должна быть социальная среда, в которой он чувствовал бы свое духовное развитие. В статье автор отметил наиболее благоприятные этапы управления образовательным процессом в общеобразовательных учреждениях и дал их научное объяснение.

Ключевые слова. воспитание, управление, самосознание, коллектив, гуманистическое, егоистическое, эмоциональное воспитание, трудолюбие, эстетика, гражданственность.

ORQANIZATION OF EDUCATIONAL WORK IN GENERAL EDUCATIONAL INSTITUTIONS

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ABSTRACT
The article talks about the main directions of school management in the modern era, the actual problems of educational work carried out in the school. In addition, the spiritual closeness that arises in teacher-student relationships, the formation of hardworkinq and benevolent feelinqs in children is brought to the fore. The staqes of the manaqement of educational work carried out in the school, the main directions of educational prosses are also reflected in the article. The author called the involvement of students in activities of social value and qood traditions as the most important moral quality and noted that the foundation of a persons formation as a human beinq beqins whit family and social education, i.e. qivinq children a sense of traditional wealth and citizenship. He riqhtly noted that every person should have a social environment to feel his spiritual development. In the article, the author noted the most favorable staqes of manaqinq the educational process in qeneral educational institutions and qave their scientific explanation.

Key words. Education, manaqement, self-awareness, collective, humanistic, eqoistic, emotional, education, diliqencs, citizenship

Müasir dövrdə məktəbi idarəetmənin ən vacib istiqaməti tərbiyə işinin düzgün təşkil olunmasıdır. Tərbiyə nədir? Tərbiyə insanın məqsədyönlü inkişafı və formalaşması, eyni zamanda onun nəticəsidir. İnsan şəxsiyyəti bir çox amillərin təsiri nəticəsində formalaşır: bunlar-daxili və xarici, təbii və ictimai, obyektiv və subyektiv, kortəbii və məqsədyönlü amillərdir. Bu vaxt insan özünün inkişafı və formalaşmasının əsas subyekti rolunda çıxış edir. Tərbiyə prosesinin əsas məqsədi cəmiyyətimiz üçün yararlı, fəal və üzərinə düşən məsuliyyəti anlayan şəxsiyyətlər, eyni zamanda ideya-mənəvi cəhətdən mətin vətəndaşlar yetişdirmək və bunun üçün münbit şərait yaratmaqdır. Odur ki, birinci növbədə tərbiyə edənlərin və tərbiyə olunanların birgə fəaliyyəti, qarşılıqlı münasibətləri düzgün qurulmalıdır.

Bildiyimiz kimi, insan ictimai varlıqdır, bu da onların kollektivlə, cəmiyyətlə, adamlarla qarşılıqlı münasibətlərində özünü biruzə verir, özünü dərk edir, mənəvi keyfiyyətlərə, yeni-yeni təsəvvürlərə, əxlaqi dəyərlərə yiyələnir, davranış adətləri və ictimai təcrübə qazanır. Bunların qarşılığında da onun sosiallaşması-yəni cəmiyyətə adaptasiya olunması baş verir. Əldə olunan təcrübələr onu deməyə əsas verir ki, insanın cəmiyyətə necə adaptasiya olunmasından, əhatə olunduğu mühitdən, tərbiyədən, asılı olaraq onun şəxsiyyətində həm mənfi və həm də müsbət keyfiyyətlər formalaşır. Əgər münasibətlər düzgün qurulursa-sinifdə, məktəbdə, ailədə, kollektivdə uşaq ilk vətəndaşlıq dərsini alır, yəni, ən kiçik yaşından oxuduğu sinfin, təhsil aldığı məktəbin ictimai işlərində yaxından iştirak edir, şəxsiyyət üçün vacib olan mühüm keyfiyyətlərə yiyələnir. İstər pedaqoji kollektivdə, istərsə də şagird kollektivində vətəndaşlıq münasibətləri nə qədər möhkəm olarsa, şagirdlərin də mənəvi həyatları zəngin və mənalı olar. İnsanın daxili zənginliyi eyni zamanda onun emosional həyatının zənginliyi ilə ölçülür. Məktəbli digər insanların ətrafında baş verənləri duymalı, hiss etməli və onlara kömək əlini uzatmalı, sevinclərinə, kədərlərinə şərik olmalıdır. Həyatı, insanları nəinki ağılla, ürəklə də dərk etməlidirlər. Uşaq hələ erkən yaşlarından əhatəsində olan insanlara nə qədər həssas yanaşsalar, özləri də humanist, xeyirxah, qayğıkeş, xoşniyyət və ləyaqətli insan kimi yetişərlər. Bu isə tərbiyə verənlərin mədəniyyəti və həssaslığı ilə şərtlənir. Məktəbin pedaqoji kollektivi və tərbiyəçilərin şagirdlərə olan təsiri nə qədər güclü olsa, insanlara qarşı laqeydlik göstərən, özünü anlamaz, "daşqəlbli" göstərən yeniyetmələrin yetişməsi təhlükəsi də nəzərəçarpacaq dərəcədə azalar. "Ürəyimi uşaqlara verirəm" əsərinin müəllifi, emosional tərbiyənin əvəzolunmaz ustadı olan V.A.Suxomlinski qeyd edirdi ki, digər insanlara qarşı kor olanlar özlərinə qarşı da kordurlar. Bu cür uşaqlar eqoistdirlər, kollektivin bütün üzvləri ilə münasibətlərin təməlindəki çatlaqlardır. Bu cür çatlar nə qədər uzun və çox olarsa, tərbiyəçinin göstərdiyi bütün səylər boşa çıxacaq, o təməlin üzərində inşa olunan ünsiyyət binası tez bir

zamanda çökəcək. Ukraynanın tanınmış pedaqoqu A.V.Suxomlinski şagirdlərin emosional tərbiyəsi ilə dərindən məşğul olmağı dilə gətirir və bunsuz tərbiyəetmənin mümkün olmadığını qeyd edirdi.

Emosional tərbiyənin mənbəyi, eyni zamanda, hər cür münasibətlərin təməli yaradıcı fəaliyyətlə, əməklə əlaqədardır. Cəmiyyətə, insanlara faydalı olan əmək məlumdur ki, uşaqlara sevinc bəxş edər. O, dərk edər ki, mən insanlara lazımam və gördüyü işlərlə iftixar hissi keçirər. Bu cür faydalı əmək yeniyetmə və gənclərin bir şəxsiyyət kimi formalaşmasında və mənəvi inkişafında mühüm rol oynayır. Bu cür formalaşma və inkişaf sayəsində təlim-tərbiyənin digər sahələrində də nailiyyətlər qazanmaq mümkündür.

Buna misal olaraq illər öncə Yevlax rayonunun Xaldan kənd orta məktəbinin direktoru işləyən, xalq müəllimi kimi fəxri ad qazanan Zahid Şöyübovun iş təcrübəsini və bu sahədə əldə etdiyi uğurları misal gətirə bilərik. Zahid Şöyübov direktor təyin olunanda məktəb çox bərbad vəziyyətdə olmuşdur. Məktəb qayda-qanunu olmayan, təlim-tərbiyənin səviyyəsinin aşağı olduğu bir yer idi. Cavan məktəb direktoru məktəbin vəziyyətini düzəltmək, hər işi sıfırdan başlamaq üçün yollar, vasitələr axtarırdı. Bəzi insanlar belə hesab edirdilər ki, təzə gələn direktorun ilk vəzifəsi təlim işlərini qaydaya salmaqdır. Lakin Zahid Şöyübov uşaqların qüvvəsindən istifadə edərək məktəb üçün idman meydançası tikdirdi. O, yaxşı dərk edirdi ki, hər bir məktəbli idmanı-futbolu çox sevir və bu işdə sevə-sevə köməklik göstərəcəklər. Onun əzmi, göstərdiyi iradə həm müəllim kollektivini, həm də şagird kontingentini inandırdı ki, birlikdə böyük işlər görə biləcəklər.

Müəllim kollektivi və şagirdlərdən könüllü dəstələr yaradaraq dərsdən sonrakı vaxtlarda iməciliklər təşkil etdilər. Az vaxtda böyük işlərə imza atan məktəb kollektivinə nəinki valideynlər, kolxozçular, hətta kəndin boldozerçisi və könüllü olaraq qoşuldular. Nəhayət ki, məktəbin idman meydançası hazır vəziyyətə gətirildi. Futbol, voleybol komandaları yaradıldı və müəllimlər də idmanın ayrı-ayrı sahələri üzrə məktəblilərlə məşqə başladılar. Komandaların yarışlara əzmlə hazırlaşması böyük qələbə qazanacaqlarından xəbər verirdi. Hətta müəllimlər də idmana böyük həvəslə yanaşır və məktəblilərə də bu həvəsi aşılayırdılar. İdman müəllimlərlə şagirdlər arasında bir körpü oldu və müəllim, şagird kollektivi idmanın sayəsində daha yaxın təmas qurmağa başladılar. Ən çətin fənnlərdən (fizika, riyaziyyat, tarix, kimya, həndəsə) zəif oxuyan məktəblilər hətta bu fənnləri oxumağa və onlarla idman meydançasında yarışan, onlara azarkeşlik edən müəllimlərinin yanında pərt olmamağa çalışırdılar.

Məktəbdə yaranan futbol, basketbol, voleybol, şahmat, üzgüçülük, yüngül atletika, güləş və bu kimi digər idman növləri üzrə məktəblərarası, rayonlararası geniş miqyaslı spartakiadalarda, yarışlarda Xaldan məktəbliləri də iştirak edərək birinciliklər qazandılar.

Beləliklə, birgə zəhmətlə, idman sahəsinə yaranan mənəvi yaxınlıqla müəllim və şagird münasibətləri quruldu və bu da şagirdlərin əməksevərliyinə, zəhmətsevərliyinə, eyni zamanda təlimdə böyük nailiyyətlər qazanmalarına səbəb oldu.

Onu da qeyd edək ki, əmək yalnız əməksevərlik hisslərini yaratmır, o eyni zamanda şagirdlərdə gözəllik hisslərini, estetik tərbiyəni formalaşdırır. Məktəbin həyətində şagirdlərin köməyi ilə güllərin əkilməsi, plantasiyaların salınması, onlara qulluq edilməsi, məktəbin həyətyanı sahəsinin iməciliklər vasitəsi ilə təmizlənməsi, ağacların dibinin boşaldırması, quş yuvalarının düzəldib ağaclardan asılması da həm əməksevərliyin aşılanmasına, həm də estetik tərbiyənin formalaşdırılmasına zəmin yaradır.

Ümumtəhsil müəssisələrində məktəblilərin hər hansı incəsənət növü ilə məşğul olması, özfəaliyyət dərnəklərinin təşkil edilməsi, rəqs ansambllarının fəaliyyət göstərməsi və yeri gələndə məktəblərdə konsertlərin keçirilməsi də şagirdlərin mənəvi zövqlərinin inkişafında mühüm rol oynayır.

Məktəbin əsas məqsədi uşaq və yeniyetmələri hərtərəfli inkişaf etmiş şəxsiyyətlər kimi gələcək həyata hazırlamaqdan və ailəsinə, Vətəninə sadiq övladlar yetişdirməkdən ibarətdir.

Şagirdlərin ictimai dəyəri olan fəaliyyət sahələrinə, xeyirli əməllərə qoşulmasının ən vacib əxlaqi keyfiyyətləri gördükləri müsbət işlərdən zövq almalarıdır. Hər dəfə insanlar üçün, sosial çevrəsi üçün, hətta oxuduğu məktəb üçün faydalı işlərə qoşulduqda onlarda xeyirxahlıq hissləri baş qaldırır və daim xeyirxah işlər görməyə can atırlar. Bu da onlara verilən tərbiyənin müsbət nəticəsidir. Şərq dünyasının böyük filosofu Əl Fərabi söyləmişdir ki, tərbiyənin ən ali məqsədi insanları xoşbəxt etməkdir. Dünyada ən xoşbəxt insan ətrafında olan insanları xoşbəxt etmək istəyəndir.

İnsanın insan kimi formalaşmasının təməli ailə və ictimai tərbiyədən, yəni uşaqlara mənəvi zənginlik və vətəndaşlıq hissinin verilməsindən başlanır. Bu tip insanların formalaşmasının ən mühüm şərti özünü daxil olduğu kollektivdə əsas sima hiss etməsi, özünü sevdiyi sənətdə tapması və əldə etdiyi nailiyyətlərdən qürur hissi keçirməsidir. Hər bir insanın öz mənəvi inkişafını hiss etməsi üçün sosial mühit olmalıdır. Bu da tərbiyə prosesinin düzgün qurulmasını və düzgün idarə edilməsini tələb edən şərtlərdəndir. Böyük rus pedaqoqu A.S.Makarenkonun təbirincə desək, tərbiyə işi eyni zamanda təşkilatçılıq işidir, yəni uşaq və yeniyetmələrin həyatının doğru-düzgün təşkilidir. Elə ona görə də ümumtəhsil müəssisələrində tərbiyə

prosesinin təşkilinə və idarə olunmasına xüsusi diqqət və qayğı göstərilməlidir. Ümumtəhsil müəssisələrində tərbiyə prosesinin idarə edilməsinin bir neçə mərhələsi mövcuddur ki, bunlara aşağıdakıları misal göstərmək olar:

- tərbiyənin məqsədini müəyyən etmək;
- tərbiyə işini planlaşdırmaq;
- tərbiyə işini təşkili və ona nəzarət etmək;
- tərbiyə işinin yekun nəticələrini təhlil etmək.

Tərbiyə işində qazanılan müvəffəqiyyətlər tərbiyənin məqsədinin doğru-düzgün müəyyən edilməsindən daha çox asılıdır. Buna görə də mövcud olan vəziyyətin ilkin təhlili aparılmalıdır. Həyata keçiriləcək tərbiyə işi ilə əlaqəli sinfin və məktəbin optimal vəziyyəti, şagirdin aid olduğu kollektivin tərbiyəlilik və inkişaf səviyyəsi aydınlaşdırılmalıdır. Bu sahədə meydana çıxan nöqsanlar və onları yaradan səbəblər araşdırılmalıdır. Təhlil və diaqnoz aparıldıqdan sonra məqsəd müəyyən edilir. Məqsədin reallığı üçün bir çox şərtləri nəzərə almaq lazım gəlir. Əvvəlcə şagird kollektivinin istəkləri, arzuları öyrənilməlidir. Burada məqsədin cəlbedici və aydın olması əsas şərtdir. Məqsəd aydın olduqda fəaliyyət motivlərinin formalaşdırılması asanlaşır. Məqsəd aydınlığı şagirdlərin işin həyata keçirilməsinə səylə çalışdıqlarını göstərir. Bu zaman məqsədin konkret olması da vacibdir. Məqsəd qeyri-müəyyən olduqda tərbiyə prosesinin planlaşdırılması və həyata keçirilməsi çətin olur. Şagird kollektivinin imkanlarının məqsədin formalaşdırılması zamanı nəzərə alınması vacibdir. Yəni, həyata keçiriləcək işlər müxtəlif vəzifələr şəklində hökmən konkretləşdirilməlidir. Şagird şəxsiyyətinin mənəvi inkişaf baxımından həyata keçiriləcək işin ictimai-faydalı olması böyük əhəmiyyət kəsb edir.

Qarşıya qoyulmuş məqsədlərin həyata keçirilməsi onun düzgün planlaşdırılması ilə əlaqədardır. Tərbiyə prosesinin planını müəyyənləşdirərkən işin məzmunu (yəni, bu sahədə hansı işlər görüləcək?), işin icraçıları (iş kimlər tərəfindən həyata keçiriləcək?), icra vasitələri (bu zaman hansı vasitələrdən, yollardan, metodlardan istifadə olunacaq), işin icra vaxtı (proses neçə müddətə həyata keçiriləcək) və.s. dəqiqləşdirilməlidir. İşin planlaşdırılmasının həyata keçirilməsinin səmərəli olması üçün bir çox şərtlər gözlənilməlidir. Planda həyata keçiriləcək işlərin rəngarəngliyi, müxtəlifliyi şagirdlərin marağını daha da artırır. Plan tərtib edilərkən bu prosesdə bütün məktəblilərin fəal iştirak etməsi təmin edilməlidir. Belə olduğu halda planda nəzərdə tutulan işlər onları marağına və sevincinə səbəb olur. Çünki, məktəblilər planı tədbir kimi deyil, özlərinin planı kimi qəbul edərək bu işlərdə fəal iştirak edirlər. Eyni zamanda planın həyata keçirilməsində onlar üzərlərinə düşən işin məsuliyyətini anlayırlar. Şagirdlər tərəfindən

planda nəzərdə tutulan işlər dərk edildikdə onlar bu prosesə şüurlu şəkildə qoşulurlar. Onu da qeyd etmək lazımdır ki, görüləcək tərbiyəvi tədbirlər kompleks şəkildə planlaşdırılmalı, qarşıya qoyulmuş məqsəd planlı şəkildə həyata keçirilməlidir.

Ümumtəhsil müəssisələrində həyata keçiriləcək tərbiyəvi işlərin hərtərəfli düşünülmüş planı işin müvəffəqiyyətli həllinin mühüm şərtidir.Tərbiyə işinin müvəffəqiyyətli icrası onun təşkilindən və bu işə rəhbərlik edənlərdən əhəmiyyətli dərəcədə asılıdır. Proses bir neçə istiqamətdə həyata keçirilir:

- həyata keçiriləcək işlərin məzmunu, həcmi və xarakteri düzgün müəyyən edilməlidir;

- işlər və vəzifələr düzgün bölünməlidir, qüvvələr düzgün yerləşdirilməlidir və kollektivin arzu-istəkləri, maraqları, qabiliyyətləri və imkanları hökmən nəzərə alınmalıdır;

- işin həyata keçirilməsi ilə əlaqəli aydın təlimat verilməlidir (işin hansı məqsədlə aparılması, görüləcək işlərin hansı ardıcıllıqla həyata keçirilməsi);
- nəhayət, işin nəticəsinin müəyyən olunmuş meyarlarla qiymətləndirilməsi. Məktəblilərin tərbiyə edilməsi işini səmərəli təşkil etmək üçün bir sıra şərtlər gözlənilməlidir. Bunları aşağıdakı kimi qruplaşdırmaq olar:
- şagirdlərdən ən fəal olanlarını və məktəb işçilərini prosesə cəlb etmək (valideynlər, müəllimlər, əmək adamları, ictimai təşkilatlardan olan nümayəndələr);
- şagirdlərin təşəbbüskarlığına, müstəqilliyinə və yaradıcılığına münbit şərait yaratmaq;

- prosesin stimullaşdırılması (keçiriləcək yarışların təşkili, müxtəlif oyunlardan istifadə edilməsi, iştirakçıların rəğbətləndirməsi);
- şagirdlər arasında qarşılıqlı köməyin təşkil edilməsi;
- şagirdlər arasında ünsiyyətin qurulması;
- əsasən kollektivçiliyə üstünlüyün verilməsi;
- prosesə müxtəlif forma və metodların tətbiqi;
- işdə nəzarətin təşkili, həyata keçirilməsi və.s.

Düzgün təşkil edilmiş tərbiyəvi işlər ümumtəhsil müəssisələrində bir çox müsbət keyfiyyətlərin inkişafına və formalaşmasına şərait yaradır (buraya nizam-intizam, dəqiqlik, işgüzarlıq, məsuliyyətlilik daxildir).

Tərbiyə işinin düzgün təşkil edilməsi onun icra edilməsinə nəzarətlə bağlıdır. Bu vaxt nəzərdə tutulan planların, proqramların həyata keçirilməsinə nəzarət olunur, qarşıya qoyulmuş

məqsəddən uzaqlaşma halları baş verdikdə dərhal korrektə işləri (düzəlişlər) aparılır. Hadisələrin nəzərdə tutulmayan istiqamətə getməsinin, yəni nəzarətdən çıxmasının qarşısı alınır.

Tərbiyəvi işlərinin sonuncu mərhələsi həyata keçirilən işlərin təhlilindən və yekunlaşdırılmasından ibarətdir. Sonuncu mərhələdə alınan nəticələrin hesaba alınması, yəni ucotu aparılır, qiymətləndirmə və yekunlaşdırıcı təhlil həyata keçirilir:

- işin ictimai səmərəliliyi, şagirdlər üçün tərbiyəvi əhəmiyyəti müəyyənləşdirilir;

- qazanılmış müvəffəqiyyətin və ya uğursuzluqların (əgər varsa) səbəbləri axtarılır;

- ortaya çıxan nöqsanların ləğv edilməsi üçün yollar və vasitələr müəyyənləşdirilir.

Qeyd edilən şərtlərə, tələblərə əməl olunması tərbiyə prosesinin uğurlu təşkilinə və idarə edilməsinə yardım göstərir.

Ümumtəhsil müəssisələrində tərbiyə işinin səviyyəsini yüksəltmək üçün sinif rəhbərləri ilə ictimai özünüidarə orqanlarının birgə fəaliyyətini qüvvətləndirmək və bir-biri ilə əlaqələndirmək vacibdir. Təcrübələr onu deməyə əsas verir ki, şagird kollektivi ilə işdə idarəetməni müəyyən sistem vasitəsi ilə həyata keçirmək müsbət nəticələr verir. Bu sistemin ünsürləri aşağıdakılardır:

- tərbiyənin məqsəd və vəzifələrini bilmək, onun aktual problemlərini, səmərəli həlli yollarını müəyyən edib tətbiq etmək;
- qarşıya qoyulan məqsədə uyğun olaraq tərbiyə işinin nəticələrini təhlil etmək;

- az vaxt və az qüvvə sərf edərək qarşıya qoyulan vəzifələri həll etmək;
- konkret fəaliyyət proqramını işləyib hazırlamaq;
- şagird şəxsiyyətinin inkişafını layihələndirərək münbit şərait yaratmaq, onların inkişaf səviyyələrini müəyyən etmək.

Şagird kollektivinin inkişaf səviyyəsini öyrənmək üçün xüsusi proqram tərtib edərək onu həyata keçirmək mühüm şərtdir.

Problemin aktuallığa. Müasir dövrdə ümumtəhsil müəssisələrində şagirdlərin düzgün tərbiyə edilməsi, onların hərtərəfli inkişaf etmiş şəxsiyyət kimi formalaşdırılması öz aktuallığını qoruyub saxlamaqdadır.

Problemin elmi yeniliyi. Hal-hazırda tərbiyə prosesinin məqsəd və vəzifələrinin düzgün müəyyənləşdirilməsi, bu sahədə görülən işlərin vacibliyi, tərbiyənin yaradıcı əməklə bağlılığı, pedaqoji kollektivlə şagird kollektivinin birgə işi, tərbiyə prosesinə müsbət təsiri və əldə edilən səmərəli nəticələr haqqında yeni məlumatlar məqalədə öz əksini tapmışdır.

Problemin praktik əhəmiyyəti. Məqalə məktəbdə tərbiyə prosesinin düzgün qurulması baxımından məktəbin pedaqoji kollektivinin, sinif rəhbərlərinin və ayrı-ayrı fənn müəllimlərinin dərsi səmərəli təşkil etmələrinə şərait yaradacaqdır.

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SOSYAL MEDYANIN GÖSTERİŞÇİ TÜKETİM ÜZERİNDE ETKİSİ

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ÖZET

Tüketici satın alma davranışı, bireylerin beklentilerini karşılamak ve gereksinimlerini gidermek adına yürütülen girişimleri içermektedir. Günümüzde pek çok kişi ürünleri tüketirken ve marka tercihi yaparken faydalarını düşünmeden satın almayı tercih etmektedir. Günümüzde markalar kişinin sosyal statüsünü, iktisadi gücünü, yaşama biçimini belirleyebilmektedir. Bireyler, marka bazında ürünleri tüketirken, toplumsal prestije de önem vermektedir. Sosyal medya, işletmelerin müşterileriyle iletişim kurduğu ve/veya etkileşimde bulunduğu bir platform oluşturmaktadır. Şirketler sosyal medya aracılığıyla dünya çapındaki tüketicilere ulaşmak için ürünlerini pazarlamaktadır. Teknolojinin ilerlemesi sayesinde birçok insan internete bağlandığından, sosyal medya platformları giderek daha fazla tüketiciye hitap eder duruma gelmektedir. Sosyal medyada değişen platformlarda ve siteler arasında önem derecesinin zaman zaman değiştiği, tüketiciye hitap eden reklamlar yayınlanmaktadır. Bu nedenle, sosyal medya, değişen teknolojilerin günümüzde benimsenmesiyle birlikte, bir kişi veya bir kuruluşla ilgili olarak resimlerin, fotoğrafların ve diğer bazı hayati iş içeriklerinin kamuya açıklandığı ve belirli bir ticari varlığa sahip bir imaj ekonomisi oluşturmuştur. Tüketici karar verme sürecini oluşturan aşamaların ve bileşenlerin teorik kısmı, bireylerin satın alma öncesi, sırasında ve sonrasında potansiyel bir piyasa işlemine katıldığı satın alma aşamalarında sistematik bir yaklaşım göstermiştir. Öte yandan, günümüz pazarlama yaklaşımlarının değişmesi ve satın alma kararı üzerindeki etkileri konusunda netlik kazanan sosyal medya pazarlamasının özünü belirlemiştir. Gösterişçi tüketim, bir insanın toplumdaki statüsünü mevkiini ve maddi gücünü göstermeye yarayan ve belki de başkalarını kıskandırmaya sevk eden tüketim anlayışıdır. Dolayısıyla, sosyal medyayı gösterişçi tüketime maruz bırakmanın en önemli nedenlerinden biri statü ve prestij gösterme arzusudur. Genel olarak, bir toplumda alt sınıflar, üst sınıfları taklit etmeye ve çoğunluğa göre lüks tüketim sergilemeye motive olurlar. Gösterişçi tüketime örnek olarak giyim, yüksek teknolojili alet ve oyuncaklar ve araçlar üzerindeki lüks marka etiketleri gibi ürünler olarak görülmektedir. Ürünleri tüketmenin yanı sıra, tüketilen ürünlerin bireylerin içinde bulunduğu toplumsal kesime gösterilmesi de söz konusudur. Bu çalışma kaynak tarama usulü kullanılarak yapılmış ve sosyal medyanın gösterişçi tüketim üzerinde etkisinin olup olmadığı nitel ve nicel akademik çalışmalar bazında irdelenmeye çalışılmıştır.

Anahtar Kelimeler: tüketici, gösterişçi tüketim, sosyal medya, tüketici davranışı

THE EFFECT OF SOCIAL MEDIA ON CONSPICUOUS CONSUMPTION

ABSTRACT
Consumer purchasing behviour includes initiatives carried out to meet the expactations of individuals and to meet their needs. Today, many people prefer to buy products instead of thinking about their benefits while consuming. Nowadays brands can determine a person's social status, economic power and lifestyle. While individuals consume objects on a brand basis, they also attach importance to social prestige. Social media creates a platform where businesses communicate and/or interact with their costumers. Companies market their products through social media to reach consumers around the world. Social media platforms are increasingly appealing to consumers, as many people are connected to the internet thanks to the advancement of technology. Advertisements appealing to the consumer are published on the changing platforms and sites in the social media, where the degree of importance changes from time to time. Therefore, with the adoption of changing technologies today, social media has created an image economy where images, photos and some other vital business content related to a person or an organization are made public and have a certain commercial presence. The theoretical part of the stages and components that make up the consumer decision-making process showed a systematic approach to the purchasing stages in which individuals participate in a potential market transaction before, during and after the purchase. On the other hand, it has determined the essence of social media marketing, which has become clear about the changes in today's marketing approaches and their effects on the purchasing decision. Conspicuous consumption is an understanding of consumption that serves to show a person's status in society, his position as well as financial power, and perhaps leads other to envy. Therefore, one of the most important reasons for exposing social media to conspicuous consumption is the desire to show status and prestige. Generally, the lower classes in a society are motivated to imitate the upper classes and exhibit luxury consumption relative to the majority. Examples of conspicuous consumption are products such as clothing, high-tech gadgets and toys, and luxury brand labels on vehicles. In addition to consuming the products, it is also possible to show the consumed products to the social segment of the individuals. This study was carried out using the literature review method and it was tried to examine whether social media has an effect on conspicuous consumption on the basis of qualitative and quantitative academic studies.

Keywords: consumer, conspicuous consumption, social media, consumer behaviour

GİRİŞ

Tüketici davranışı, bireylerin ürün ve hizmetleri nasıl seçip kullandıklarını ifade eder. İnsanların farklı markalar arasında nasıl seçim yaptıklarına, nasıl araştırdıklarına ve nasıl alışveriş yaptıklarına odaklanır. Tüketici davranışı literatürdeki gibi ele alacak olursak kişisel, sosyal, kültürel ve psikolojik faktörlere bağlıdır. Bu olguları daha güncel deyimler haline getirirsek tüketici davranışını etkileyen faktörler şunlardır: Meslek: Bireyin mesleği, satın alma kararını etkilemede önemli bir rol oynar. Bireyin işinin doğası, kendisi için seçtiği ürün ve markaları doğrudan etkiler. Bireyin görevi ve işinin doğası, satın alma kararlarını etkiler. Atölyede çalışan bir kişi, çalışmak için her gün birinci sınıf markalar giymeyi göze alamayabilir ancak, yönetici konumundaki bireylerin bu satın almaları yapması işinin/görevinin/statüsünün bir parçası olmaktadır. Yaş: Yaş ve insan yaşam döngüsü de tüketicilerin satın alma davranışlarını etkiler. Gençler, hoş ve zarif tasarımları tercih eden orta yaşlı veya yaşlı bir kişiye kıyasla parlak/çarpıcı renkler satın almakla daha fazla ilgilenmektedirler. Ekonomik durum: Bireyin satın alma eğilimi, aylık geliri/kazancı ile doğru orantılıdır. Yüksek gelirli bireyler, daha çok ihtiyaç maddelerine harcama yapan orta ve alt gelir grubundan bireylere kıyasla pahalı ve kaliteli ürünler satın almaya meyillidirler. Yaşam tarzı: Avusturyalı psikolog Alfred Adler tarafından 1929'da önerilen bir terim olan yaşam tarzı, bireyin toplumda kalma şeklini ifade eder. Bazı insanlar için markalı giysiler giymek gerçekten önemlidir, bazı kişiler ise gerçekten marka bilincine sahip değildir. Lüks bir yaşam alanına sahip bir birey, statüsünü ve imajını koruma hissine kapılabilmektedir. Bireyin yaşam tarzı, onun tutumu, algısı, sosyal ilişkileri ve yakın çevresi ile ilgilidir. Kişilik: Bireyin kişiliği, satın alma davranışını da etkiler. Her bireyin satın alma davranışına yansıyan kendine özgü kişilik özellikleri vardır. Bir fitness tutkunu her zaman fitness ekipmanları arar, bir müzik aşığı ise müzik aletleri, CD'ler, konserler, müzik şovları vb.ile ilgilenir (MSG, 2022).

Günümüzde internetin yaygınlaşması sayesinde sosyal medya, tüketicilerin metin, resim, ses ve video bilgilerini birbirleriyle ve şirketle paylaşabilmeleri için bir ortam oluşturmuştur. Sosyal medya, bireylerin ve toplulukların kullanıcı tarafından oluşturulan içeriği paylaşmasına, oluşturmasına, tartışmasına ve değiştirmesine olanak tanıyan etkileşimli platformlar oluşturmak için mobil ve web tabanlı teknolojilere güvenmektedir. Sosyal Medya, katkıda bulunma, paylaşma, tüketme, arama, katılma ve oynama olmak üzere altı boyuta sahiptir. Sosyal medya günümüzde hem kapsam hem de işlev olarak birçok farklı sosyal ağ sitesinden oluşmaktadır. En popülerleri arasında Facebook, Twitter ve Instagram, günlük hayatta sıklıkla kullanılan sosyal medya platformlarıdır. Sosyal medyanın kullanımı, bireylerin daha derin bağlarla

etkileşime girmesine olanak tanır. Bu nedenle, kullanıcıların sosyal medyada kendileri hakkında olumlu şeyleri paylaşma konusunda daha seçici olmaları daha olasıdır. Sosyal medya kullanımının lüks malların, diğer bir deyişle gösteriş amaçlı malların harcamalarını artırarak irrasyonel seçimler yapılabileceğine dair etkisine ilişkin önceki araştırmalara dayanmaktadır.

Pazarlamaya yeni bir yön veren, sosyal medya pazarlaması, markayı tanıtmak ve ürün veya hizmetinizi satmak için Instagram, Twitter ve Facebook gibi sosyal medya platformlarını kullanmak anlamına gelmekte ve işletmeler yeni bir ürünle ortaya çıktığında ve lansmanı sosyal medya üzerinden yapmayı planladığında, buna sosyal medya pazarlaması adı verilmektedir. İşletmelerin müşterileri ile yorumlar yoluyla etkileşime girmesi, sosyal medya pazarlamasıdır. İlave olarak, marka değerlerini ve hikayesini sergileyen ilgi çekici içeriklerin yer alması da sosyal medya pazarlamasına dahil edilmektedir.

Gösterişçi tüketim terimi ilk olarak Thorstein Veblen tarafından ortaya atılmıştır. Veblen'in teorisi, gösterişçi tüketim olarak adlandırılan tüketim kalıplarının eğilimi teorisidir. Gösterişçi tüketim, 1899'da tanıtılan Veblen'in "Aylak Sınıf Teori"sinden türemiştir. Bu teori, bireylerin daha yüksek sosyal statüye sahip diğerlerinin tüketim kalıplarını taklit etmeye çalıştıkları bir çerçeve önermektedir. Bu, bireylerin ekonomik dereceye dayalı olarak kendilerini başkalarıyla karşılaştırma eğiliminde olduğunu varsaymaktadır. Veblen, zenginlerin genellikle zenginliği göstermek için çok belirgin olan mal ve hizmetleri tükettiklerini ve böylece daha yüksek sosyal statü elde ettiklerini savunur. Prestij ve birey için artan sosyal statü, başkalarının kıskanç hissedeceği anlamlı bir değere sahiptir. Gösterişçi tüketim, genellikle lüks ürünlerin tüketimini ifade eder ve belirli tüketici segmentlerinin yanı sıra yüksek sınıf hedefine sahiptir. Gösterişçi tüketim, markaların ürünü lüks olarak konumlandırması için bir fırsat yaratmaktadır (Memushi, 2013:253-254).

1. Tüketici Davranışı

Tüketici davranışı geniş kapsamlı bir davranış biçimi olup; antropoloji, matematik/istatistik, biyoloji, felsefe, anatomi, mimarlık, coğrafya, ekonomi, işletme, sosyoloji, psikoloji, hukuk gibi pek çok disiplinle ilişki içerisindedir. Tüketici davranışı bireyin algısına, yeteneklerine ve eğilimine göre belirlenmekte ise de önemsiz ayrıntılara da bağlı olabilmektedir. Ancak yine de, tüketiciye yöneltilen bir mesajın yanıt olarak karşılık bulması tüketici açısından satın alma davranışında açıklayıcı bir konumda yer almaktadır. Tüketicilerin satın alma kararında beklentileri, gereksinimleri ve deneyimleri en etkili unsurlar olarak görülmektedir. Üreticiler-Pazarlamacılar bunu bildikleri için tüketicilere olumlu deneyimler yaşatmak amacıyla çaba sarf ederler. Bu bağlamda, işletmelerin tüketicilerin ilgisini çekebilmeleri için tüketici davranışlarını

doğru analiz etmesi gerekmekte aksi takdirde tüketicilerin başka markaları yönelmesine engel olamayacaklarını bilmeleri gerekmektedir (Diyarbakırlıoğlu, 2021: 6). Öte yandan önemli olan, tüketicinin satın almayı düşündüğü ürün veya hizmetleri nasıl değerlendirdiğidir. Tüketim Değerleri Teorisi'ne göre tüketici, ürün veya hizmet satın alırken bir takım ekonomik, sosyal ve psikolojik değerlerden etkilenir (Sheth ve ark. 1991).

Tüketici davranışını etkileyen faktörleri genel olarak aşağıdaki başlıklar altında toplamak mümkündür:

1. *Kültürel Faktörler:* Kültürel faktörler üç alt başlıkta sınıflandırılır: Kültür, Alt Kültür ve Sosyal Sınıf. Kültürün etkisi yöreden yöreye değişmekte olduğu için bu durum pazarlamacıların farklı grupların, bölgelerin ve ülkelerin kültürünü analiz ederken çok dikkatli olmaları gerektiği anlamına gelmektedir. Alt kültür: Pazarlamacılar, pazarı birkaç küçük parçaya bölerek bu grupları kullanabilirler. Örneğin bir coğrafi grubun ihtiyaçlarına göre ürünler tasarlayabilirler. Sosyal Sınıf: Aynı sosyal sınıftaki tüketiciler benzer satın alma davranışı gösterirler. Bu nedenle, pazarlama faaliyetleri farklı sosyal sınıflara uyacak şekilde uyarlanabilmektedir.

2. *Sosyal Faktörler:* Sosyal faktörler üç alt başlıkta sınıflandırılır: Referans Grupları, aile, roller ve statüler. Referans Grupları bir tüketicinin tanımladığı ve katılmak isteyebileceği gruplardır. Referans Grupları: Örneğin, sosyal gruplar, çalışma grupları veya yakın arkadaşlar gibi gruplardır. Aile, alıcı davranışını büyük ölçüde etkilemektedir ve bu nedenle şirketler, hangi aile üyelerinin satın almalar üzerinde en fazla etkiye sahip olduğuyla ilgilenmektedir. Rol ise bir kişinin yapması beklenen faaliyetlerden oluşurken, statü bir kişinin toplum içindeki duruşudur.

3. *Psikolojik Faktörler:* Psikolojik faktörler motivasyon, sezgi, öğrenme, algı, tutum, kişilik, inançlar ve tutumlar olarak sınıflandırılır. Motivasyon: İhtiyacımız olanı alma dürtüsüdür. Her insanın farklı ihtiyaçları vardır. Ancak, bazı ihtiyaçlar diğerlerinden daha acildir. Öğrenme: Tüketicilerin bilgi edindikten sonra davranışlarını değiştirmesidir. Bu süreç nasıl alışveriş yaptığınızı ve ne satın aldığınızı etkiler. Tutumlar ve İnançlar: Bunlar "zihinsel durum" veya fikirlerdir. Pazarlamacılar, inançları ve tutumları olumlu olanlarla değiştirmeyi amaçlar ve bunu benzersiz kampanyalar tasarlayarak yaparlar. Algı: Bu, bir müşterinin bir ürün hakkında bilgi toplaması ve ardından ona anlam vermesidir. İki kişi aynı ürüne bakıp çok farklı bir şey görebilir.

4. Kişisel Faktörler: Tüketici davranışını etkileyen bir diğer önemli faktör de kişisel faktörlerdir. Kişisel Faktörler yaş, meslek ve yaşam tarzı ve kişilik üzerinde şekillenmektedir. *Yaş* konusunda söylenebilecek en kısa yorum: Her yaşam döngüsünün farklı satın alma

seçeneklerini içermekte olduğudur. Örneğin, gençler giysilerdeki en son trendleri satın almakla daha çok ilgilenirken, orta yaşlı insanlar bir aile arabası satın almakla daha fazla ilgilenen bireyler olabilmektedirler. *Meslek ve Yaşam Tarzı*: Bu iki faktör, tüketici davranışının önemli belirleyicileridir. Bunun bir örneği yeme-içme alışkanlıklarıdır. Vejetaryen bir yaşam tarzı yaşayan bir kişi vegan ürünleri satın alırken, et yemeyi tercih eden kişi ise et içeren ürünleri satın alma eğilimde olacaktır. Psikolojideki birçok modern ve geleneksel çalışma, kişiliğin 5 temel boyutuna işaret etmektedir. 1949'da ortaya çıkan ve giderek gelişen teorilere göre temel olarak alınan beş geniş kişilik özelliği şunlardır: *Dışa dönüklük* (sosyallik, atılganlık; tersi İçedönüklük), *uyumluluk* (şefkat, saygı, başkalarına güven), *deneyime açıklık (*entelektüel merak ve yaratıcı hayal gücü gibi yönleri içerir*), vicdanlı olma* (organizasyon, üretkenlik, sorumluluk) ve *nevrotiklik* (kaygı ve depresyona yönelik eğilimler)' tir. Pazarlamacılar, bir ürün veya hizmet için tüketici davranışını bu özelliklere göre belirlemektedirler (Durmaz vd., 2011:118).

Tüketiciler, kendilerine sunulan ürün ve hizmetleri satın alan veya tüketen bireylerdir. Tüketici satın alma davranışı bazen gizemli ve karmaşık olabilir. Bu nedenle, tüketici karar verme süreci, bireysel tüketim davranışının kritik yönlerini göstermektedir.

Tüketici davranışı beş aşamada sınıflandırılabilir:

1. Sorun tanıma
2. Bilgi arama
3. Alternatiflerin değerlendirilmesi,
4. Nihai karar
5. Satın alma sonrası kararlar (Chopra ve Gupta, 2020:1944).

Tüketiciler satın alma kararı aşamasında, kriterlerine uyan birden fazla ürünü incelemiş durumdadır. Örneğin, tüketici pamuklu gömlek arıyor ise muhtemelen pamuklu gömlek satan birçok markaya bakmıştır. Artık tüketici, gömleği alıp almama konusunda kritik bir karar vermek zorundadır. Bu aşamada işletmeler, tüketicilere ihtiyaçlarını hatırlatmakta ve bir güven duygusu yaratmaya odaklanmaktadır. Satın alma aşamasında tüketici ürünü satın almaya karar vermiştir. Ancak bu karar, kesin bir satışın gerçekleşmek üzere olduğu anlamına gelmemektedir. Müşterinin son aşamada satın almaktan vazgeçmesine yol açabilecek birçok faktör vardır. Örneğin, E-ticarette web sitesinde gezinme zorluğu veya karmaşık bir ödeme süreci, bir markanın satışını kaybetmesine neden olabilir. Satın alma sonrası değerlendirmede ise farklı bir süreç işlemektedir. Satın alma süreci satışla bitmez. Ürünü satın aldıktan sonra kullanmak ve değerlendirmek, tüketicinin üründen memnun olup olmadığını belirleyecektir.

Teşekkür e-postaları ve satın alma sonrası anketler, markaların müşterilerin ürünlerle ilgili herhangi bir sorunla karşılaşıp karşılaşmadığını anlamalarına yardımcı olabilirler. Bunlar aynı zamanda müşterilerle olumlu bir ilişki geliştirirken memnuniyetsizliği de giderebilirler (Lawrence, 2021).

2. Gösterişçi Tüketim

Sokrates, şehirde bir gezi için giyinmiş bir kadını gördüğünde şöyle dedi:

"*Seyahatinizin şehri görmek için değil, şehrin sizi görmesi için olduğundan şüpheleniyorum…*"
Sokrates (MÖ 470-339).

Gösterişçi tüketim çok eski dönemlere dayanan bir olgudur genel olarak kişilerin çevrelerine prestijini ve statüsünü göstermek amacıyla yaptığı alışverişler şeklinde tanımlanmaktadır. Bireyler satın aldıkları ürünlerin çevrelerince prestij göstergesi olarak görülmesini istedikleri için bu tip tüketime yönelmektedir (Güleç, 2015:63). Gösterişçi tüketim, kişinin egosunu şişirmek için maliyeti yüksek bir ürün satın almayı içermektedir (Dinç, 2022: 3-4). Gösterişçi tüketim, bireyin üstünlüğünü ve farklılığını göstermeye çalıştığı tüketim biçimi olarak, bireyin üst sınıfa ulaşmasının yanı sıra içerisine dâhil olduğu sınıfa da tüketimlerini gösterme arzusunda olmalarına sebep olmaktadır. Bütün sınıflar sadece gösteriş için tüketim yapmaktadırlar ve bu sınıfsal ayrım bireyin en üst sınıfa girme istediğini baskın hale getirmiştir (Dinç, 2022: 9). Günümüzde küreselleşmenin etkisi ile rekabetteki büyük artış ile markalar ve bu markalara yapılan vurgu geniş mecralara yayılmıştır. Bu konu, bilimsel açıdan Amerika Birleşik Devletleri'nin toplumsal alışkanlıkları çerçevesinde ilk kez *Thorstein Veblen* tarafından incelenmiştir. 1899 yılında yayınlanan; "The Theory of The Leisure Class" (Aylak Sınıfı Teorisi) adlı eserinde Veblen, tüketimin gösteriş amacı ile yapılabildiğini ileri sürmüş ve toplum ile ekonomi arasındaki ilişkiyi sınıfsal farklılaşmalara dayandırmıştır. Veblen; gösterişçi tüketimin üst sosyal sınıf tarafından yapılmakta olduğunu belirtmiş ve ayrıca, üst sosyal sınıfa benzemeye çalışan sınıflar tarafından da gösteriş amaçlı olarak tüketim yapıldığını eserinde ifade etmiştir (Güleç, 2015:63). Başkalarına kendini beğendirme arzusu, kendini kanıtlama arzusu veya başkalarına daha zengin olduğunu gösterme isteği gibi psikolojik etkenler gösterişçi tüketimin nedenleri olarak belirtilebilmektedir. Toplumun değerler sisteminde ekonomik gücün önemli bir statü göstergesi olarak algılanması yanında; ışıltılı-renkli bir görünüme sahip olan modern dünyanın cezbedici özellikleri, insanın önüne sınırsız olanaklar sunarak başlarını döndürmüş ve insanları, sınırları olmayan uçsuz bucaksız gösteriş alanında yaşadığına inandırmıştır (Hız, 2011: 118).

Başkalarının mülkiyetini kıskanma eylemi, bir tüketicinin davranışını da etkilemekte ve bu

durum başka bir kişinin sahip olduğu bir öğeyi/objeyi kendisi ile eşleştirmek veya sahip olmak istediğinde görülmektedir. İçinde bulunduğumuz çağda gösterişçi tüketim davranışı, internet ve sosyal medya sayesinde hızla artmaktadır. Sosyal medyanın, aşırı satın alma davranışı kalıplarını tetiklemede önemli bir rolü bulunmaktadır. Bireyin materyalist karakteri de irrasyonel tüketimi etkiler, yani lüks mallara sahip ve gösterişli görünmek amacıyla ve de övgü alma umuduyla bu öğeleri tüketim yoluna gidebilirler. Bireyler başkalarına ait mülkiyet bilgilerini sosyal medya aracılığıyla alır. Sosyal medyada bunu şahsen görebilen tüketicide mantıksız düşünceler ortaya çıkabilmektedir. Hayran oldukları kişiler ile aynı konumda olma isteği kişileri gösterişçi tüketime sevk edebilmektedir. Bencil bir karaktere sahip bireylerin davranışları, başkalarının sahip olduklarını kıskançlık ve materyalizmin de katkısıyla, genellikle göze çarpan şeylerle ilişkilendirilmesi yönündedir. Gösterişçi tüketim eylemleri, bunları yapan bireyleri tatmin etmektedir. Kısacası, İçinde bulunduğumuz çağda gösterişçi tüketim davranışı, internet ve sosyal medya sayesinde hızla yayılmaktadır. Sosyal medya kullanımının, tercihen bireyler veya gösterişçi tüketim geçmişine sahip tüketiciler olmak üzere birçok kişiye ürün satın alırken ulaşabileceği düşünülmektedir (Wiratama, 2022:119).

Gösterişçi tüketimdekilerin satın almaları, ihtiyaç duyma veya sadece başarma amacıyla değil maksimum memnuniyet arzusuna dayanmaktadır. Günümüz Modern dünyasında insanların arzuladığı mutluluk, sahip oldukları ve gösterebildikleri mallar veya işaretlerden ibaret olarak görülmektedir. Tüketim bu durumda bir işaret veya nesne manipülasyonuna dönüşmektedir. Tüketim sadece bir arzu değildir. Meta satın alma, zevkin bir işlevi olarak ihtiyaçların serbest bırakılması ile kendini tatmin, zenginlik hissi gibi sebeplerle gerçekleşebilen eylem, tüketim olmaktadır (Wiratama, 2022:119).

Özellikle gençlerin arkadaş grupları, tercih ettikleri ürün ve markalarda belirleyici olabilmektedir. Arkadaş çevresi gençlerin zorunlu tüketim mallarına olan taleplerini önemli ölçüde etkilememekte ancak, gösteriş amaçlı tüketim ürünü olan taleplerini güçlü bir şekilde etkileyebilmektedir. Marka ve pahalı ayakkabı, kıyafet, telefon kullanmaları buna örnek gösterilebilir. Gelir durumu daha altta olan bireyler üst gruptakilerin satın alma davranışlarını taklit etmeye çalışmaktadırlar. Geliri düşük olan bireyler içinde bulundukları gruptan farklılaşmamak için gerekirse ürünlerin imitasyonu dahi satın alabilmektedirler. Bireyler içinde bulundukları çevre veya gruptaki statülerinin bozulmaması adına bütçelerini aşan gösterişçi tüketime yönelebilmektedirler. (Koçak, 2017: 104-106).

3. Sosyal Medya ve Pazarlama Bağlantısı

Sosyal medya, internet kullanıcılarının çevrimiçi olarak birbirleriyle etkileşime girmesine

yardımcı olan paylaşım ve kişisel yorumlar gibi etkinliklere dayalı sosyal ağ siteleri olarak tanımlanabilir (Güzel, 2020:95). Sosyal medya; zaman ve mekân ayırımını ortadan kaldırdığı gibi aynı zamanda, bireysel ve kitle iletişimi farkı ile özel ve kamusal alan farkını da ortadan kaldırmakta, sanal ve gerçek arasındaki sınırları yok edebilmektedir. Sosyal medyada herkes hem takipçi hem de izlenen konumundadır. Tüketiciler içerik oluşturmak, değiştirmek, paylaşmak ve tartışmak için içerik paylaşım sitelerini, blogları, sosyal ağları ve wikileri kullanmaktadır (Atalar, 2019:22). Sosyal medyanın sunduğu erişilebilirlik ve şeffaflık, şirketlerin kendilerini yeni bir pazarlama zihniyetiyle donatmasının kaçınılmaz ve gerekli olduğu günümüz pazarında tüketicilerin kendilerini nasıl konumlandırdıkları konusunda değişikliklere yol açmıştır (Murtaza, 2021: 486). Sosyal medyanın büyümesi tüketiciler için blog, sohbet, oyun ve mesajlaşma gibi birçok elektronik aktivite sağlamıştır. İnternetteki sosyal ağlar, tüketicilerin bilgi ve tavsiye toplaması için iyi bir platformdur ve özellikle gelişmekte olan ülkelerde sosyal medya ve sosyal ağ sitelerinin hızlı büyümesi, pazarlamacılara müşteriler ile bağlantı kurmak için yeni bir fırsat sunmaktadır (Noureddine ve ZeinEddine, 2018: 78).

Sosyal medya, insanları birbirine bağlayarak ve bilgi alışverişini kolaylaştırarak giderek daha yaygın hale geldikçe, tüketici davranışları da değişmektedir. Tüketiciler artık sosyal medya aracılığıyla ilgi çekici bir reklamı YouTube'da kolayca izleyebilirken, Twitter'da kendi fikirlerini ortaya koyabilmekte ve Facebook'ta arkadaşlarıyla paylaşabilmektedir. Sosyal medya, kağıt tabanlı medyadan (örneğin dergiler ve gazeteler) ve Radyo, TV gibi geleneksel elektronik medyadan kalite sıklığı, etkileşim, kullanılabilirlik ve performans dahil olmak üzere birçok yönden farklıdır (Chopra ve Gupta, 2020: 1946).

Teknolojinin gelişmesi ile birlikte haberleşme araçları (kitle iletişim araçları) artmıştır ve insanlar oturdukları yerden sosyalleşme imkanı bulmuşlardır. Teknolojinin gelişmesi; sosyal medya araçlarının kullanımını arttırmış ve insanlar yediklerini, içtiklerini, gezdiği yerleri ve daha birçok şeyi gösteriş haline çevirmişlerdir. Paul Virilio tam da bu durumu "görmenin sanayileşmesi" olarak isimlendirmiştir (Dinç, 2022:10).

Sosyal medyanın insanları ve davranışlarını nasıl etkileyebileceğini açıklamaya çalışan "*bulaşma teorisi*", belirli davranışların zamanla yayılabileceği ve büyüyebileceği kavramına dayanmaktadır. Sosyal medya, insanları bu ağlardaki diğerlerinin bilgisine, tutumlarına, davranışlarına ve inançlarına maruz bırakarak sosyal bulaşmayı teşvik eder. Sosyal bulaşma, özellikle insanlar başkalarıyla etkileşime girdikten sonra davranışlarını değiştirdiğinde ortaya çıkar. Bunun nedenleri, artan farkındalık veya bir ilişkilendirme sürecinde grup kurallarına uyma isteği olabilmektedir (Esmer, 2020: 15).

Tüketici davranışları, kişisel, sosyal, kültürel, psikolojik ve fizyolojik nitelikleri barındırmak ile birlikte ABD'de sosyal ağ kullanıcıları üzerinde yapılan araştırma sonucuna göre; Amerikalıların % 52'si bir ya da daha fazla sosyal ağ profiline sahip olup, çevrimiçi sosyal ağ kullanıcılarının dörtte biri, beğendiği ürün ve hizmetleri sosyal ağ sitelerinde takip etmekte ve bu takipçilerin yüzde 80'i de Facebook'taki marka sayfalarını kullanmaktadır. Dolayısıyla çevrimiçi sosyal ağlar ürün bilgi kaynağı haline gelmiş durumdadır (Sarıtaş ve Karagöz, 2017: 365).

Sosyal medya; tüketiciler tarafından aktif olarak kullanılmakta olan, popüler bir ortamdır. Bu nedenle tüketicilerin satın alma kararları üzerinde televizyon gazete reklam gibi geleneksel kitle iletişim araçları veya ağızdan dolma bilgilerden çok daha fazla ve tek başına tüketicileri etkileme gücüne sahiptir. Bu gücün sebebi ise sosyal medyada, tüketicilerin satın aldıkları bir ürün ve hizmet hakkında fikir yürütebilmekte, yorum yapabilmektedir. Ürünleri satın alanların yorumları dikkat çekmektedir. Sosyal medyada pazarlama aracı olarak ünlü kişiler tercih edilmektedir. Zira, tüketiciler, satın alma kararlarını etkileyecek farklı online hesaplara ilgi duymaktadırlar. Sosyal medya aracılığı ile yürütülen pazarlama faaliyetlerinde ünlü kullanılmasına en iyi örnek influencerlardır (Dinç, 2022: 52-53).

Influencer (Etkileyici):

Influencer pazarlama, markaların ücretli tanıtım yoluyla güçlü sosyal medya takibine sahip kişilerle ortak olduğu bir reklam stratejisidir. Influencer 'fenomen pazarlaması' anlamına gelmektedir. Fransızcadan günümüze geçmiş olan fenomen kelimesi Türk Dil Kurumu Sözlüğünde 'olay' ve 'görüngü' anlamını taşımaktadır. Influencer kelimesi ise sözlükte etkilemek, tesir etmek, söz geçirmek ve ikna etmek anlamına gelmektedir. Köletavitoğlu (2017) kendi sayfasında yazmış olduğu yazıda Influencer Marketing ile ilgili; "takipçileri ile yakın ve güvene dayalı ilişkileri ile pazarlama dünyasının en etkili unsurlarından biri olarak kabul edilen "ağızdan ağıza pazarlamanın" (word of mouthmarketing) dijital dünyadaki yansıması sosyal medya fenomenleri (influencerlar) ve markaları yeni ve dinamik bir iş modelinde bir araya getiriyor" düşüncesine yer vermektedir. Günümüzde sosyal medya mecralarında görmüş olduğumuz ünlü kişiler, hatırı sayılır kişiler veya meşhur oluşunu yalnızca sosyal medya aracılığı ile kazanmış kişiler fenomen/görüngü olarak isimlendirilmektedir. Sosyal medya üzerinde kendisini takip edenlerin sayısı fazla olan, insanlar arasında tanınan fenomenlerin sürekli olarak izlenmesi ve düzenli olarak takip edilmesi reklamcılık ve marka tutumu yaratma konusunda yeni yöntemler yaratmaktadır. Buna bağlı olarak teknolojinin en yaygın olduğu ve

aktif kullanıldığı günümüz zamanında işletmeler, tüketicileri satın alma davranışına yönlendirmek amacı ile geleneksel pazarlamanın dışına çıkarak ürün ve markaları hakkında bilgi ve tanıtım yapmak ayrıca pazar alanında farkındalık yaratmak için instagram, twitter, facebook, youtube gibi sosyal medya uygulamalarında influencerlar (fenomenler, etkileyiciler) aracılığıyla "Influencer Marketing" yapmaktadır. Gösterişçi tüketim sınıfı olan Aylak Sınıf Teorisi'nde Veblen, bireyin boş zamanının fazla olmasından dolayı sadece gösteriş amaçlı tüketim yaptığını vurgulamaktadır. Gereksiz tüketim sonucunda bireyin kendi imajını yaratması ve bu imajı sürdürmesi gösterişçi tüketim ve aylaklığa bağlanmıştır. Toplumun büyük bir kesiminin düzenli bir işi vardır ve mesai saatlerine uyarlar. Herhangi bir işte çalışmayan, sabit bir işi olmayan bireyler toplum tarafından üst sınıf ve kaliteli olarak algılanmaktadır. Bu düzlemde günümüz sosyal medya Influencerları (fenomenler, etkileyiciler) her gün değişik yerlere gittikleri, yiyip içtikleri, alışveriş yaptıkları yerlerin gösterimini yapmaktadırlar. Sabit bir işçinin çalışma saatleri gibi bir mesai zamanları bulunmamaktadır. Serbest ve boş zamanları vardır. Influencerların (etkileyicilerin) satın alma üzerine etkisi ile ilgili yapılan bir araştırmadan elde edilen sonuçlar; ● Tüketicilerin % 49'unun influencerların düşüncelerine önem verdiği, ● Tüketicilerin % 89'unun influencer tarafından bir ürünü almaya ikna edildiği, ● Gençlerin % 70'inin ünlülerden ziyade influencerların düşüncelerine önem verdikleri, ● Kadınların % 86'sının bir ürün hakkında bilgi almak için sosyal medyaya başvurduğu, ● Tüketicilerin % 37'sinin sponsorlu gönderilerde influencerların diğer tanıtımlara kıyasla daha gerçekçi olduğunu beyan ettikleri sonucuna ulaşmışlardır (Dinç, 2022: 53-55). Influencer pazarlama, tüketicilerin karar verme süreci üzerinde büyük bir etkiye sahiptir. Influencerlar, sosyal medya hesaplarında farklı ürünleri tanıtarak tüketicileri belirli ürünleri satın almaya teşvik edebilir. (Markkanen, J.M. (2021).

Tüketicilerin % 49'unun bir ürünü satın almadan önce sosyal medya platformlarındaki etkileyicilerin yorumlarını aramaktadır. Tüketicilerin % 40'ı bir ürünü Twitter, Instagram ve Facebook gibi bir sosyal medya platformunda gördükten sonra satın almıştır. Kadınların % 86'sı satın alma tavsiyesi için sosyal medya platformlarını kullanmaktadır. Müşterilerin % 72'si, bir sosyal medya fenomeni tarafından tavsiye edildikten sonra bir markaya daha fazla güvenmektedir. Tüm bu rakamlar, influencerların tüketici davranışları üzerinde güçlü bir etkiye sahip olduğunun açık göstergeleridir (Dinç, 2022: 53-55).

Büyük bir kitleye yönelik olumlu bir tavsiyenin faydaları, genellikle bir öğenin parasal değerinden çok daha ağır basacaktır, bu nedenle ücretsiz bir promosyon ürünü vermekten çekinmeyin. Sosyal medya, markalar ve tüketiciler için eşit bir oyun alanı yaratarak, ikisi

arasında daha önce hiç görülmemiş türden bir ilişkinin kilidini açmıştır. Sosyal platformlar, modern çağın vitrinleri olmuştur (Kowalewicz, 2022).

4. Sosyal Medyanın Gösterişçi Tüketime Etkisi

"*İhtiyacınız olmayan şeyleri satın alırsanız, yakında ihtiyacınız olan şeyleri satmak zorunda kalırsınız*".

Warren Buffet

Bilişim sektörünün gelişimi ile birlikte tüketiciler; kitle iletişim araçlarını kullanarak özellikle internet, sosyal medya ve bloglar aracılığıyla satın alma ihtiyacı hissettikleri ürünler hakkında daha fazla bilgiye erişme imkanı bulabilmektedirler. Üstelik tüketiciler kitle iletişim araçları sayesinde firmaları, ürünleri, hizmetleri karşılaştırabilmekte ve kendileri için en uygun ürün ve hizmetleri kolaylıkla seçebilmektedirler. Takip etmiş oldukları sosyal medya uygulamalarında, sanal ortamda oluşturulan gruplardaki tüketiciler, bir gruba ait olmak ve grupta iyi bir şöhrete sahip olmak istedikleri için belli bir markaya sahip olmak istemekte ve bu sayede kendileri hakkında pozitif bir imaj oluşturarak o gruba dahil olduklarını hissetmektedir (Sayın vd., 2017: 439).

Sosyal paylaşım siteleri (Facebook), mikro bloglama (Twitter), fotoğraf paylaşım siteleri (Instagram) ve video paylaşım siteleri (YouTube) gibi sosyal medya sitelerinde Dünya çapında giderek artan sayıda insan, birbirleriyle bağlantı kurmak, bilgi aramak ve araştırmak gibi faaliyetler için siber dünyada muazzam miktarda zaman harcamaktadır. Sosyal medyanın gelişimi ve dünya çapında yayılması, ürünlerinin tanıtımı ve dağıtımında önemli değişiklikler yaratmaya devam etmektedir. Tim Berners Lee tarafından başlangıçta fizik camiası için tasarlamış olan world wide web (www); iletişim, paylaşım, sohbet ve bilgi akışı olanaklarının sağlanması ile " sosyal web " şekline dönüşmüştür. Ask.com, lycos, metacrawler, altavista, google, Microsoft live, yahoo! ve diğer tüm arama motorları bilgileri düzenlemek için oluşturulmuştur. Pazarlamacılar arasındaki yeni trend ise arama motoruna çeşitli anahtar kelimeler yazıldığında sonuçların sıralanmasıdır. Pazarlamacılar için önemli olan müşterinin bir arama sonucunda şirketin web sayfasını ilk etapta görmesidir. İnternetin ortaya çıkması ile Sosyal medya pazarlaması da gelişmeye başlamıştır. İletişim unsurunun önemi dikkate alınarak, "Pazar" yaratmak için "medya" (iletişim ve araçlar) kullanılmaya başlanmıştır. Sosyal medya, medyası ile hayatımıza girmiştir. Sosyal medyanın kullanıcıların zevkleri, ilgi alanları ve bakış açıları üzerinde etkisi bulunmaktadır. İşletmeler, kullanıcılarla belli bir uyum sağlamaya çalışmaktadır. Kullanıcılar sosyal medyada düşüncelerini rahatça ifade etme fırsatı bulurken, işletmeler de bireylerin tercihlerinin oluşmasında, bilgiye erişimde ve karar

vermesinde etkili olmaktadır. Bu durum bireylerin tutum ve davranışlarını etkilerken işletmeler ise bireylerin bağlılıklarını, aidiyetlerini ve ihtiyaçlarını karşılamaya çalışmaktadırlar (Atalar, 2019: 44-46).

Tüketim kalıpları gösterişçi tüketim üzerinde etkili olan önemli bir faktördür. Günümüzde bireyler tüketim kalıplarına uymakta ve tüketimde tek tip kalıplar meydana gelmektedir. Örneğin, dünyanın çeşitli yerlerinde milyonlarca insan aynı marka akıllı telefonu kullanmakta, aynı marka koşu ayakkabılarını giymekte, aynı marka otomobili tercih edebilmektedir. Tüketim kalıplarının gelişiminde önemli etkisi olan internetin yaygınlaşması ve sosyal medyanın insan hayatında önemli bir yer kaplaması ile gösterişçi tüketim bunlardan etkilenir hale gelmiştir. İnsanlar satın aldıkları ürünleri sosyal medya hesaplarında çevrelerine sahip oldukları ürünleri gösterme ihtiyacı hissetmekte ve bu durum gösterişçi tüketim eğilimini arttırmaktadır (Diyarbakırlıoğlu, 2021: 41).

Tüketiciler belirli ürünleri, ürün kendilerine çekici geldiği için seçerler. Seçim, farklı kaynaklardan toplanan bilgilerden etkilenebilir, bu nedenle sosyal medya karar vermede etkili bir araçtır. Sonuç olarak sosyal medya verileri, tahminler veya beklentilerle tüketici kararlarını etkilemektedir. Yeni bir unsur olarak sosyal medya, uzun vadeli satın alma davranışı teorisini daha da karmaşık hale getirmiştir. Alışveriş konumları yalnızca geleneksel kanallardan etkilenmekle kalmamakta, aynı zamanda çevrimiçi platformlara da uzanmaktadır. Platformlardaki filmler, kitaplar, müzik, markalar ve kullanıcı tarafından oluşturulan içerikler, kullanıcılara yüksek derecede kişisel zevk ve kişilik kazandırmaktadır ki tüketicilerin bu platformlarda yaptığı incelemelerin tek kontrol özelliği ise "güven" dir.

Noureddine ve ZeinEddine (2018) tarafından Lübnan'daki üniversite öğrencileri üzerinde yapılan araştırma bulgularında; sosyal medyanın satın almadan önce kişiyi bir şeye olan ihtiyacı tanımaya teşvik ettiği belirtilmektedir (Noureddine ve ZeinEddine, 2018: 80, 82-83).

Öte yandan önemli olan, tüketicinin satın almayı düşündüğü ürün veya hizmetleri nasıl değerlendirdiğidir. Tüketim Değerleri Teorisi'ne göre tüketici, ürün veya hizmet satın alırken bir takım ekonomik, sosyal ve psikolojik değerlerden etkilenir. Bu teoriye dayanan yakın tarihli bir araştırma, sosyal ve finansal tüketim değerlerinin satın alma niyeti üzerinde doğrudan bir etkisi olduğunu, ancak duygusal ve fonksiyonel tüketim değerlerinin satın alma niyeti üzerinde doğrudan bir etkisi olmadığını bulmuştur. Bu bulgu aynı zamanda gösterişçi tüketicilerin sosyal değerleri tercih ettiklerini de göstermektedir. Ürünle ilgili kendi duygu ve işlevselliklerinden ziyade, ürüne sahip olarak yaratabilecekleri statü, arzu edilirlik veya tanınma daha önemlidir. Bir ürünün finansal değeri olarak yüksek fiyatı, tüketiciye pahalı ürünleri satın alan daha üst bir

sosyal sınıfa ait olduğunu hissettirir. Bu anlamda satın alma niyeti, tüketicilerin belirli bir ürünü gelecekte satın alma isteğini ve o tüketicinin ürünü satın alma planlarını temsil eder. Tüketiciler bir ürünle ilgili düşüncelerini, isteklerini ve memnuniyetsizliklerini sosyal medya aracılığıyla hem işletme hem de diğer kullanıcılarla paylaşabilmektedir. Bu nedenle sosyal medya satın alma niyetini tetikleyen bir unsur olarak görülmektedir (Efendioğlu, 2019:2177).

Sosyal medyanın gösterişçi tüketim üzerinde etkisini inceleyen seçilmiş araştırma sonuçları aşağıda verilmiştir:

Atalar (2019) tarafından üniversite öğrencileri üzerinde yapılan araştırmaya göre; Facebook kullanımı arttıkça sosyal medya bağımlılık düzeyinin artacağı, dolayısıyla gösterişçi tüketim eğilimlerinin artacağı düşünülmektedir. Facebook kullanıcılarının narsisizm ve/veya haset düzeyleri arttıkça gösterişçi tüketim eğilimlerinin de artacağını söylemek mümkündür. Kısacası, Facebook kullanım yoğunluğu arttıkça, kullanıcılar Facebook "beğeniler" sayfalarında yüksek maliyetli markaları (snob ve/veya prestijli markalar) sergileme eğiliminde olmaktadırlar (Atalar, 2019: 127-128).

Sayın vd., (2017) tarafından "Sosyal medyanın tüketici davranışları ve üniversite öğrencileri üzerindeki etkisini belirlemeye yönelik" olarak yapılan çalışmada; demografik değişkenler açısından satın alma öncesi ve sonrasının farklılıklar gösterdiği belirlenmiştir. Buna göre tüketiciler olarak öğrencilerin satın alma öncesi davranışlarında yaşın etkili olduğu, cinsiyet, eğitim durumu ve gelirin etkili olmadığı görülmüştür. Satın alma sonrası tüketici davranışlarında ise cinsiyetin etkili olduğu, yaş, eğitim durumu ve gelirin etkili olmadığı belirlenmiştir (Sayın vd., 2017: 450-451).

Xhema (2019) tarafından yapılan araştırmaya göre; sosyal medya kullanımı ile müşteri sadakati arasında negatif bir ilişki olduğu anlaşılmıştır. Bu açıdan ilk elde edilen sonuç şöyledir: Sosyal ağları ve arama motorlarını kullanarak daha fazla zaman harcayan müşteriler, markalara daha az sadık kalmakta, yani gelecekteki satın almaları için belirli markaları düşünmemekte ve başkalarını şirketin ürünlerini satın almaya teşvik etmemektedirler. İkinci olarak; Xhema (2019)'nın çalışması, sosyal medya kullanımı ile müşteri toleransı arasında negatif bir ilişki olduğunu, yani sosyal ağlarda ve arama motorlarında daha fazla zaman harcayan müşterilerin kötü hizmet ve aşırı fiyatlandırmaya daha az toleranslı olduğunu göstermiştir. Üçüncüsü, bu çalışma sosyal medya kullanımı ile müşteri deneyimi arasında pozitif bir ilişki olduğunu göstermiştir. Bu, sosyal medya kullanımının artmasıyla birlikte, müşterilerin satın alma kararları üzerinde daha fazla deneme yapma eğiliminde oldukları anlamına gelir (yeni ürünleri denemek veya fiziksel olarak görmeden ürünleri satın almak). Son olarak, çalışmada, sosyal

ağların dünyayı etkilediği belirtilmektedir (Xhema, 2019: 507-508).

Dinç (2022) tarafından yapılan araştırmaya göre; Dünya üzerinde sürekli olarak değişen yaşam koşulları, küreselleşme ve seyahat imkânlarının gelişmesi bireyleri yaşadıkları yer dışında yeni yerler görme, öğrenme ve eğlenme isteklerini arttırarak seyahatlerini sıklaştırmaya sebep olmuştur. Bu sıklaşan seyahatlerin sonucunda turizm faaliyetleri önem kazanmış ve konaklama işletmelerine olan talep artmıştır. Değişen yaşam koşulları insanların satın alma taleplerini de değiştirmiştir. Eski zamanlarda bireyler kendi ekonomisine uygun satın alım tercih ederken günümüzde bu davranış şekli özellikle internetin aktif kullanımı ve sosyal medyanın artması ile gösteriş halini almıştır. Gösterişçi tüketimin temelinde zengin olmak, mülkiyet sahibi olmak ve varlık içinde yaşamak düşüncesi hakim iken, günümüzde bu durum yaşamın temel gayesi haline dönüşmeye başlamıştır. Gösterişçi tüketiminde özenti ve kıskandırma duygusu egemendir. Bireyler satın alma faaliyetini üründen fayda sağlamak yerine toplumda statü oluşturmak amacı ile gerçekleştirmektedir. Bu durumda gösterişçi tüketimin satın alma tercihleri üzerindeki etkisi kaçınılmaz olmaktadır. Literatürde gösterişçi tüketim ile ilgili çok sayıda araştırma bulunmaktadır. Dinç (2022)'in Kütahya ili ve ilçelerinde yaşayan Milli Eğitim Bakanlığına (MEB) bağlı devlet okullarında çalışan öğretmenler üzerinde yaptığı araştırması ile konaklama işletmelerinin değişen talebe yönelik gösterişçi tüketime dayalı satın alma davranışlarını dikkate almaları gerektiği gerçeği ortaya konulmuştur. Bu faktörü dikkate alarak faaliyetlerini gerçekleştiren konaklama işletmelerinin rekabette önemli bir avantaja sahip olacaklarının şüphesiz olduğu araştırmada ifade edilmiştir. Öğretmenlerin gösterişçi tüketimin eğilimlerinin konaklama işletmesi tercihleri üzerindeki etkisini değerlendirmek amacıyla regresyon modeli kurulmuş ve analiz edilmiştir. Analiz sonuçlarına göre: Gösterişçi tüketimin satın alma tercihleri üzerinde anlamlı ve pozitif yönde etkisinin olduğu ve gösterişçi tüketimin satın alma üzerinde etkisi olduğu kanısına ulaşılmıştır. Elde edilen veriler sonucunda öğretmenlerin gösterişçi tüketim eğiliminde yaşlara göre anlamlı ve olumlu farklılıklar tespit edilmiştir. Yaş dağılımına göre 43 yaş ve üzeri yaştaki öğretmenlerde diğer yaş gruplarına kıyasla gösterişçi tüketim eğiliminin daha az olduğu gözlemlenmiştir (Dinç, 2022: 94, 105-108).

Widjajanta vd., (2018) tarafından yapılan araştırmaya sonuçlarına göre; her gün kullanılan sosyal medyanın insanları gösterişçi tüketime ya da gösteriş için aşırı tüketime yönlendirebileceği gözlenmiştir. Sosyal medyanın, medyada mal veya hizmet tüketimiyle ilişkilendirilen her şeyin aşırı övgüyle paylaşılmasında bireysel bir medya aracı haline geldiği belirlenmiştir. Bu ilişki çelişkili sonuçlar getirebilmektedir. Çalışma, benlik saygısı ile gösterişçi tüketim arasında pozitif bir ilişki olduğunu öne sürmekte, bu da yüksek benlik saygısı

düzeylerinin gösterişçi tüketimi ürettiğini göstermektedir. Sosyal medya kullanımı, kişinin özel hayatını izleyicilere gösterme konusundaki özgüveni ile de ilişkilidir. Bu, dolaylı olarak gösterişçi tüketim davranışına atıfta bulunur. Yüksek düzeyde bir benlik saygısı, bir kişinin gösterişçi tüketimini artıracaktır. Çalışma aynı zamanda önceden yapılmış olan, gösterişçi tüketim ile sosyal medya platformlarının kullanımı arasında paralellikler bulmak için yürütülen araştırmaları da desteklemektedir. Sonuçlar ayrıca, benlik saygısı ile gösterişçi tüketim arasında pozitif bir ilişki olduğunu açıklayan ve yüksek benlik saygısı düzeylerinin gösterişçi tüketim ürettiğini gösteren araştırmaları da desteklemektedir (Widjajanta vd., 2018:10-11).

SONUÇ

Tüketicilerin davranışını etkileyen ve satın almalarında etkili olan faktörler kültürel, sosyal, psikolojik ve kişisel faktörlerdir. Tüm bu faktörlerin bir araya gelerek karmaşık bir şekilde harmanlandığı sosyal medyada prestij ve gösteriş amaçlı olarak yapılan paylaşımlar bireyleri üst sınıfa yönelmeye sevk etmektedir. Sosyal medya, reklam ve iletişimin birlikte kullanıldığı bir platform olarak karşımıza çıkmaktadır. Sosyal medyayı kullanan bireyler, ürünler hakkındaki yorumları, düşünceleri bu ortamda görebilmekte ve kendileri de ürünler hakkında düşüncelerini belirterek yorumlar yapabilmektedirler. Tüketiciler ürünler hakkında nihai satın alma kararlarını verirken farklı yönlerden ürünler hakkında bilgi sahibi olabilmektedirler. Bu nedenle birçok birey sosyal medyada gezinmeden satın alma kararını vermemektedir. Gösterişçi tüketim üst sosyal sınıf tarafından yapılmakla birlikte; üst sosyal sınıfa benzemeye çalışan sınıflar tarafından da gösteriş amaçlı olarak tüketim yapıldığı görülmektedir. Sosyal medyada yer alan bireyler çoğunlukla statü sahibi olmak kendilerini belli bir gruba ait kılmak ve bu gruptan ayrılmamak uğruna veya benzer pek çok sebeple gösterişçi tüketimi tercih edebilmektedirler.

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TİCARİ AÇIKLIĞIN EKONOMİK BÜYÜME ÜZERİNDEKİ ETKİLERİNİN AMPİRİK ANALİZİ: TÜRKİYE İÇİN BİR KANIT

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ÖZET

Ticari dışa açıklık ve ekonomik büyüme arasındaki ilişki, hem teorik hem de ampirik literatürde ilgi gören bir konudur. Bununla birlikte, ticarete daha fazla açık olmanın ekonomik büyümeyi teşvik edip etmediği konusunda bir fikir birliği yoktur. Klasik dış ticaret teorilerine göre, uluslararası ticaret, daha geniş pazarlara erişim sağlamakta ve ülkeler arasında iş bölümü ve uzmanlaşma yoluyla verimliliği artırmaktadır. Karşılaştırmalı üstünlük teorisine göre, bir ülke başka bir ülkeyle ticaret yapmak isterse, karşılaştırmalı üstünlüğe sahip olduğu malları üretir. Buna göre ilgili ülke daha düşük maliyetle üretim yaptığı sektörde uzmanlaşarak daha büyük ölçekte mal üretir. Neoklasik iktisatçılar uluslararası ticaretin ekonomik büyümenin ana itici gücü olduğunu vurgulamakta ve ayrıca ticaret ile ekonomik büyüme arasında güçlü ve anlamlı bir ilişki olduğunu savunmaktadırlar. Yeni içsel büyüme modelleri ise, ileri teknolojilerin uluslararası yayılmasının bir sonucu olarak ticari açıklık ve ekonomik büyüme arasındaki pozitif ilişkiyi açıklamaktadır. Ticaretin serbestleştirilmesi, uzun vadede verimliliği ve üretkenliği artırmaya katkıda bulunarak ölçek ekonomilerine sahip sektörlerde uzmanlaşmayı teşvik eder ve ihracatın artmasına yol açar. Bunun yanı sıra mal ve hizmetlere erişimi kolaylaştırarak, kaynakların tahsisinde verimlilik sağlayarak, teknoloji yayılımı ve bilgi yayma yoluyla toplam faktör verimliliğini artırarak ve yeni istihdam fırsatları yaratarak ekonomik büyümeyi artırabilmektedir. Uluslararası ticaret aracılığıyla ülkeler gelişmiş ekonomilerden temel girdileri, teknolojileri ve makineleri, kapalı ekonomilere göre daha kolay ithal ederler ve böylece ekonomik büyümelerini olumlu yönde etkileyebilirler. Daha yüksek düzeyde ticari dışa açıklığa sahip bir ülke, gelişmiş ekonomilerde üretilen teknolojileri kullanma konusunda daha büyük bir yeteneğe sahiptir ve bu yetenek, daha düşük düzeyde bir dışa açıklığa sahip bir ülkeden daha hızlı büyümelerine yol açar.

Bu çalışmanın amacı Türkiye'de ticari dışa açıklık ve ekonomik büyüme ilişkisinin hem teorik hem de ampirik olarak incelenmesidir. Belirtilen ilişkinin ortaya konulması ekonomik büyümeyi pozitif etkileyecek politikalar geliştirilmesine katkıda bulunacaktır.

Anahtar Kelimeler: Ticari Dışa Açıklık, Ekonomik Büyüme, Türkiye

EMPIRICAL ANALYSIS OF THE EFFECTS OF TRADE OPENNESS ON ECONOMIC GROWTH: AN EVIDENCE FOR TURKIYE

ABSTRACT

The relationship between trade openness and economic growth is a topic of interest in both theoretical and empirical literature. However, there is noconsensus on whether greater openness to trade stimulates economic growth. According to classical foreign trade theories, international trade provides Access to wide rmarkets and increases productivity through the division of labor and specialization among countries. According to the theory of comparative advantage, if a country wants to trade with an other country, it produces goods for which it has a comparative advantage. Accordingly, the relevant country specializes in the sector in which it produces at a lower cost and produces goods on a larger scale. Neoclassical economists emphasize that international trade is the main driver of economic growth and also argue that there is a strong and meaningful relationship between trade and economic growth. New endogenous growth models explain the positive relationship between trade openness and economic growth as a result of the international spread of advanced technologies. Trade liberalization contributes to increased efficiency and productivity in the long run, encouraging specialization in sectors with economies of scale and leading to increased exports. In addition, it can increase economic growth by facilitating Access to goods and services, providing efficiency in the allocation of resources, increasing total factor productivity through technology diffusion and information dissemination, and creating new employment opportunities. Through international trade, countries import basic inputs, Technologies and machinery from developed economies more easily than from closed economies and thus can positively affect their economic growth. A country with a higher level of trade openness has a greater ability to use Technologies produced in advanced economies, and this ability leads to faster growth than a country with a lower level of trade openness. The aim of this study is to examine the relationship between trade openness and economic growth in Turkey, both theoretically and empirically. Revealing the stated relationship will contribute to the development of policies that will positively affect economic growth.

Keywords: Trade Openness, Economic Growth, Turkiye

GİRİŞ

Dünya ekonomisinde 1980'li yıllarda ortaya çıkan serbestleşme eğilimi, siyasal, sosyal, kültürel ve ekonomik olarak ülkeleri etkilemiştir. Serbestleşme faaliyetleri neticesinde 1980 sonrasında dışa açıklığın ülke ekonomileri üzerine etkileri tartışılmaya başlanmıştır. Ülkenin içe dönük ekonomik faaliyetlerini tersine çevirerek iç yapısını dış dünyaya açık hale getirmesi, pazarların birleşmesi ve büyük bir uluslararası pazar oluşması olarak ifade edilendışa açıklık kavramı, ülkelerin; ticarî, finansal ve iş gücü açıklığı olmak üzere üç farklı alanda dışa açıklık durumunu kapsamaktadır (İspiroğlu, 2021; Çelebi, 1991; Kazgan, 1985). Ticarî dışa açıklık ise mal ve hizmetler üzerindeki kontrollerin kaldırılarak ticari serbestleşmenin sağlanarak uluslararası piyasalarla bütünleşilmesini ifade etmektedir (İspiroğlu, 2021). Ticari dışa açıklık; ülkelerin diğer ülkelerle olan ticari ilişkilerinde ne kadar serbest ya da ne kadar katı politikalar uyguladığının göstergesidir. Bir ülkede tam anlamıyla ticari dışa açıklığın sağlanabilmesi, ihracat ve ithalata karşı tüm kısıtlayıcı uygulamaların kaldırılması ile mümkün olabilmektedir (Mercan ve Göçer, 2014).

Dünya ticaretini serbestleştirerek ülke sınırlarını ortadan kaldırıp dünyayı tek bir pazar haline getirmeyi amaçlayan 1995'te GATT (General Agreement on Tariffs and Trade: Gümrük Tarifeleri ve Ticaret Genel Anlaşması)'ın yerine kurulan WTO (World Trade Organization: Dünya Ticaret Örgütü) ile UNCTAD (United Nations Conference on Tradeand Development: Birleşmiş Milletler Ticaret ve Kalkınma Konferansı), ülkelerin ticari dışa açılma sürecini hızlanmasına katkıda bulunmaktadır (Özyıldız vd., 2018; Mercan ve Göçer, 2014). Bu bağlamda uluslararası ticarette kotalar ve tarifeler azaltılarak, ülkelerin dünyayla ticaretinin arttırılması ve amaçlanmıştır. Sonuç olarak ticarette devletin kontrolünün azaltılmış ve daha serbest ticaret politikaları benimsenmiştir (Mercan ve Göçer, 2014).

Serbestleşme politikalarıyla gündeme gelen ticari dışa açıklığın makroekonomik göstergeler üzerinde etkileriliteratürde yaygın bir tartışma konusudur. Bunların başında ise ekonomik büyüme gelmektedir. Ticari dışa açıklık gelişmekte olan ülkelerde sürdürülebilir ekonomik büyümenin önemli bir belirleyicisidir (Karaca vd., 2022). Ticari dışa açıklık beş kanal aracılığıyla ekonomik büyümeyi olumlu etkilemektedir. Birincisi, ithalat ve ihracata bağlı olarak GSYİH'de ve artışı sağlanacak ve daha önce ülke içerisinde üretim imkânı olmayan sermaye malı ve ara malına erişim kolaylaşacaktır (Miller ve Upadhyay, 2000). İkinci olarak, dışa açılma sayesinde ülkelerin kişi başına düşen tüketim harcamaları artacak ve böylecediğer ülke mallarına olan taleplerinde bir artış olacağından istihdam ve tüketim miktarı da artacaktır. Üçüncü etki ise diğer ülkelerden aktarılan teknik bilgi ve yeni üretim yöntemlerinin verimlilik

artışlarına yol açmasıdır. Dördüncü etki ise, tasarrufların dünya genelinde yatırımlara yönelmesi ile kaynak dağılımında etkinliğin sağlnamasıdır. Böylece uluslararası uzmanlaşma ve verimlilik artışı ile birlikte rekabete dayalı kazançlar ortaya çıkacaktır. Son etki ise, yerli firmaların yabancı firmalarla artan rekabeti neticesinde firmaların maliyetlerinde azalma ve yenilikçiliği teşvik ederek kalite standartlarında yükselmeye yol açmasıdır (İspiroğlu, 2021; Karaca vd., 2022).

Ticari dışa açıklığın ekonomik büyüme üzerine olumlu etkilerine karşın, ticari dışa açıklığın ekonomik büyüme üzerinde olumsuz etkileri de ortaya çıkabilmektedir. Ticari açıklıktaki artış enflasyonu artırarak ve döviz kurlarını düşürerek ekonomik büyümeye zarar verebilmektedir. Düşük kaliteli ürünlerin üretiminde uzmanlaşan ve birincil ürün ihraç eden ülkeler ticaret hadleri şoklarına karşı savunmasız kalacağından ekonomik büyüme olumsuz etkilenebilmektedir. Ticari dışa açıklığın ekonomik büyümeyi olumlu etkileyip etkilemediği, yabancı teknolojilere hâkim olma ve yerel çevreye adapte olma kolaylığına da bağlıdır.

Ticari dışa açıklığın ölçülmesinde çok çeşitli ölçütler bulunsa da verilerin bulunabilirliği ve ulaşılabilirliği bakımından en çok tercih edilen, üretime dayalı (çıktı temelli) bir ölçüt olan ithalat ve ihracat toplamının GSYİH'a oranı olarak hesaplanan ölçüttür (İspiroğlu, 2021). En yaygın tanıma göre ticari açıklık, mal ve hizmetlerin ülkeler arasında serbestçe dolaşımını ve üreticiler arasındaki rekabeti engelleyen kısıtlamaların olmamasıdır. İhracat ürünleri için uluslararası piyasalarla uyumlu fiyat politikalarının uygulanmasıyla ihracatın önündeki önemli engellerden birisi kalkmış olacaktır. Benzer şekilde ithal ürünler üzerindeki vergi oranlarının yüksek tutulmaması, kotaların kaldırılması veya hafifletilmesi de ithalat önündeki engellerin ortadan kalkması anlamına gelecektir. Yine döviz serbestliği, doğrudan yatırımların ve portföy yatırımlarının önündeki engellerin kalkması ve benzeri politikalarla dış ticaret önündeki engeller kaldırılabilmektedir (Sugözü ve Omer, 2022).

LİTERATÜR TARAMASI

Ticari açıklık ve ekonomik büyüme ilişkisiyle ilgili geniş kapsamlı literatüre rağmen, gelişmişlik düzeyi, gelir düzeyi, kurumsal yapı, ihracat yoğunluğu gibi ülkelere özgü özellikler, yöntem ve dönem farklıkları ile ticari açıklık ölçümündeki farklılıklar gibi sebeplerle sözkonusu iki değişken arasındaki ilişkinin yönü ile ilgili tam bir fikir birliği bulunmamaktadır.İlgili literatür genel olarak değerlendirildiği zaman ticari açıklığın ekonomik büyümeyi olumlu etkilediği görülmektedir.Yapılan çalışmaların birçoğu bu ilişkinin pozitif yönlü olduğunu gösterse de ticari açıklığın büyümeyi olumsuz etkilediğini öne süren çalışmalar

da mevcuttur (Karaca vd., 2022). Tablo 1'de konuyla ilgili bir literatür özetine yer verilmiştir.

Tablo 1. Ticari Açıklık ve Büyüme İlişkisiİle İlgili Literatür Özeti

Yazar(lar)	Dönem/ Ülke	Yöntem	Sonuç
Karaca vd.(2022)	1992-2019 BRICS-T ülkeleri	Panel Veri Analizi	Ticari açıklık ve büyüme arasında çift yönlü bir nedensellik ilişkisi vardır.
Sugözü ve Omer (2022)	1995-2020 11 Avrasya ülkesi	Panel Veri Analizi	Özellikle gelişmekte olan ülkelerde ticari açıklık ile büyüme arasında negatif ilişki tespit edilmiştir.
Wanı (2022)	1992-2019 Hindistan	ARDL Sınır Testi	Kısa ve uzun vadede ticari açıklık ile ekonomik büyüme arasında negatif bir ilişki vardır.
Hye ve Lau (2015)	1971-2009 Hindistan	ARDL Sınır Testi	Ticari açıklık ve ekonomik büyüme arasında uzun dönemde negatif ilişki, kısa dönemde ise pozitif ilişki bulunmuştur.
Mehrara vd. (2013)	1991-2006 19 petrol zengini ülke	Panel Veri Analizi	Ticari dışa açıklık ekonomik büyümeyi negatif etkilemektedir.
Gries ve Redlin (2012)	1970-2009 158 ülke	Panel Eş-Bütünleşme Testleri ve Panel Hata Düzeltme Modelleri	Ticari açıklık ile büyüme arasında uzun dönemde iki yönlü nedensellik ilişkisi bulunmuştur.
Ulaşan (2012)	1960-2000 79 Ülke	Panel Veri Analizi	Ticari dışa açıklığın, ekonomik büyüme üzerinde pozitif bir etkiye sahip olduğu sonucuna ulaşmıştır.
Ahmadi ve Mohebbi (2012)	1971-2008 İran	EKK	Dışa açıklık ekonomik büyüme üzerinde pozitif bir etkiye sahiptir.
Türedi ve Berber (2010)	1970-2007 Türkiye	Johansen-Juselius Eşbütünleşme, Granger nedensellik testi	Ticari açıklık ve büyüme arasında çift yönlü nedensellik ilişkisi vardır.
Omisakin vd. (2009)	1970-2006 Nijerya	Toda-Yamamoto Nedensellik Testi ve ARDL Sınır Testi	Ticari dışa açıklıktan büyümeye doğru tek yönlü nedensellik ilişkisi bulunmuştur.
Yapraklı (2007)	1990-2006 Türkiye	Eşbütünleşme ve Nedensellik Testi	Uzun dönemde ticari açıklık ekonomik büyümeyi pozitif etkilemektedir.
Utkulu ve Kahyaoğlu (2005)	1990- 2004 Türkiye	Doğrusal Olmayan Zaman Serisi	Ticari açıklık büyümeyi pozitif yönde etkilemektedir.
Yanikkaya (2003)	1970-1997 100 ülke	Panel Veri Analizi	Açıklık ve büyüme arasında pozitif bir ilişki vardır.
Bahmani ve Niroomand (1999)	1960-1992 59 ülke	Johansen Eşbütünleşme Testi	19 ülkede açıklık ve büyüme arasında pozitif bir ilişki bulunmuştur.

UYGULAMA

Bu çalışmada ticari açıklık ile ekonomik büyüme arasındaki ilişki 1961-2021 dönemi için Türkiye örneğinde analiz edilmiştir. Çalışmada ekonomik büyümeyi temsilen sabit fiyatlarla gayrisafi yurtiçi hâsıla bağımlı değişken olarak kullanılmış ve bağımsız değişken olarak da ticari açıklık değişkeni ele alınmıştır. Çalışmada kullanılan her iki seri de Dünya Bankasının Dünya Kalkınma göstergelerinden temin edilmiş ve doğal logaritmaları alınarak analize dâhil

edilmiştir. Analizde ilk olarak ele alınan serilerin bütünleşme dereceleri Geliştirilmiş Dickey-Fuller (ADF), Philliphs-Perron (P-P) ve Kwiatkowski, Phillips, Schmidt ve Shin (KPSS) birim kök testleri kullanılarak ortaya konulmuş ve elde edilen sonuçlar Tablo 2'de gösterilmiştir.

Tablo 2. Birim Kök Testi Sonuçları

Değişkenler	ADF		PP		KPSS	
	Test İst.	Kritik Değer	Test İst.	Kritik Değer	Test İst.	Kritik Değer
GDP	-0.494416	-2.911730	-0.393994	-2.910860	0.977684	0.463000
OPEN	-1.922932	-2.910019	-1.923755	-2.910019	0,935533	0.463000
Δ GDP	-6.112441	-2.911730	-6.075776	-2.911730	0.164432	0.463000
Δ OPEN	-7.731060	-2.910860	-7.833176	-2.910860	0.154735	0.463000

ADF ve PP testlerinde temel hipotez serinin birim kök içerdiğini, KPSS testinde ise serinin durağan olduğunu ifade etmektedir. Her üç birim kök testi için de test istatistikleri kritik değerler ile karşılaştırıldığında elde edilen sonuç serilerin birim kök içerdiğini ve birinci farkı alındığında durağan hale geldiklerini göstermektedir.

Çalışmada Johansen eş-bütünleşme testi öncesinde çeşitli bilgi kriterleri kullanılarak uygun gecikme uzunluğu belirlenmeye çalışılmıştır. Olabilirlik oranı (LR), Akaike bilgi kriteri (AIC) ve Hannan-Quinn bilgi kriterlerine (HQ) göre gecikme uzunluğu 3 olarak belirlenmiş ve Tablo 3'te sunulmuştur.

Tablo 3. Gecikme Uzunluğunun Belirlenmesi

Gecikme	LogL	LR	FPE	AIC	SC	HQ
0	-116.3572	NA	0.234875	4.227044	4.299378	4.255088
1	143.7482	492.3425	2.50e-05	-4.919579	-4.702577*	-4.835448
2	147.1287	6.157343	2.56e-05	-4.897454	-4.535784	-4.757236
3	156.7492	16.83579*	2.10e-05*	-5.098185*	-4.591847	-4.901879*
4	159.6977	4.949288	2.19e-05	-5.060632	-4.409626	-4.808238

Tanımlayıcı test istatistikleri açısından bakıldığında ele alınan modelde otokorelasyon ve değişen varyans problemi bulunmamaktadır. Otokorelasyon LM ve White Değişen Varyans testlerine ilişkin sonuçlar Tablo 4'te sunulmuştur.

Tablo 4. Tanımlayıcı Test İstatistikleri

Otokorelasyon LM Testi			White Değişen Varyans Testi	
Gecikme	LM Test İst.	Prob	Chi-sq	167.8943
1	6.670927	0.1543	Prob	0.3592
2	4.466878	0.3465		
3	0.356719	0.9859		
4	0.988982	0.9115		

Değişkenler arasındaki uzun dönemli ilişki Johansen eş-bütünleşme testi ile incelenmiş ve test sonuçları Tablo 5'te verilmiştir.

Tablo 5. Johansen Eş-bütünleşme Testi Sonuçları

Bağımlı Değişken: GDP							
		İz Testi			En Büyük Özdeğer Testi		
Eş-bütünleşme Vektör Sayısı Hipotezi	Özdeğer	İz İstatistiği	0.05 Kritik Değer	Olasılık Değeri	En Büyük Özdeğer İstatistiği	0.05 Kritik Değer	Olaslık Değeri
Bağımsız Değişken: OPEN							
r=0*	0.26240	18.5281	15.4947	0.016	17.3484	14.264	0.0158
$r \leq 1$	0.02048	1.17966	3.84146	0.277	1.17966	3.8414	0.2774

Tablo 5'ten de görüleceği üzere değişkenler arasında eş-bütünleşme ilişkisinin olmadığını ifade eden H_0 hipotezi reddedilmektedir. Başka bir ifadeyle ele alınan seriler arasında en az bir eşbütünleşik vektör bulunmakta bu durum ticari açıklık ve ekonomik büyüme arasında uzun dönemli bir ilişki olduğuna işaret etmektedir. Değişkenler arasında uzun dönemli bir ilişkinin varlığı ortaya konulduktan sonra değişkenlere ilişkin katsayılar FMOLS, DOLS ve CCR eş-bütünleşme testi kullanılarak elde edilmiş ve analiz sonuçları Tablo 6'da sunulmuştur.

Tablo 6. FMOLS, DOLS ve CCR Testi Sonuçları

FMOLS				
Değişkenler	Katsayı	Stan.Hata	t-istatistiği	Olasılık Değeri
OPEN	1.764693	0.166680	10.58734	0.0000
C	22.65221	0.522625	43.34312	0.0000
DOLS				
Değişkenler	Katsayı	Stan.Hata	t-istatistiği	Olasılık değeri
OPEN	1.715517	0.153170	11.20007	0.0000
C	22.78776	0.486409	46.84897	0.0000
CCR				
Değişkenler	Katsayı	Stan.Hata	t-istatistiği	Olasılık değeri
OPEN	1.768491	0.164135	10.77460	0.0000
C	22.64091	0.510867	44.31856	0.0000

Tablo 6'da yer alan FMOLS, DOLS ve CCR test sonuçlarına göre ticari açıklık ekonomik büyüme üzerinde pozitif bir etkiye sahiptir. Buna göre ticari açıklıktaki %1'lik bir artış, ekonomik büyümeyi %1.8 artırmaktadır. Değişkenlere ilişkin katsayılar istatistiksel olarak anlamdır.

SONUÇ

Bu çalışmada ticari dışa açıklık ve ekonomik büyüme arasında pozitif bir ilişki olduğu bulgusuna ulaşılmıştır. Bu nedenle, Türkiye'de ticaret engellerinin azaltılması ve uluslararası ticaretin teşvik edilmesi önem arz etmektedir. Ticari açıklığın Türkiye'nin ekonomik büyümesi üzerinde daha büyük bir etkiye sahip olması Türkiye'nin ticaret kompozisyonunu değiştirmesine bağlıdır. Bu bağlamda hammadde ve yarı mamul mal ihracatı yerine katma değeri yüksek malların ihraç edilmesi sağlanmalı ve gelişmiş ülkelerden gelen teknolojileri özümseyebilecek beşeri sermayesi geliştirilmelidir.

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FONKSİYONEL ÜRÜN GELİŞTİRME: FARKLI EKMEK ÇEŞİTLERİNDE DUYUSAL ANALİZ ÇALIŞMALARININ İNCELENMESİ

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ÖZET

Ekmek, M.Ö. 8000'li yıllardan itibaren insanların temel besin gıdalarının başında gelmektedir. Tarih boyunca uygarlıklar kendi kültür ve coğrafi koşullarına uygun, farklı çeşitlerde ekmek üretmişlerdir. Ekmek günümüzde hala diyette en çok tüketilen besinlerden birisi halindedir. Kolay ulaşılabilir olması, her gelir grubuna hitap etmesi de ekmeğin sık tüketilmesinin sebepleri arasında sayılabilmektedir. Kontrollü şekilde tüketildiğinde ekmek, zengin besin içeriği sayesinde sağlığa faydalı olabilmekte ve vitamin, mineral, protein vb. besin ögeleri ile zenginleştirme yapılarak fonksiyonel ve besleyici özellikleri arttırılmaktadır. Fonksiyonel gıdalar, insan sağlığına olan olumlu etkileri ile bilinmektedirler. Beslenme ve tıp gibi alanlarda yapılmakta olan birçok çalışmaya konu olmaktadırlar. Yapılmakta olan bilimsel çalışmaların etkisi ile fonksiyonel gıdalar hem üretici hem de tüketicilerin dikkatini çekmektedir. Böylece gıdaların fonksiyonel etkileri bilinçli tüketiciler tarafından tercih sebebi olarak değerlendirilmektedir. Buna bağlı olarak farklı istek ve ihtiyaç gruplarına yönelik olarak yeni fonksiyonel ürünler geliştirilmekte ve pazara sunulmaktadır. Ürün geliştirme kavramı günümüz teknolojisi ve şartları dolayısıyla firmalar için büyük önem arz etmektedir. Pazarda kalabilmek, rekabet ortamında varlığını sürdürebilmek için firmalar farklı ürün geliştirme stratejileri izlemektedirler. Doğru stratejileri kullanarak tüketici beklentilerini karşılayacak ürün geliştirme prosesini uygulayabilen işletmeler pazarda varlığını devamlı olarak koruyabilmektedirler. Ürün geliştirme süreci sonrasında geliştirilen ürünlere duyusal analiz yapılarak, yeni ürünün beş duyu organına nasıl yansıdığı bilimsel olarak saptanabilmektedir. Duyusal analiz çalışmaları ile ürünün kabul edilebilirlik derecesi, tüketicilerin satın alma niyeti, tasarımı, kalite kontrolü gibi konularda objektif veriler elde edilebilmektedir. Bu sebeple duyusal analiz ürün geliştirme sürecinin gerekli bir parçası haline gelmektedir. Orijinal veya geliştirilmiş ürünlerin farklılıkların nasıl algılandığı, birden fazla ürün örnekleri arasındaki değişikliklerin saptanması ve sayısal verilerin elde edilebilmesi için birçok firma ve araştırmacı tarafından sıklıkla duyusal analizler yapılmaktadır. Bu çalışmada, ürün geliştirme kavramı, duyusal analiz ve ekmekler üzerinde durulmuştur. Yeni ürün geliştirme kapsamında ekmekler hakkında yapılmış duyusal analiz incelemeleri derlenmiştir. Araştırma kapsamında çalışma konusuna uygun şekilde ekmeklere yönelik ürün geliştirme ve duyusal analiz içeren 12 farklı çalışma; amaçları, duyusal analiz süreçleri, yöntemleri ve sonuçları bakımından incelenmiştir.

Anahtar Kelimeler: Ürün Geliştirme, Duyusal Analiz, Ekmek, Fonksiyonel Gıda, Beslenme

FUNCTIONAL PRODUCT DEVELOPMENT: INVESTIGATION OF SENSORY ANALYSIS STUDIES IN DIFFERENT BREAD VARIETIES

ABSTRACT

Bread has been one of the main foods of people since 8000 BC. Throughout history, civilizations have produced different kinds of bread suitable for their own cultural and geographical conditions. Bread is still one of the most consumed foods in the diet today. Being easily accessible and appealing to every income group can be counted among the reasons why bread is consumed frequently. When consumed in a controlled manner, bread can be beneficial to health thanks to its rich nutritional content, and its functional and nutritional properties are increased by enriching it with nutrients such as vitamins, minerals, protein, etc. Functional foods are known for their positive effects on human health. They are the subject of many studies in many fields such as nutrition and medicine. With the effect of scientific studies, functional foods attract the attention of both producers and consumers. Thus, the functional effects of foods are considered by conscious consumers as a reason for preference. At this point, new functional products are developed and offered to the market for different demand and need groups. The concept of product development is of great significance for companies due to today's technology and conditions. In order to stay in the market and to survive in a competitive environment, companies follow different product development strategies. Businesses that can implement the product development process to meet consumer expectations by using right strategies can maintain their presence in the market continuously. After the product development process, sensory analysis is performed on products, and how the new product reflects on five senses can be scientifically determined. With sensory analysis studies, objective data can be obtained on subjects such as the degree of acceptability of the product, consumers' purchase intention, design, and quality control. For this reason, sensory analysis is becoming a necessary part of the product development process. Sensory analyzes are frequently carried out by many companies and researchers in order to perceive the differences in original or improved products, to determine the changes between multiple product samples, and to obtain numerical data. In this study, the concept of product development, and sensory analysis and breads were investigated. Within the scope of new product development, sensory analysis studies on breads were compiled. Within the scope of the research, 12 different studies, including product development and sensory analysis for breads, were examined in terms of their aims, sensory analysis processes, methods, and results.

Keywords: Product Development, Sensory Analysis, Bread, Functional Food, Nutrition

1. GİRİŞ

Zihinsel, fiziksel ve sosyal olarak iyi bir halde olabilmek için kişilerin sağlıkları hususunda koruyucu önlemler almaları gerekmektedir. Bu önlemlerin başında ise sağlıklı beslenme yer almaktadır. Büyümek ve gelişmek, güçlü bir bağışıklık sistemine sahip olmak, verimli şekilde çalışabilmek için gereken besin öğelerinin eksiksiz biçimde alınması ve vücuttaki sistemler tarafından kullanılması süreci sağlıklı beslenme olarak açıklanmaktadır (Kalkan, vd. 2017).

Ekmek, insanların tükettiği ilk ve en temel gıdalardan birisidir ve günümüzde kadar varlığını sürdürmüştür. Diğer gıda ürünlerine göre kolay ulaşılabilir olması ve daha ucuz olması ekmeği tercih edilebilir kılmaktadır. Bunun yanı sıra doyurucu ve besleyici özellikleri de ekmeğin günümüze kadar ulaşmasında etkili olmuştur. Beslenme alanında bilinçlenen tüketiciler ekmek satın alırken daha dikkatli olmakta ve tüketmekte oldukları ekmekler konusunda hassas davranmaktadır. Bu sebeplerden dolayı unlu mamüller endüstrisi tüketici ihtiyaçlarını karşılayabilmek için büyük çaba sarf etmekte ve devamlı surette yeni ürünler geliştirmektedir (Yıldız, vd. 2021).

Bu çalışmada ürün geliştirme kavramı ve ekmek ile ilgili çalışmalar hakkında bilgi verilmiştir. Farklı ekmek çeşitlerinde yapılan duyusal analiz çalışmaları incelenmiş ve daha önce yapılmış bu çalışmaların amaçları ve araştırma bulguları hakkında literatür taraması yapılmış, sonuçlar derlenmiştir. Bu çalışma duyusal analiz yöntemlerinin karşılaştırılması açısından önem taşımaktadır.

2. YÖNTEM

Bu çalışmada ürün geliştirme kavramının tanımı ortaya konarak, farklı ekmek çeşitlerinde yapılan araştırmaların özellikle duyusal analiz bölümleri ile ilgili literatür çalışması yapılmıştır ve bu konuya yönelik yapılmış olan birkaç yerli, yabancı kaynak ile sınırlandırılmış ve kaynaklar taranmıştır. Araştırmanın mevcut bilgiler üzerine inşa edilmesi veya mevcut bilgiler ile ilişkilendirilmesi disiplinlerden bağımsız olarak tüm akademik araştırma faaliyetlerinin yapı taşıdır. Bir literatür taraması ile birçok ampirik bulgudan elde edilmiş sonuçlar ve bakış açıları entegre edilebilmektedir. Böylece araştırma soruları daha güçlü şekilde değerlendirilir. Ek olarak, literatür taraması; teorik çerçeveler elde etmek ve kavramsal modeller oluşturmak için fırsat sunar. Ayrıca daha fazla araştırmaya ihtiyaç duyulan alanları ortaya çıkarmak için araştırma bulgularını sentezlemenin mükemmel bir yoludur (Snyder, 2019).

3. ÜRÜN GELİŞTİRME VE DUYUSAL ANALİZ

Ürün geliştirme, Ar-Ge çalışmaları ile orijinal, geliştirilmiş, farklılaşmış yeni ürünler oluşturup,

üretip ardından pazarlama sürecidir. Her yeni ürün piyasada yeni pazar oluşturur, mevcut bir ürünün yerini alır veya mevcut ürünün sınırlarını genişletir. Günümüzde artan teknolojik imkanlar, sınırsız insan ihtiyaçları ve tüketim alışkanlıkları gibi etmenler üreticileri devamlı güncel kalmaya ve rakipler ile rekabet halinde olmaya zorlamaktadır. Ürün geliştirme rekabet edebilmek ve güncel kalabilmek için firmanın kullandığı bir stratejidir (Yayla, 2018).

Ürün geliştirme; özelleştirilmiş prosedürlere, modellere dayanır. Ayrıca uygun araçlar ile desteklenir, buna bağlı olarak başarı ve devamlılık için önem arz eden; üretim maliyeti, ürün kalitesi ve tedarik zinciri mevcudiyeti açısından fayda sağlamaktadır. Aynı zamanda şirketin karlılığını arttırmanın yollarından birisi olarak değerlendirilir. Ancak, geliştirilen yeni ürünün başarısının birçok faktöre bağlı olduğunu ve bazı durumlarda yüksek riskler içerebileceği unutulmamalıdır (Marczewska, vd. 2021).

Günümüzün başarılı firmalarına bakıldığında, pazara sundukları ürün ve hizmetleri devamlı surette gözden geçirdikleri ve gerektiğinde yeniden düzenlemelere gittikleri görülmektedir. Bu firmalar; müşterilerin, rakiplerin ve teknolojik gelişmelerin dinamikleri ile başa çıkabilmek için sürekli araştırma ve geliştirme halindedirler (Hart, 1996).

Ürün geliştirme sürecinde, duyusal analiz ve değerlendirmesi önemli bir basamaktadır. Duyusal analiz, bir ürünün koku, tat, renk, dokunma ve işitme gibi beş duyu organı tarafından algılanabilen niteliklerin değerlendirilmesi yoluyla incelenmesidir. Duyusal analiz, çeşitli ürünlerin (gıdalar, kozmetikler, ilaçlar, tekstil ürünleri, ev ürünleri) organoleptik profilini oluşturmaya imkan tanır ve bunların tüketici tarafından nasıl algılandığının bilinmesi üreticiler için faydalı olmaktadır (Piana, vd. 2004). Özellikle gıdalarda duyusal analiz ise gıdanın görünüş (renk şekli vb.), lezzet, doku, koku, kıvam, aroma vb. özelliklerini analiz eden farklı puanlama sistemlerine göre değerlendiren bir yöntemdir (Onoğlu ve Elmacı, 2019)

Gıda ürünlerinin duyusal özelliklerinin değerlendirilmesi, ürün kalitesinin değerlendirilmesi noktasında nihai yöntem olmuştur ve olmaya devam edecektir. Duyusal kalite, yalnızca ölçülebilen bir parametredir. Dikkatle seçilmiş prosedürler kapsamında nesnel veya öznel olarak uygulanabilen bir dizi test veya araçtan oluşur (Drake, vd. 2008). Duyusal özelliklerin tüketiciler tarafından kolayca ayırt edilebildiği göz önüne alındığında, tüketicilerin duyusal tepkilerinin ölçülmesi, değerlendirilmesi ve yorumlanması için duyusal analiz gereklidir. Güvenilir sonuçlar elde edebilmek için, çalışmanın amacına uygun metodolojiler kullanılarak duyusal analizler yapılmalıdır (de Resende, vd. 2008).

4. EKMEK

Ekmek, ya da Yunanca "artos", geçmişte sağlık ve sudan sonra gelen en önemli insan iyiliği olarak kabul edilmiştir. "Artos" teriminin kökeni eski Yunancaya dayanmaktadır ve bağlamak, eşleştirmek, bir araya getirmek anlamlarına gelmekte olan "ararisko" veya "demlemek anlamına gelmekte olan "arito" fiilinden gelmektedir (Kourkouta, vd. 2017).

Türk Gıda Kodeksi'nce ekmek; buğday ununa ilaveten; su, maya, tuz ve şekere ek olarak vital gluten ile izinli katkı maddeleri ilave edilerek yoğrulması, şekillendirilmesi, fermantasyon işleminin yapılması ve pişirilmesi ile elde edilen ürünü kapsamaktadır (Kocaadam vd, 2016).

Ekmeğin tarihi M.Ö. 8 binli yıllara hatta daha da eskisine dayanmaktadır. İlk ekmeğin gernik / siyez buğdayı ve su karışımından yapıldığı düşünülmektedir. Bu karışım ıslatılmış bir taş üzerinde düz bir bisküvi şeklinde pişirilmekte olduğu bilinmektedir. Daha sonra fermente ürün elde etmek amacıyla maya kullanımına başlanmıştır. Muhtemelen karıştırma sırasında veya pişirilmeyi beklerken un ve sulu karışıma havadaki maya sporlarının karışımı ile bu süreç başlamıştır (Wei vd, 2020).

Eski uygarlıklar döneminde köy ve kırsal alanlarda yaşayan kişilerin ekmeklerini kabartabilmek için önceki hamurdan aldıkları maya örneğini kullandıkları bilinmektedir. Başlarda ekmek yapımı için yalnızca buğday kullanılırken sonrasında çavdar ve ek olarak farklı tahıllar kullanılmaya başlanılmıştır (Erenoğlu, 2013).

Ülkemizde nüfusla orantılı olarak artmakta olan beslenme ihtiyacının karşılanması, şehirlere yönelik yapılan göçer, çalışma hayatına katılan kişi sayısının sürekli artışı, refah seviyelerinin yükselmesi ve rahat hayat arayışı, hazır gıdalara yönelik talebin artması gibi sebeplerle ekmek ve diğer unlu mamüller tüketiminde artışlar meydana gelmiştir (Olgun, vd. 2017). Artan tüketim miktarı ve gelişmekte olan gıda endüstrisi teknolojileri; gıdaların içerik bakımından zenginleştirilmesini ve gıda alanında yeni ürünlerin geliştirilmesini beraberinde getirmiştir. Gıdaların zenginleştirilmesi; gıdada kendiliğinden bulunan ya da bulunmayan bazı gerekli besin öğelerinin, toplumun geneline veya belirli özel ihtiyaçlara sahip kesimlerine yönelik olarak eksikliklerin giderilmesi veya önlenmesi amacı ile gıdaya sonradan eklenmesini kapsamaktadır (FAO/WHO, 1994).

4.1. Ekmek Çeşitleri

Ekmekler en sık tüketilen besinlerden birisidir. Bu tüketim sıklığına bağlı olarak birçok farklı ekmek çeşitleri geliştirilmiştir ve hala geliştirilmektedir. Ekmekleri çeşitlendirme ve adlandırmada kullanılan bazı esaslar bulunmaktadır. Bu esaslardan bazıları aşağıdaki gibidir;

➢ Ekmeğin hamuruna ilave edilmiş olan ceviz, zeytin, sarımsak gibi meyveler ile çeşitlendirilmesi yaygın olarak görülmektedir. Bu durumda ekmek içerisine konulan meyvenin adı ile adlandırılır.

➢ Ekmeğin tat ve kokusuna katkısı dolayısıyla çörekotu, susam, haşhaş gibi bitki ilaveleri ile de farklı çeşitli ekmekler yapılmaktadır.

➢ İçerik ve şekil bakımından farkları ile öne çıkmakta olan, üretildiği bölgenin adı ile özdeşleşmiş ekmek çeşitleri de bulunmaktadır. Bunlara örnek olarak; Trabzon ekmeği, Vakfıkebir ekmeği gösterilebilir.

➢ Ekmekler pişirilme yöntemine göre de çeşitlendirilmektedir. Tava ekmeği, tandır ekmeği bunlara örnek niteliğindedir.

➢ Ekmeğin üretiminde esas madde olarak buğday ununa ek kullanılan un türleri de alternatif bir çeşit olarak karşımıza çıkmaktadır. Bu duruma örnek olarak mısır ekmeği, çavdar ekmeği gösterilebilir (Zülfikar, 2012). Tablo 1. de ismi duyulan farklı ekmek çeşitleri verilmiştir.

Tablo 1. Ekmek Çeşitleri

	Ekmek Çeşitleri		**Ekmek Çeşitleri**		**Ekmek Çeşitleri**
1	Tam Buğday Ekmeği	**11**	Trabzon Ekmeği	**21**	Tahinli Ekmek
2	Vakfıkebir Ekmeği	**12**	Çadvar Ekmeği	**22**	Tava Ekmeği
3	Tandır Ekmeği	**13**	Patatesli Ekmek	**23**	Çörek
4	Mısır Ekmeği	**14**	Baget Ekmek	**24**	Siyez Ekmek
5	Kepek Ekmeği	**15**	Baston Francala	**25**	Karabuğday Ekmeği
6	Susamlı Ekmek	**16**	Bazlama	**26**	Menekşe Buğdayı Ekmeği
7	Yulaf Ekmeği	**17**	Kete	**27**	König Ludwig Brod (Alman Köy Ekmeği)
8	Tost Ekmeği	**18**	Köy Ekmeği	**28**	Sebzeli Focaccia
9	Lavaş	**19**	Pide	**29**	Kavılca
10	Sarımsaklı Ekmek	**20**	Sac Ekmeği	**30**	Keimkraft Ekmek

Kaynak: (Zülfikar 2012, Olgun, vd. 2012, URL1)

5. LİTERATÜR ÇALIŞMALARI: EKMEK VE DUYUSAL ANALİZ

Bu bölümde ekmek çeşitlerinde yapılan farklı duyusal analiz teknikleri incelenmiş, araştırmaların amaç, yöntem ve sonuçları derlenmiştir. Tablo 2'de 10 adet yerli çalışma ve 2 adet yabancı çalışma ile sınırlı kalınarak, amaç, yöntem, duyusal analiz ve sonuçları çalışma kapsamında incelenmiş ve literatür cetveli oluşturulmuştur.

Tablo 2. Duyusal Analiz Örnek Çalışmalar Literatür Cetveli

	Yazar/ Yazarlar	**Çalışmanın Amacı, Yöntemi, Duyusal Analizi ve Sonucu**
1	Yıldız, B. , Çakıcı, A. , Yaprak Uslu, D. & Uslu, H. (2021).	Bu çalışmada aynı yöntemler ile fakat farklı maya esansları kullanılarak iki çeşit ekmek üretilmiş ve belirlenen özellikler bazında değerlendirmek amaçlanmıştır. Bu amaç doğrultusunda elma ve incir meyveleri tercih edilmiştir. Ekşi mayaları hazırlarken geleneksel yöntemler doğrultusunda geliştirilmiş dört aşama yer almaktadır. Ekşi mayaların özelliklerinin belirlenmesinde pH, küf sayımı, maya

		sayımı ve asitlik ile ilgili analizler yapılmıştır. Ardından üretilen iki farklı maya ile ekmekler elde edilmiştir. Elde edilen ekmeklerin özelliklerinin tespiti için; duyusal ve kimyasal analizler yürütülmüştür. Üretilen ekmeklerin kabul edilebilirlik derecesinin belirlenmesi için eğim görmüş 10 adet panelist mevcuttur. Panelistler, ekmekleri; görünüşü, aroma, tadı, kabuk ve ekmek içi rengini 1-10 arasında bir skala ile değerlendirmişlerdir. Bu çalışmanın sonucuna göre ekşi maya kullanımı duyusal ve deneysel olarak ekmeğin aroma ve tadını geliştirmektedir. Ayrıca nem kaybını minimalize ederek kullanım süresini arttırmaktadır.
2	Arslan Burnaz, N. , Hendek Ertop, M. & Karataş, Ş. M. (2018).	Bu çalışma ile tıbbi ve aromatik bileşenlerle geleneksel ekmeğin zenginleştirilip antioksidan özelliğinin artırılması hedeflenmiştir. Ekmek yapımında; tıbbi aromatik bitkiler kullanılmıştır. Pişirme işleminin ardından ekmekler bir saat oda sıcaklığında bekletilmiştir. Ardından ekmeklere belirli analizler yapılmıştır. Çalışmada Gümüşhane Üniversitesi öğretim elemanlarından 35 kişi panelist olarak yer almaktadır. Duyusal analizde hazırlanmış ekmeklerin; renk, görünüm ve duyusal özelliklerinin puanlanması amacı ile 1 ile 5 arasında puanlama sistemi ile oluşturulmuş formları doldurmuşlardır. Duyusal analiz sonuçlarına göre genel kabul edilebilirliği en yüksek çıkan ekmek tarçınlı ekmek olarak belirlenmiştir.
3	Olgun, M. , Budak Başçiftçi, Z. , Ayter, N. G. & Aydın, D. (2017).	Bu çalışma ile tam buğday ekmeği, normal ekmek, Trabzon ekmeği vb. gibi ekmek türlerinin renkleri kokuları ve tatlarının üniversite öğrencileri tarafından analiz edilerek en beğenilenlerin belirlenmesi amaçlanmıştır. Araştırma kapsamında Eski Şehir Orhan Gazi Üniversitesi'nin 100 öğrencisi ile ekmekler koku tat ve renkleri bazında tadım testine tabii tutulmuştur. Duyusal analizler 100 öğrenci tarafından yapılan tadım testinin 1 ile 5 arasında değerlendirmesi ile yürütülmüştür. Bu çalışmanın sonucuna göre susamlı ekmek en beğenilen ekmektir. Ardından tam buğday ekmekleri ve yulaflı ekmekler koku, tat ve renk özellikleri bakımından en beğenilen diğer ekmek çeşitleri olarak gözlemlenmiştirler.
4	Ünsal, A. S., Ayhan, A. T. L. I., & Köten, M. (2020).	Bu çalışma kapsamında, Şanlıurfa bölgesine özgü tırnaklı ve tava ekmeklerinin çimlendirilmiş buğday ile yapılmasının etkilerinin belirlenmesi amaçlanmıştır. Bu araştırma kapsamında, Dariel türü buğday kullanılmış olup, buğdaylar saf su yardımı ile çimlendirilmiştir. El yordamı ile ayıklanan buğdaylar makinede öğütülmüş ve un elde edilmiştir. Buğday temizlenip yıkanmış ve ardından kaba alınıp kendi hacminin dört katı kadar su eklenmiştir. Oda ısısında karanlık ortamda on saat kadar bu kapta bekletilen buğdaylar süzülmüş ve tekrar yıkanmıştır. Ve tekrar süzülmüştür. Üzeri bir tülbent ile kapatılan buğdaylar 24 saat karanlık ortamda bekletilmiş ve çimlendirilmiştir. Çimlenmiş buğdaylar aynı marka cihazla yirmi dört saat kurutulmuş ve un haline getirilmiştir. Duyusal analizler Harran Üniversitesi'nde öğrenim gören 10 kişi tarafından gerçekleştirilmiştir. Tırnaklı ekmekler 1-5 puan skalasında değerlendirilmiştir. Tava ekmekler ise 1-10 puan skalasında değerlendirilmiştir. Bu çalışmanın sonuçlarına göre, tırnaklı ekmeklerin tadı, aroması ve yumuşaklığı dışında, tava tipi ekmeklerin ise rengi ile tat ve aroması haricindeki duyusal özelliklerinin tamamı çimlenmiş buğday unu kullanımına bağlı olarak düşüş göstermiştir.
5	Barışık, D., & Tavman, Ş. (2018).	Bu çalışmanın amacı, farklı miktarlarda nohut unu kullanımının ekmeğin kalitesine olan etkilerini tespit etmektir. Glüten içermeyen nohut unu ilaveli ekmeklerin üretimi çalışma kapsamında verilmiştir. Hamur homojen hale getirilip ardından 400 gram olarak ayrılarak ikinci fermentasyona tabii tutulmuştur. Glüten içermeyen ekmekler, 220°C ısı ile 30 dakika pişirilmiştir. Soğuması için oda ısısında bir saat tutulmuştur. Duyusal analizler Ege Üniversitesi yüksek lisans öğrencileri ve öğretim elemanlarından oluşan 35 kişi ile gerçekleştirilmiştir. Ekmek içi rengi ve sertliği, lezzet ve tercih edilebilirlik oranları 1 ile 4 arasında puanlanarak değerlendirilmiştir. Bu çalışmanın sonuçlarına göre, glütensiz ekmek uygulamasında nohut unu miktarı arttıkça, ekmek hacminde ve pişirme kaybında azalma meydana gelmektedir. Kül, protein ve CIE değerlerinde ise artma meydana gelmektedir. ($p<0.05$).Aynı zamanda nohut unu miktarındaki artışla paralel olarak ekmek sertliğinin de arttığı çalışma kapsamında rapor edilmiştir. Nihai sonuç olarak %40 nohut unu içerek ekmek en beğenilen ekmek olmuştur.
6	Hatıpoğlu, S. (2016).	Bu çalışma ile, patates unu ve gamın ekmeğin kalitesine olan etkileri incelenmek istenmiştir. Bu çalışmada; farklı gramajlarda un kullanılarak ekmekler üretilmiştir. Çalışma kapsamında ekmeklerde %0-30 oranında patates unu bulunmaktadır ve ayrıca %1-3 aralığında guar gamı bulunmaktadır. Ekmeklerle belirli analizler

		uygulanmıştır. Ata Ekmek Gıda ve Unlu Mamüller Ltd. Şti.'de personellerinde 28 kişi panelist olarak seçilmiştir. Panelistler ekmekleri; renk, koku, lezzet, yapısal özellik ve genel kabul değerlerini 1 ile 7 arasında olacak şekilde hazırlanmış formlar ile değerlendirmişlerdir. Araştırmaya göre patates unu ilavesi ekmeğin raf ömrünü uzatmaktadır. Duyusal olarak a glutensiz ekmek formülasyonları genel olarak kabul edilebilir bulunmuştur. Patates ununun %2 ile 3 oranında ilavesi ve gam ilavesinin en beğenilen ekmek olduğu belirlenmiştir.
7	Certel, M., Erem, F., Fundagül, E. R. E. M., Konak, Ü., & Karakaş, B. (2009).	Bu çalışmanın amacı dondurulmuş ve kısmen dondurulmuş hamurdan yapılmış beyaz ekmeklerin fiziki ve duyusal özelliklerinin belirlenmesidir. Araştırma kapsamındaki deneme ekmekleri direkt hamur metodu ile üretilmiştir. Üretim için, tip 650 buğday unu, %2.5 oranında ticari çözünebilir aktif kuru maya, tuz, seker ve içme suyu kullanılmıştır. Ekmeklerin duyusal özelliklerinin belirlenmesi için 1 ile 5 arası puanlama yapılmıştır. Bu araştırmanın sonuçlarına göre sertlik değerinin donuk hamurlarda ilk günden itibaren, kısmi olarak pişmiş ekmeklerde ise onuncu günden itibaren kontrol ekmeklerine göre farklılık gösterdiği gözlemlenmiştir.
8	Bircan, D., Güray, C. T., & Bostan, K. (2017).	Bu çalışmanın amacı değişik yöntemler kullanılarak sağlanmış ekşi hamurlardan üretilmiş ekmeklerin belirli yönlerden karşılaştırılmasıdır. Bu çalışma kapsamında üç çeşit ekşi maya üretilmiştir. İlk grup için bir kaba buğday unu, yoğurt ve sıcak su eklenmiştir. İkinci grup için ise yoğurt yerine aynı seviyede boza eklenmiştir. Üçüncü grupta da daha önceden hazırlanmış bir hamurdan 250g alınmış ve tüm ürünler üstü kapalı olarak mayalandırılmaya bırakılmıştır. 6 kişiden oluşan panelistler ekmekleri 1 ile 100 arasında belirlenmiş bir skalada ekmeğin kabuğunun rengi, ekmek içi rengi, kokusu, gözeneklilik, kıvam ve tadı yönünden değerlendirmişlerdir. Bu çalışmanın sonuçlarına göre yoğurt kültürü kullanılarak ekşitilen ekşi hamur ekmeğinin en beğenilen ekmek olduğu rapor edilmiştir.
9	Dirim, S. N., Ergün, K., Çalişkan, G., Özalp, H., & Balkesen, N. (2014).	Bu çalışma kapsamında, besin değeri yüksek meyve ve sebze unları ile ekmek elde ederek alternatif tatlar oluşturma ve fonksiyonel ürün geliştirmek hedeflenmiştir. Bu çalışma kapsamında kontrol ekmeği üretilmiştir. Araştırma için ek olarak sebze ve meyve unlu ekmekler üretilmiştir. Duyusal değerlendirmede, çeşitli sebze meyve unları ile yapılan ekmekler yarı eğitimli 10 adet panelist ile değerlendirilmiştir. Ekmeklerin rengi kokusu, lezzeti ve genel beğenilirlik özellikleri değerlendirilmiştir. Duyusal analiz sonuçlarında kontrol ekmekleri ve zenginleştirilmiş ekmeklerin beğeni oranları arasında büyük farklar olmamakla beraber sonuçlara göre en çok beğeni toplayan ekmeklerin sırası ile barbunya unu, soya unu ve bezelye unu katkısı ile elde edilen ekmeklerdir.
10	İlhan, E., Büyükİzgİ, A. N., & ErmİŞ, E. (2020).	Bu çalışma kapsamında '*Spirulina platensistozunun'* ekmekte kullanım potansiyeli araştırılmıştır. Ekmek hamuruna (%0,1-0,5-1,0-3,0) ağırlık oranlarında *Spirulina* platensis tozu tozu eklenmiştir. Bu ekmekler çeşitli analizlere tabii tutulmuştur. Ürün on kişilik panelist ekibi tarafından koku, çiğnenebilirlik, lezzet ve genel beğeni açısından değerlendirilmiştir. 1 ile 5 arasında puanlanmıştır. Bu çalışma sonucunda %0,1 *Spirulina platensis* tozu ilavesi ile yapılan ekmeğin genel beğenilirlik oranı en yüksek olan ekmek olduğu belirlenmiştir.
11	Suha, M., Humaina, A., Niyaz, H. N., & Naila, A. (2021).	Çalışmanın amacı, ekmeğe mısır unu, limon suyu ve kabartma tozu ilavesinin genel olarak ekmeği tat, aroma, görünüm, doku ve renk dahil olmak üzere nasıl değiştirdiğini ve tüketicilerin bu yeni ürünlere karşı kabul edilebilirlik düzeylerinin belirlenmesidir. Çalışma kapsamında iki farklı ürün katılımcılar tarafından denenmiştir. Bunlardan birisi mısır unu, limon suyu ve kabartma tozu ile zenginleştirilmiş ekmek diğeri ise beyaz ekmektir. Analiz için kontrol ekmeği ve zenginleştirilmiş ekmek üretilmiştir. Her iki ürünü de değerlendirmek üzere 30 eğitimsiz katılımcı panelist olarak yer almıştır. Kontrol ekmeği ve zenginleştirilmiş ekmek örnekleri görünüm, renk, tat, aroma, doku ve genel kabul edilebilirlik gibi kriterlere göre 1 ile 9 arasında bir skala ile derecelendirilmiştir. Bu çalışmanın sonucuna göre zenginleştirilmiş ekmeğin genel olarak kabul edilebilirliği, katılımcıların %43.3'ü tarafından 'Orta derecede' olarak derecelendirilmiştir, Katılımcıların %70'i ise normal beyaz ekmek için genel kabul edilebilirliği 'Çok fazla' olarak derecelendirmiştir.
12	Tóth, M., Kaszab, T., & Lambert-Meretei, A.	Bu çalışma, 4 günlük bir depolama testi sırasında farklı glutensiz ürünlerin buğday bazlı muadilleriyle karşılaştırmayı amaçlamaktadır. Bu çalışmada üç farklı ekmek türü analiz edilmiştir: koçanı (zanaatkar, yuvarlak ekmek), beyaz ve tam tahıllı somunlar (kalıba içinde pişirilmiş). Her ekmek türünden iki örnek (glutensiz ve buğday bazlı

	(2022).	ürünler) seçilmiş ve karşılaştırılmıştır. Duyusal değerlendirmede, ekmek örneklerini test etmek için 15 kişi yer almıştır. Katılımcılardan, glutensiz ekmeği için görünüm, renk, tat ve doku ile ilgili olarak tanımlanan 17 duyusal özelliğin yoğunluğunu değerlendirmeleri istenmiştir. Sonuçlar; dahil edilen numunelerin, oda sıcaklığında saklama sırasında buğday bazlı muadillerine benzer doku özellikleri ve nitelikleri olan, koruyucu madde içermeyen, yemeye hazır ekmek ürünleri olma kabiliyetine sahip olduğunu göstermektedir. Depolama testinin sertlik, yaylanma ve yapışkanlık verileri, son birkaç yılda glutensiz ürünlerinin kalitesinin arttığını ve buğday bazlı unlu mamüllerle karşılaştırılabilir örneklerin halihazırda piyasada mevcut olduğunu göstermiştir.

6. SONUÇ

Ekmek çok uzun yıllardır temel besin öğelerinden birisi olarak tüketilmektedir. Tüketici istek ve ihtiyaçları doğrultusunda unlu mamüller endüstrisi tarafından birçok yeni ekmek türü geliştirilmekte ve satışa sunulmaktadır. Ekmek gerek temel besin öğelerinden birisi olması gerekse belirli hastalıklara yönelik olarak içeriğinin zenginleştirilmesi veya daraltılması kapsamında araştırmacıların önemli çalışma alanlarından birisini oluşturmaktadır. Yapılan çalışmalarda kullanılan ekmek çeşitlerinin; glütensiz ekmek, tava ekmeği, tam buğday ekmeği, çavdar ekmeği, susamlı ekmek, lavaş, patates unlu ekmek vb şeklinde olduğu görülmektedir. Ekmeklere tıbbi aromatik meyveler ve meyve suları, ikame unlar gibi ilave maddelerin katıldığı, duyusal analizde çoğunlukla tercih ve beğenilirlik testinin uygulandığı görülmektedir. Çalışmalar kapsamında geliştirilen ürünler duyusal kalite kriterlerinden renk, koku, sertlik, gözeneklilik, tat ve genel kabul görülebilirlik özellikleri bazında değerlendirilmiştir. Literatür incelemesinde duyusal analizde panelist sayısının 6 ila 100 kişi aralığında değiştiği görülmüştür. Yapılan duyusal analiz çalışmalarının yeterli sayıdaki eğitimli panelistler ile yürütülmesi çalışma sonuçlarının geçerliliğine olumlu yönde katkı sağlayacaktır. Yapılan araştırma sonucunda ürün geliştirme ve ekmeklerin duyusal analizi üzerine birçok çalışmaya rastlanmıştır. Glütensiz ekmekler, buğday unu yerine ikame un geliştirilerek yapılan ekmekler, farklı ürünler ilave edilerek ekmeklerin fonksiyonel besin özelliklerinin arttırılması ve piyasada olan ekmek çeşitlerinin belirli özellikler yönünden değerlendirilmesi çok çalışılan konulara örnek olarak gösterilebilmektedir. Gelecekte yapılacak çalışmaların duyusal analiz yanında kimyasal analizler içermesi geliştirilen yeni ürünün fonksiyonel değerinin belirlenmesi noktasında faydalı olacaktır. Böylece sağlıklı beslenme açısından tüketicilere ışık tutacaktır. Ayrıca farklı bilim alanları ile ortak yürütülecek gıda ürünü geliştirme çalışmaları; araştırmaları daha kapsamlı hale getirecektir. Geliştirilen ürünlerin satın alınabilirliği, tüketici tercihleri, potansiyel tüketim sıklığı gibi farklı özelliklerinin ölçülmesi gıda pazarlama alanına ve üretici firmalara katkı sağlayacaktır.

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TATLI ÇEŞİTLERİNDE DUYUSAL ANALİZ VE YENİ ÜRÜN GELİŞTİRME ÇALIŞMALARININ İNCELENMESİ

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ÖZET

Şeker, bal veya şeker türü ikameler ilave edilerek elde edilen yiyeceklerin geneline tatlı denilmektedir. Yüksek oranda enerji veren yiyeceklerin başında gelen tatlılar insanoğlu için vazgeçilmez bir besin kaynağıdır. Şekerin keşfedilmediği ve bulunmadığı zamanlarda dahi insanlar tatlı ihtiyacını kuru meyveler veya şeker muadili besinler ile karşılamıştır. Tatlıların içerisine katılan malzemeler yapılan tatlının çeşidine göre değişiyor olsa dahi tatlılar genellikle karbonhidrat içerikli ürünlerin başında gelmektedir. Türk mutfağında tatlı son yenilen yemek çeşidi olarak bilinmekte ayrıca tatlı çeşitleri genellikle sütlü tatlılar, meyve ve sebze tatlıları, tahıl tatlıları ve hamur tatlıları olarak bilinmektedir. Mutfakların kültürel etkileşimi her yiyecekte olduğu gibi tatlıları da etkilemiş ve yeni tatlı çeşitleri ortaya çıkmıştır. İnsanoğlunun yeniye olan merakı ve yeni olanı deneme isteği ortaya çıkan yeni tatlıları kabul etmesini ve yeni ürünlerin oluşabilmesini kolaylaştırmıştır. Bunun sonucunda gıda üretici firmaları farklı tatlar ortaya çıkarma ve yeni ürün geliştirme çalışmaları içerisine girmiştir. Bir ürünün orijinal olabilmesi, iyileştirilebilmesi ve yeni bir ürün olarak pazara sunulabilmesi olarak tanımlanan ürün geliştirme çalışmaları var olan üründe farklılık oluşturabilmekte veya mevcut ürünün yerini alabilmektedir. Gastronomi gibi farklı damak tatlarının sentezini oluşturan bir alanda ürün geliştirme ile mevcut bulunan ürünlerin daha cazip hale getirilmesi sağlanmakta veya hitap eden hedef kitlenin farklılaştırılması mümkün olabilmektedir. Bu bağlamda ürün geliştirme faaliyetleri yiyecekten içeceğe kadar çok çeşitli ürünlerde yapılmaktadır. Çalışmamız son yıllarda tatlı çeşitleri kapsamında yapılan ürün geliştirme çalışmalarının incelenmesinden oluşmaktadır. Toplamda 12 adet tatlı çeşidinde yapılan ürün geliştirme çalışmaları amaç, yöntem ve sonuçları bakımından incelenmiş ve özellikle duyusal analiz çalışmalarının ayrıntılarına yer verilmiştir. İncelenen çalışmalarda vegan, glütensiz, diyabetik beslenme gibi nish tüketim olarak bahsedebilecek ihtiyaçtan doğan bir gereksinimi karşılayan çalışmalar olduğu kadar, farklı mutfakların ürünlerinin sentezi olarak ifade edilen füzyon mutfak gibi yeni tatların oluşturulmasının hedeflendiği çalışmalar, tatlıların besleyici ve fonskiyonel

özelliklerini arttırmaya yönelik çalışmaların da olduğu görülmektedir. İncelenen çalışmalarda yeni tatlar oluşturmanın dışında, daha az kalorili ve daha az maliyetli ürünler ile yapılan çalışmaların olduğu da görülmektedir. Çalışmaların duyusal analiz bölümünde kullanılan deney gruplarında kişi sayıları yapılan çalışmaya göre çok farklılık göstemektedir. Gastronomi ve gıda ile ilgili alanlarda, ürün geliştirme çalışmalarında duyusal ve kimyasal analizlerin yapılması sonrasında yeni tatların oluşturulup pazara sunulması ve tüketici beğenisinin belirlenmesi kritik bir öneme sahiptir. Bu çalışmalar yapılırken, duyusal analiz yöntemlerindeki panelist sayılarının arttırılması ve standart analiz kurallarına uyulması tavsiye edilmektedir.

Anahtar Kelimeler: Gastronomi, tatlı, ürün geliştirme, duyusal analiz, tüketici beğenisi

INVESTIGATION OF SENSORY ANALYSIS AND NEW PRODUCT DEVELOPMENT STUDIES IN DESSERT VARIETIES

ABSTRACT

Foods obtained by adding sugar, honey or sugar substitutes are generally called desserts. Desserts, which are among the foods that give high energy, are an indispensable food source for human beings. Even when sugar was not discovered and did not exist, people met their sweet needs with dried fruits or sugar equivalent foods. Even if ingredients added to desserts vary according to the type of dessert made, desserts are usually among the products containing carbohydrates. In Turkish cuisine, dessert is known as the last course of the meal, and desserts are generally known as milk desserts, fruit and vegetable desserts, cereal desserts, and pastry desserts. The cultural interaction of cuisines has affected desserts as well as every food, and new types of desserts have emerged. People's curiosity about the new and the desire to try the new one have made it easier for them to accept new desserts and create new products. As a result, food manufacturers have started to work on creating different flavors and developing new products. Product development studies, which are defined as the ability of a product to be original, to be improved and to be offered to the market as a new product, can make a difference in the existing product or replace the existing product. In a field, such as gastronomy, that creates the synthesis of different tastes, product development can make existing products more attractive or differentiate the target audience. In this context, product development activities are carried out in a wide variety of products from food to beverage. Our study investigated product development studies carried out within the scope of dessert varieties in recent years. In total, product development studies on 12 dessert varieties were examined in terms of purpose, method and results, and especially the details of sensory analysis studies were included. In the studies examined, it was seen that there were studies conducted to create new tastes, such as fusion cuisine, which is expressed as the synthesis of products of different cuisines, to meet a need arising from a need, which can be mentioned as food consumption, such as vegan, gluten-free and diabetic nutrition, and to increase the nutritive and functional properties of desserts. Apart from creating new flavors in the studies examined, it was also seen that there were studies with less costly products low in calories. The number of people in the experimental groups used in the sensory analysis part of the studies differed greatly in the studies examined. In the fields of gastronomy and food, after sensory and chemical analyzes are carried out in product development studies, it is of critical importance that new flavors are created and presented to the market and that consumer taste is determined. While conducting such studies, it is recommended to increase the number of panelists in sensory analysis methods and to comply with standard analysis rules.

Keywords: Gastronomy, dessert, product development, sensory analysis, consumer taste

1.GİRİŞ

Canlıların tümü yaşamak için beslenmeye ihtiyaç duymaktadır. İnsanoğlu ise, yaşadığı süre boyunca yemeği hem yaşama hem de bir keyif aracı haline getirmiştir. Gıda maddelerimizden biri olan şeker, beslenme ihtiyacımızı giderirken en çok yararlandığımız hammaddelerin başında gelmektedir (Şavkay, 2000). İnsanoğlunun zaman geçtikçe tatlılara olan merakı ve tüketme isteği artmıştır. Bu nedenle çoğu zaman yemeğin bitişinde yenilen yemek türü olan tatlılar, öncelikle tercih edilen gıda maddesi haline gelmiştir (Belge, 2013). Tatlı denildiğinde akla ilk gelen gıda maddesi çoğunlukla şeker olsa bile, doğada hazır bulunan yiyecekler vardır ki, bunlardan ilk akla gelen baldır. Yiyeceklerin kendi içerisinde var olan şekeri açığa çıkartmak için yapılan bir diğer gıda ise, pekmezdir. Pekmez, meyvede bulunan şekerin kaynatılarak açığa çıkarılması işlemidir (Şavkay, 2000). İnsanoğlu yaşamı boyunca günlük enerji gereksinimi karşılayan karbonhidrat ve enerji verici besinlerden olan şekere duyduğu gereksinimi doğal veya yapay türleri ile karşılamak durumunda kalmıştır. Diyabet, çölyak ve çeşitli hastalıklara sahip olup şekeri beslenme grubundan çıkarmak zorunda kalan tüketiciler için ise, böylesi enerji veren bir besini günlük öğününden çıkarabilmek sanıldığı kadar kolay değildir. Bu durumda işletme ve gıda üreticileri her müşterinin beklentisine uygun ürün çıkarabilmek ve bu ürünü pazarda tutundurabilmek mecburiyetindedir. Duyusal analiz çalışmaları sayesinde üretilen yeni ürünlerin tüketiciler tarafından beğenilme, ürünün kabul edilebilirliği aşamalarından geçerek pazarda tutundurma faaliyetleri yapılmaktadır. Bu çalışmada tatlı kavramı, tatlı çeşitleri, gastronomideki yeri ve tatlılarda yapılan ürün geliştirme çalışmalarının duyusal analizi, yöntemi ve sonucu incelenmiştir.

2. YÖNTEM

Bu çalışma literatür taraması çerçevesinde geliştirilmiştir. Literatür araştırması, çalışmayı yapan kişi tarafından cevap aranan araştırma soruları için fikir toplamanın yanı sıra, benzer çalışmaların sonuçları hakkında bilgi sahibi olunmasını sağlayan süreci ifade etmektedir (Frankel & Wallen, 1990). Araştırma için bir el yazması rapor niteliğinde olan literatür taraması, yapılan çalışmanın amacı ve yöntemi için zemin oluşturmakta ve okuyuculara gerçekleri sunmaktadır. Literatür taraması yaparken konunun gözden geçirilmesi ve kanıt oluşturulması için akademik dergilerde ki makaler, konu ile ilgili kitaplara veya gazetelere başvurulur. Literatür taraması konunun ana noktalarını tanımlamayı, bulguları açıklamayı önce ki yapılan çalışmaların dahil edilerek konunun derinlemesine anlaşılmasını sağlamaktadır. (Denney & Tewksbury 2013).

3. TATLI ÇEŞİTLERİ VE TÜRK TATLILARININ GASTRONOMİDEKİ YERİ

Yemek kültürümüzde son yemek olarak tüketilen tatlılar sofranın vazgeçilmez unsurunu oluşturmaktadır. Tatlı yapımında temel gereksinim olan şeker çok geç keşfedilen bir gıda ürünüdür. Şeker olmadan önce tatlı yapımı için kullanılan ürünlerin başında pekmez, bal, kuru meyve gibi ürünler gelmektedir. Şekerin muadili olarak kullanılan bu ürünler, pahalı olmalarından dolayı genelde alım gücü yüksek insanların sofralarında bulunan yiyeceklerdendir (Şavkay, 2000).

Türk mutfağını diğer mutfaklardan ayıran özelliklerin başında helva, baklava, pişmaniye, pekmez, tahin, aşure gibi tatlıların var olmasıdır (Tez, 2018). Türk mutfağında tatlılar, içerisinde bulunan ana malzeme ve yapılışlarından dolayı birkaç gruba ayrılmaktadır; sütlü tatlılar, meyve ve sebze tatlıları, tahıl tatlıları ve hamur işi tatlılarıdır (Cebeci, 2019, Şavkay, 2000, Bakan, 2021).

Tatlı denildiğinde hamur tatlıları ilk akla gelen çeşitlerdendir. Bu tatlı çeşitlerinin en önemlisi baklavadır. Baklava, yapımı ve hamurunun içeriği açısından en az değişime uğrayarak günümüze gelen tatlılardandır. Yapılışı oldukça ustalık gerektiren baklava şuan günümüzde çokça tüketilmektedir. Meyve ve sebze tatlıları ise, Türk mutfağının zengin meyve, sebze çeşitliliğini öne süren, yapılışı itibari ile şekerin meyve ve/veya sebze ile buluşmasından oluşan tatlılardandır. Türk mutfağındaki meyve, sebze çeşitliliği fazla olduğu için bu kategoride ki tatlılar fazlalaşmakta çünkü çok sayıda meyvenin tatlısı yapılabilmektedir. Sütlü tatlılar denilen grubun ana malzemesi süttür ve en hafif tatlı çeşitlerindendir. Tatlı yapılırken süt dolaylı olarak ilave ediliyor ise, adı sütlü tatlı olmaz. Sütlü tatlı diyebilmemiz için ana malzemenin süt olması gerekmektedir (Şavkay, 2000). Türk mutfak kültüründe önemli bir yer tutan helvalar ise, tahıl tatlıları grubuna aittir. Helvanın kelime anlamı ‘tatlı yiyecek’ dir. Helvaların çok çeşitli türleri bulunmakta ve helvalar düğün, bayram gibi neşeli gün yiyeceği olarak yapılması dışında cenaze günü de yapılarak dağıtılan tatlı çeşitleri olması sebebi ile türk mutfağında ayrı bir öneme sahiptir (Işın, 2008).

Türk mutfağı dışında tatlı çeşitlerine baktığımızda çoğunlukla kültürümüze daha sonra dahil olmuş tatlılar göze çarpmaktadır. Bu tatlılara, cheesecake, brownie, biscotti ve profiterole örnek verilebilmektedir. Genellikle etkileşim sonucu kültürümüze dahil olan bu tatlılar, tanzimat dönemi ile artış yaşamıştır (Hatipoğlu, 2014). Ülkemizde baklava, tulumba, lokma, helva muhallebili tatlılar, kadayıf, sütlaç, lokum, yaş pasta en fazla tercih edilen tatlı çeşitleridir. (Kızıldemir vd., 2014).

4. ÜRÜN GELİŞTİRME VE DUYUSAL ANALİZ ÖNEMİ

Yeni ürünlerin tasarımının oluşturulması, üretilmesi ve pazara sunulması olarak tanımlanan ürün geliştirme kavramı, orijinal veya geliştirilmiş ürün odaklı bir prosesi ifade etmektedir. İşletmelerin gelişmesi için oldukça önemli bir süreç olan ürün geliştirme, günümüzde firmaların yöneticileri tarafından yenilikçi yatırımlar olarak görülmekte, firmanın devamlılığının sağlanması için önemli bir aşamayı ifade etmektedir. Pek çok firmanın varlık nedenlerinden en önemlisi olan ürün geliştirme; rekabetçilik, üreticinin varlığını sürdürme, karlılık sağlama, müşteri odaklı ürünleri pazara sunma, ürün kalitesi iyileştirme gibi pek çok fayda sağlayabilmektedir (Yayla, 2018). Ürünlerin geliştirildikten sonra pazara sunma sürecinin tamamlanması için en kritik süreçlerin başında duyusal analiz çalışmaları gelmektedir.

Duyusal analiz bir ürünün niteliğinin koku tat, doku, renk gibi beş duyu organı aracılığı ile algılanması olarak ifade edilmektedir (Piana, vd. 2004). İnsanoğlunun duyu organlarının bir enstrüman olarak ele alındığı, aynı zamanda besinlerin kıvam, renk, şekil, görünüş, lezet, aromalarının duyular aracılığı ile ölçülebildiği disiplindir. Gıda üretiminde yeni bir ürün pazara çıkarılacağında ilk olarak yeme kalitesinin ölçülmesi gerekmekte ve bunun için duyusal değerlendirme yapılmaktadır. Yapılan değerlendirmeler sonucunda pazar payı az olan ürünlerin pazar payının arttırılması ve ürünün tüketicilerin beğenisine sunulması sağlanmaktadır (Megep, 2012).

Gıdaların kalitesini değerlendirme için mikrobiyolojik, kimyasal ve fiziksel testler yapılmaktadır. Yapılan bu testlerin sonuçları ne kadar iyi olursa olsun ürün hakkında karar vermede söz sahibi olan yapılacak duyusal analizdir. Duyusal analizde, tüketicinin beğenisini kazanmayan her ürün için rapor olumsuz olarak nitelendirilmektedir (Çelik, 2004). Duyusal analiz testleri tüketicilerin istediği ve beğendiği ölçüler doğrultusunda kimyasal ve fiziksel özelliklerin test edilmesini sağlamaktadır. Gıda endüstrisinin gelişmesi ile fiziksel veya kimyasal özelliğin dışında tüketiciye farklı duyusal özellikleri de sağlama isteği ve ihtiyacı doğmuş bu sayede duyusal analizin önemi artmaya başlamıştır (Silici, 2005).

5. TATLILARDA ÜRÜN GELİŞTİRME ÇALIŞMALARININ İNCELENMESİ

Bu bölümde farklı tatlı çeşitlerine ait çalışmaların duyusal analiz ile ilgili kısımlarına ait sonuçlar Tablo 1'de verilmiştir.

Tablo 1. Tatlılarda Ürün Geliştirme Çalışmaları Literatür Tablosu

	Yazar/ Yazarlar	**Çalışmanın Amacı, Yöntemi, Duyusal Analizi ve Sonucu**

1	Şimşek, A., Güleç, E. ve Sevim Usta (2020).	İlgili çalışma veganların veya çölyak hastalarının tüketimine uygun kazandibi tarifinin geliştirilmesini ve satışa sunulmasını amaçlamaktadır**.** Pirinç unu ve hindistan cevizi sütü ilave edilerek yapılan kazandibi tatlısı 4 formda hazırlanmış ve ürünler iki aşamalı deneysel araştırma yönemi ile test edilmiştir. Araştırmada eğitimli 8 panelist ve 85 tüketici örneklem grubunu oluşturmaktadır. Tatlıların duyusal analiz ölçeği olan 5'li beğeni ölçeği ile değerlendirilmesi istenmiştir. Ölçekte ürün ile ilgili koku, görünüm, doku, lezzet adı altında dört bölüm yer almaktadır. Duyusal analizi yapılan 4 ürün arasında en beğenilen kazandibi tarifi için tüketicinin beğenisini ölçecek tadım anketi yapılmıştır. Araştırmanın sonucunda farklı miktarda hindistan cevizi sütü, damla sakızı, nişasta, pirinç unu, şeker ile 4 kazandibi tarifi yapılmıştır. En çok sevilen kazandibi tarifi ise, ''*1 lt Hindistan cevizi sütü, 1 adet damla sakızı, 200 gr şeker, 40 gr mısır nişastası, 60 gr pirinç unu''* içeren reçete olmuştur. Çalışmanın sonucunda vegan ve çölyak hastalarının tüketimi için oluşturulan kazandibinin, herkesin severek tüketebileceği bir forma dönüştürüldüğü gözlemlenmiştir. Bu sayede kazandibinin tüketim ve üretimi yaygınlaşabileceği, oluşturulan yeni reçetenin işletmelerin menülerine eklenebileceği belirtilmiştir.
2	Bal, M., Yıldırım, M., ve Ahmet Salih Sönmezdağ (2019).	İlgili çalışmanın amacı baklava çeşitlerinin incelenmesi, geleneksel, inovatif bakış açıları ile üretilerek geliştirilmesi, standart reçetenin oluşturulması ve duyusal analizlerin yapılarak yeni ürünlerin gastronomi sektörüne kazandırılmasının sağlanmasıdır. İlgili çalışmada reçetenin, lezzet profil analizinde istenen sonuca ulaşması için dört farklı deneme yapılmıştır. Her yapılan denemede elma pulpu, yağ miktarı şerbet, tatlı ve ekşi elma serumu, pişme süresi değiştirilmiştir. İlgili çalışmada panelde Gastronomi ve Mutfak Sanatları bölümünden 12 eğitimli panelist tadım yapmıştır. Yapılan literatür taraması ve panelist ön değerlendirmesi sonucunda; ''Lezzet, profil analizinde kullanılan genel izlenim, meyve aroması, şerbet kıvamı, tekstür, çıtırlık, yağ aroması, harç oranı, pişme oranı ve renk tonu'' gibi parametreler incelenmiştir. Duyusal analiz sonucunda geçmişte farklı çeşiti (lorlu, mercimekli, kavunu gibi) olan baklavanın meyveli olarak denenip standart reçetesinin oluşturulması amaçlanmıştır. Duyusal analizleri istatistiksel açıdan değerlendirme aşamasında Temel Bileşen Analizinden yararlanılmıştır. Analiz sonucunda ''pişme derecesi, genel izlenim, meyve aroması, şerbet kıvamı, renk tonu, çıtırlık'' parametrelerini en iyi temsil eden denemenin 5. Deneme olduğu saptanmıştır. 5. Denemenin kullanılması tavsiye edilerek çalışma sonucunda gelecekte bu gibi ürün geliştirmelerin desteklenmesinin gastronomi turizmi için büyük fayda sağlayacağı ifade edilmiştir.
3	Yılmaz, A. ve A., M. (2021).	Bu çalışmada, farklı un katkılı, diyabet hastalarına yönelik pataşu hamuru yapılması amaçlanmaktadır. 4 farklı formda diyabetlilere yönelik pataşu yapılmıştır. Nohut, siyez, kinoa ve tam buğday un çeşitleri ile yapılan pataşuların duyusal analizi ise eğitimli panelistler ile gerçekleştirilmiştir. 13 kişiden oluşan eğitimli panelistler sektör tecrübesi olan şeflerden ve pastane çalışanlarından oluşmaktadır. Pataşuları 5'li beğeni ölçeğine göre değerlendiren panelistler, değerlendirmelerini koku, doku, görünüm, lezzet ve tüketme eğilimi kriterlerine yönelik yapmıştır. Görünüm kriterleri; iç boşluk, kabarık ve renk ile ifade edilirken, doku kriterleri; ağızda dağılma, gevreklik şeklindedir. Kinoa, siyez unu ve tam buğday katkılı pataşu hamurlarının toplam puanı, nohut unu katkılı hamura göre daha fazladır. Kinoa, siyez, tam buğday unu katkılı hamurların puanlarında anlamlı bir fark görülmemiştir. En yüksek puana sahip hamur, tam buğday unu katkılıdır. Çalışma sonucunda glisemik indeksi düşük unlar ile üretilen ürünün diyabet rahatsızlığı olanlara yönelik olabildiği sonuca ulaşılmıştır. Bu tarz ürünlerin özel tüketim alışkanlığına yönelik olabileceği ve tüketime sunulabileceği ifade edilmektedir.

4	Çelik, İ. ve Tümer G (2020).	İlgili çalışma buğday ve arpa unu ile elde edilmiş kavurga ununun, tulumba tatlısında kullanımına yönelik sonuçlarını incelemektedir. Farklı un ile hazırlanan reçete sonucu ürün çeşitliliğinin artırılması sağlanırken aynı zamanda meydana gelen fiziksel, kimyasal ve duyusal özellikleri belirlenmektedir. Tulumba reçetesinin üretimi için kontrol örneği ve kavurga unu ilavesi 100 g buğday unu esas alınarak oluşturulmuştur. İkame örnekler için kavurga unu standart una %5, %10 ve %20 oranlarında kavurga/ buğday, kavurga/arpa, kavurga/arpa/buğday (KB, KA ve KAB) ilave edilmiştir. Tulumbalar renk, gözenek, tekstür, çiğnenebilirlik, genel beğeni ve lezzet özellikleri bakımından 1 puandan 7 puana kadar değerlendirilmiştir. Kullanılan kavurga, Malatya, Aksaraya, Nevşehir, Çankırı, Sivas, Yozgat, Kayseri, Kars, Erzurum kış mevsimini sert geçen yok tutucu ve proteince zengin bir çerez olarak bilinmektedir. Kavurga unu kullanarak yapılan tulumbaların fiziksel, kimyasal, duyusal özelliklerinin ortaya çıkarıldığı bu çalışmada elde edilen tulumba kavurga unu kullanımı sayesinde kalori oranı %8,05 oranında azalırken, magnezyum içeriği %8,99 oranında artmıştır. Duyusal değerlendirmede düşük puan almasının nedeninin, tulumba tatlısının alışık olunmayan özelliklerden kaynaklandığı ifade edilmektedir. Çalışma sonucunda kavurga ununun tulumba dahi pek çok unlu mamüle eklenebileceği düşünülmektedir.
5	Uyanık, B. (2016).	İlgili çalışmanın amacı, bölgenin turizm destinasyonunun farkına varılması, mutfak kültürünün arttırılması ve yöresel ürünlerinin kaybolmasının önüne geçilmesidir. Az tüketilen veya unutulma ihtimali olan lezzetlerin tamamen kaybolmasının önüne geçilmesi ve/veya gelecek nesillere aktarımı füzyon mutfak tekniği ile amaçlanmaktadır. Fransız mutfağına ait olan çikolata sufle ile Kapadokya'nın ürününden tahin pekmez ilaveli suflenin duyusal analizi eğitimli panelistler ile yapılmış ve sonuçları karşılaştırmalı incelenmiştir. Panelistlerin sufleyi tat, görünüm, koku, görsel, genel beğeni ve akışkanlık gibi kriterlere göre ürünleri 5 farklı parametreye göre değerlendirmiştir. Bu çalışmada Kapadokya'nın geleneksel lezzeti pekmez kullanılarak füzyon mutfak uygulaması yapılmıştır. Günümüzde oldukça yaygın bir akım olan füzyon mutfağın ülkemizde uygulanması oldukça düşüktür. Bu çalışma ise füzyon mutfak uygulamasına örnek teşkil etmektedir. Benzer çalışmaların yaygınlaşması ve bununla ülkemizin yöresel mutfaklarını tanıtmanın mümkün olabileceği düşünülmektedir.
6	Satouf, M. ve Mehmet Köten vd. Hatib Beyen (2020).	Bu çalışma Türkiye'de tüketimi ve yapımı artan Suriye burmasının kalite kriterlerini belirlemek için yapılmıştır. Tatlının yapılışı ile ilgili bilgiler Riad Gharra isimli ustadan alınmıştır. Yapılan tatlı denemelerinde nem, kül, yağ, protein, karbonhidrat, ham lif, enerji, antioksian aktivite ve duyusal analizler yapılmıştır. Tatlının duyusal değerlendirmesi 1 ile 5 puan üzerinden yapılmıştır. Renk puanları 2.67-4.67 arasında değişmektedir. Kontrol örneği yüksek puan almışken, B2 örneği düşük puan almıştır. Koku, lezzet, kıvam, yumuşaklık ve genel beğeni puanlamaları şu şekildedir. Koku 2.50-4.00, lezzet 2.50-4.17, yumuşaklık 3.33-4.17, kıvam 2.83-4.16, genel beğeni ise 3.17-4.19 şeklindedir. Çalışma sonucunda Suriye'nin geleneksel tatlısı olan Mebruma tatlısının hem kalite kriterlerinin ortaya çıkarılması hem de bilinirliğinin arttırılması sağlanmaya çalışılmıştır. Üretim aşamalarında belli standartları olmaması ve tatlıyı yapan ustaların farklı olması kalitesinde farklılıklar olmasını muhtemel hale getirmiştir. Ürün tanıtmanın gerçekleşebilmesi standart bir tarif ile mümkün olmaktadır. Üretim ve paketlemenin aynı standart ve özen ile gerçekleşmesi gerekmektedir. Çalışmanın benzer çalışmalara yön göstereceği düşünülmektedir.
7	Şaşmazer, R. Ç. (2019).	Bu çalışma besin değeri yüksek kayısı ve kinoa sosu ilaveli puding yapmayı amaçlamaktadır. Vitamin açısından oldukça zengin olan kayısı ve kinoa ile sos hazırlanarak bu sos %3, %5 ve %7 oranlarında pudinglere ilave edilmiştir. Kontrol örneği olarak ise, sos içermeyen puding hazırlanmıştır. Duyusal analiz, tekstür,

		kimsyasal ve fiziksel analizler yapılarak 5 gün takip edilmiş ve 3 tekerrürlü olarak yapılmıştır. Puding örneklerinin duyusal analizi 9 puanlık hedonik skalaya kadar yapılmıştır (1'den 9'a kadar (sırasıyla, çok beğenmedim ve çok beğendim) 9 eğitimli panelist ile numuneler tat, koku, renk ve kıvam özelliklerine göre puanlandırılmıştır. Değerlendirmeler sonucunda pudinglerin genel beğeni puanının 7 olduğu saptanmıştır. Puding beğenisi gün geçtikçe azalmakta ve tat unsuru da kaybolmaktadır. %5 sosa sahip puding daha yüksek beğeni alırken, diğer pudingler birbirine yakın sonuçlar almıştır. Yapılan çalışmanın sonucunda %5 sos ilaveli pudigin +4 derecede raf ömrünün 3 gün olduğu ve fonksiyonel bir ürün olduğu belirlenmiştir.
8	Şeker, T, İ. (2020).	Çalışmada meyan kökü gibi fonksiyonel bir bitkinin sünger kekte kullanımı denenmiş ve böylece günlük yaşantımızda çok tüketmediğimiz bir ürün olmayan meyan kökünün kullanım alanının yaygınlaşması sağlanmak istenmiştir. Çalışmada ilk önce meyan kökü yerel bir marketten alınarak şerbet üretilmiştir. 100 ml suyun içine 5, 10, 15, 20 gr meyan kökü eklenmiş ve 50 derecede 2 saat boyunca ısıtılmıştır. Şerbet süzülerek, soğutularak kek reçetesinde kullanılmıştır. Meyan kökünden yapılan şerbetle kek yapılmıştır. Piştikten sonra 2 saat soğuyan kekler analize tabi tutulmuştur. Çalışmada duyusal analiz 30 kişiden oluşan panelistler ile yapılmış ve puanlandırma ölçeği için 1 ile 5 arası puanlama kullanılmıştır. Analiz kriterleri kabuk rengi, gözenekli yapı, doku, koku, çiğneme, tat, aroma ve genel kabul düzeyi şeklindedir. Bu çalışma sonucunda meyan kökünün sünger kek yapımı denenmiş ve bu sayede günlük olarak yaygın tüketilebilecek yeni bir ürün olması amaçlanmaktadır. Yapılan keklerden %5 ve %10 meyan şerbeti ikamesi bulunan keklerin duyusal analizleri genel beğeni açısından geçerlilik görmüştür.
9	Çelik, İ. ve Yasemin Kuzumoğlu (2020).	Çalışmada glütensiz lokma tatlısı üretimi amaçlanmaktadır. Duyusal analiz çalışmalarının genelinde glütensiz çalışmaların öne çıktığı anlaşılmaktadır. Araştırmada patates unu yerini ikame olarak üzüm çekirdeği, keten unu, kavun çekirdeği tozuna bırakmış ve bu unlarla hazırlanan lokmalar duyusal analize tabi tutulmuştur. Çalışmada kontrol örneği olarak pirinç unu ve mısır nişastasına patates unu ilave edilerek oluşturulmuştur. %40 pirinç unu ve mısır nişastası, %20 patates unu ile kontrol örneği yapılmıştır. Glutensiz un kapsamında kullanılan "*üzüm çekirdeği tozu, kavun çekirdeği tozu ve keten unu 100 g'da 20 g olarak hesaplanmış ve ayrı ikameler*" oluşturulduğu bildirilmiştir. 32 kişiden oluşan duyusal analiz Pamukkale Üniversitesi Gıda Mühendisliği Bölümü'nde gerçekleştirilmiştir. 7'li hedonik ölçek ile puan verilen lokmalardan kontrol örneği(patates ilaveli lokma) ve kavun çekirdeği tozu ilaveli lokmanın puanlarında benzerlik bulunmaktadır. Kontrol ve diğer örnekler arasında kırılganlık, koku, çiğnenebilirlikte anlamlı farklılık mevcuttur. Analizlerin sonunda en beğenilen lokma üzüm çekirdeği tozu ile yapılan olurken, diğer lokmaların değerleri birbirine yakındır. Çalışmada üretilen lokma tatlısı çölyak hastalarının tüketimine uygun olması açısından önem taşımaktadır. Bunun yanı sıra incelemelerde patates unu yerine katılan unların lokmanın protein ve diyet lifi bakımından fazla olmasını sağlamış, kalori değerini de düşürmüştür. Analizlerin sonunda en beğenilen lokma, üzüm çekirdeği tozu ile yapılan lokma olmuştur.
10	Yıldırım, R. M., Tuncay Gümüş vd. (2018).	Revani, çoğunlukla Orta Doğu ülkesinde ve Türkiye'de tüketilen irmik ve şuruptan yapılan bir tatlıdır. Ancak çölyak hastaları revani tüketemezler çünkü irmik gluten içerir. Araştırmada "*mısır unu, pirinç unu, patates unu, mısır nişastası ve tapyoka nişastası kullanılarak glutensiz revani yapılmış*" ve tarifler soya proteini, bezelye proteini ve transglutaminaz (TG) enzimi ile geliştirilmiştir. TG ve protein kaynaklarının bir kombinasyonu, pirinç unu dayanan revani'nin sertliğini arttırmada, sadece soya proteinine kıyasla daha etkili bulunmuştur. Glutensiz revani örneklerinin görüntü analizi, hava kabarcıklarının dağılımını gözlemlemek için gerçekleştirilmiştir. Pirinç unu ve mısır nişastası karışımı veya mısır unu, patates

		unu ve mısır nişastası karışımı, revani'de hava kabarcıklarının daha düzenli dağılımını sağlamıştır. Protein ve TG' nin kaynağı, mısır unu ve pirinç unu karışımından yapılan glutensiz revani örneğinin duyusal özelliklerini etkilememiştir. Çalışma sonucuna göre %62,5 mısır unu ve %37,5 pirinç ununun soya proteini ve TG ile kombinasyonunun, glutensiz revani formülasyonunu başarıyla kullanılabileceğini ortaya koymuştur.
11	Özer, Ç. (2019).	İlgili çalışmada bazı Türk ve Uluslararası tatlılarında (Revani, Tiramisu, Cheesecake ve Ricotta keki gibi) süt bazlı tatlı tariflerinde (krem peynir, ricotta peyniri yerine) lor peyniri kullanarak beslenme değeri açısından daha yüksek ve maliyet açısından daha düşük tatlılar yapmak amaçlanmıştır. Cheesecake, tiramisu, ricotta kek ve revani için tüm malzemeler yerel pazardan temin edilmiştir. Kontrol numuneleri orijinal reçetelere göre hazırlanmıştır. Lor peyniri orijinal tariflerde %25 oranında orijinal peynir ve yoğurt ile değiştirilmiştir. ve test numuneleri için %50 oranında ilave edilmiştir. Panelistler yaşları 20 ile 45 arasında değişen toplam 10 gönüllüden oluşmaktadır. Her tatlı kendi içinde kontrol tatlısı ve lor ikameli tatlı olarak gruplandırılmıştır. Tatlı için %25 ve %50 oranında lor kullanılmıştır. Numuneler tek olarak verilmiştir. Değerlendirme için, tatlılar renk, görünüm, lezzet, doku ve genel kabul edilebilirlik ve bunları kullanan bir puanlama sistemi 9 puanlı bir hedonik ölçek (1 = aşırı derecede hoşlanmama, 5 = ne sevme ne de hoşlanmama, ve 9 = son derece benzer) duyusal değerlendirme için Abdel- Salam' ve Ahmet (2007) alınmıştır. Tatlılar için satın alma 5 puanlık bir ölçek kullanılarak değerlendirilmiştir. Krema, ricotta ve mascarpone peynirleri ana malzemelerdir. Sırası ile cheesecake, ricotta cake ve tiramisu üretimi yapılmıştır. Kullanılan ana malzemeler tatlıları kalorisi yüksek, değerli ve maliyeti yüksek tatlılar yapar. Uluslararası mutfaklardan bu deneysel tatlılar lor kullanılarak daha sağlıklı yiyecekler tüketilebilir. Türk mutfaklarında lor peyniri kullanımı yaygınlaşabilmektedir. Lor peyniri mükemmel bir protein kaynağı ve aynı zamanda az yağlı bir peynirdir. Kabul edilebilir miktarda lor peynirinden yapılan deneysel tatlılar orijinal tariflere kıyasla panelistler tarafından kabul edilen iyi organoleptik özelliklere sahiptir. Bu nedenle, işlevsel olduğu sonucuna varılabilir. Krem peynir, ricotta peyniri ve mascarpone peyniri ikame edilerek lor peyniri ile duyusal kaliteyi değiştirmeden düşük kalorili, düşük maliyetli ve besin değeri daha yüksek tatlılar üretilebilmiştir.
12	Joshi, S., Singh, A. vd. (2020).	Hindistan'da yeterince kullanılmayan bir meyve olan dikenli armut, bağışıklığı artırması gibi nedenlerden fonksiyonel faydaları ile bilinir. Jelatin bazlı tatlı, dikenli armut meyvesi suyu kullanılarak hazırlanmış ve pektin bazlı jölelerle karşılaştırılmıştır. Dikenli armut meyveleri (opuntia elatior Mill çeşidi), Gujrat bölgesindeki tarım çiftliklerinden toplanmıştır. Diğer hammaddeler yakındaki marketten temin edilmiştir. Pektin, Gıda Bilimi ve Teknolojisinden alınmıştır. Dikenli armut meyvelerinden meyve suyu ekstraksiyonu Ravindrakumar, (2016) tarafından verilen metoda göre yapılmıştır. Hem küspe hem de tohumlardan oluşan kepçeli küspe, tohum kırılmadan sadece tohumun küspeden ayrılmasını kolaylaştırmak için 10-15 saniye düşük hızda bir karışım öğütücüsüne konulmuştur. Tüm karışım, tohumların hamurdan ayrılması için 8 gözlü elek boyutunda elenmiştir. Saf hamur, santrifüj (Refrigerated Centrifuge MP800, Electrocraft (India) Pvt. Ltd., Mumbai, Hindistan) kullanılarak 3600 rpm'de 10 dakika santrifüjlenmiştir. Daha sonra 2 katlı müslin bezden süzülmüştür. Toplanan ekstrakt, berrak meyve suyu olarak kabul edilerek çalışma için kullanılmıştır. Jelatin bazlı tatlıyı tüketici kabulünü karşılaştırmak için duyusal değerlendirme yapılarak sonuçlar gözlemlenmiştir. Duyusal analiz için katılımcı sayısı 33 kişidir. Her iki jelatin ve pektin bazlı tatlılar için 1-9 hedonik ölçek kullanılmıştır. Jelatin bazlı tatlının görünüm, aroma, ağız hissi ve genel kabul edilebilirlik açısından pektin bazlı jöleden üstün bulunmuştur.

		Tat değerlendirmesi açısından pektin bazlı jöle daha yüksek bulunmuştur. Pektin bazlı jölenin jelatin bazlı tatlıdan daha koyu renkli olduğu gözlemlenmiştir. Jelatin esaslı tatlıda kalite parametrelerindeki kayıp, pektinli jöleye göre daha az olduğu gözlemlenmiştir. Hazırlanan ürün, fazla miktarda şeker tüketemeyen şeker hastaları için iyi bir seçenek olabilmek ile beraber fonksiyonel bir ürün olduğu ifade edilmiştir.

6. SONUÇ

Türk mutfağında geniş bir yer kaplayan, haz ve yeme ihtiyacını ortak paydada buluşturun tatlılar, insanoğlunun ilk zamanlarından itibaren tüketilmiştir. Gelişen ve farklılaşan günümüzde ise, tüketicilerin beklentileri değişebilmektedir. Tüketicinin değişen talep ve ihtiyaçlarına yönelik ürün geliştirme çalışmaları her grupta olduğu gibi tatlılarda da ortaya çıkmıştır. Bu doğrultuda tatlı yapımında temel gıda maddesi olan şeker, un, sütün muadili ürünler kullanılarak tarifler geliştirilmiştir. Glutensiz, vegan, şekersiz beslenmek durumunda kalan tüketicilere, alternatif tatlılar sunma ve bunun standardının oluşturulması, bir işletme için müşteri kaybını önleyecektir.

Gastronomi gibi farklı beslenme alışkanlıklarının popüler hale getirildiği multidisipliner bir alanda her geçen gün trendler değişebilmekte ve bu tüketicilerin beslenmelerine de yansımaktadır. Ürün geliştirme faaliyetleri ve duyusal analiz testlerinin bu noktada önemi yadsınamaz bir gerçektir. Zengin besin içerikli farklı unlar, fonksiyonel besinler ile farklılaşan tatlılar, standart yapılan tarifler ile kalite, tat, doku özellikleri bakımında karşılaştırılmaktadır. Tatlılarda ürün geliştirme çalışmaları kapsamında incelediğimiz 12 çalışmadan 4 tanesi glütensiz, vegan ve diyabetik beslenen tüketicilere yönelik iken, diğer 4' ü fonksiyonel gıdalar olarak adlandırılan besin değeri yüksek gıdaların kullanılmasına yöneliktir. 2 çalışma inovatif ürün ve füzyon mutfak gibi amaçlara yönelik iken, bir çalışmada sadece kalite kriterlerini belirlenmesi amaçlanmakta, diğerinde ise, besin değeri yüksek ve az maliyetli ürün kullanılmaktadır. Duyusal analiz değerlendirmelerinde genellikle 5'li, 7'li, 9'lu hedonik ölçekler kullanıldığı, panelist sayılarının da 8, 10, 30 ve 85 şeklinde değişkenlik gösterdiği göze çarpmaktadır. İncelenen çalışmalarda yer verilen panelist sayısının sınırlı tutulduğu ve gelecek çalışmalarda panelist sayılarının arttırılmasının gerektiği düşünülmektedir. Özellikle bu alanda çalışan üreticilerin özel beslenme ihtiyacı olan tüketiciler için inovatif tatlı ürünlerinin sayısını artırması ve şeker ikamesi kullanılarak hazırlanan sağlıklı ürünlerin geliştirilmesine daha fazla önem vermesi tavsiye edilmektedir.

7. KAYNAKÇA

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ÖZET
Özünütərbiyənin formalaşmasını təmin edən vasitələr insanın öz tələbatlarından meydana gəlir. Yuxarı sinif şagirdləri aktiv həyata doğru irəliləyirlər. Bu yolda onlar özlərinə, öz maraqlarına, davranışlarına, hərəkətlərinə, şəxsi xüsusiyyətlərinə daha çox diqqət yetirirlər. Yeniyetmə və gənclər özünəyönəlmiş proses nəticəsində xarakterlərində formalaşmış olan mənfi xüsusiyətləri müsbət xüsusiyyətlərlə əvəz etməyə çalışırlar. Bu, onların özlərinə qarşı bəslədikləri tənqidi münasibət, özünüidarə, özünütəhlil və güclü iradəsi nəticəsində mümkün olur. Yuxarı sinif şagirdlərinin düzgün şəkildə özünütərbiyəsi onların cəmiyyətdə, müxtəlif kollektiv və qruplarda layiqli mövqe tutmasını təmin edir. Istər təhsil müəssisələrinin, istərsə də ətraf mühit və tərbiyə edən şəxslərin yuxarı sinif şagirdlərinin özünütərbiyəsi prosesinə dəstəyi və yönləndirici təsiri böyük əhəmiyyətə malikdir. Yeniyetmə və gənclər ətrafında baş verən hadisə və prosesləri təhlil edərək nəticə çıxarır. Bu zaman onlar hansı hərəkətlərin yanlış və doğru olmasını müəyyənləşdirir, müsbət xüsusiyyətlərin mənəvi daşıyıcısına çevrilirlər. Həmçinin cəmiyyətin inkişaf istiqamətindən asılı olaraq dəyişən norma və qaydalar tərbiyə prosesində də yeniliklərin meydana gəlməsinə səbəb olur. Hər dövrün özünəməxsus əxlaqi, mənəvi, etik qayda və normaları ilə ayaqlaşan şəxsin özünütərbiyə prosesi yeniyetmə və gəncin gələcək həyat və fəaliyyətinin təmin olunmasında vacib rol oynayır. Özünütərbiyənin həyata keçməsi üçün yuxarı sinif şagirdləri daim öz inkişaf səviyyələrini təkmilləşdirməlidir. Yuxarı sinif şagirdlərinin özünütərbiyə işinin düzgün qurulması onların özlərini düzgün qiymətləndirməsinə, öz xarakterlərini, şəxsi keyfiyyətlərini şüurlu dərk etmələrinə və mənlik şüurunun formalaşmasına kömək edir.

Açar sözlər: yuxarı sinif şagirdi, özünütərbiyə, özünütərbiyəyə təsir edən amillər, hərəkətverici qüvvələr, iradə, müsbət və mənfi xüsusiyyətlər, xarakter, müəllim.

ПРОБЛЕМА САМООБРАЗВАНИЯ СТАРШЕКЛАССНИКОВ

Резюме
Средства, обеспечивающие формирование самообразования, исходят из потребностей человека. Старшеклассники переходят к активной жизни. Таким образом, они больше внимания уделяют себе, своим интересам, поведению, поступкам и личностным характеристикам. Подростки и молодые люди пытаются заменить отрицательные черты, сформировавшиеся в их характере, положительными в результате процесса самоориентации. Это возможно в результате их критического отношения к себе, самоконтроля, самоанализа и сильной воли. Правильное самообразование старшеклассников обеспечивает им достойное положение в обществе, в различных коллективах и группах. Большое значение имеет опорное и направляющее влияние как образовательных учреждений, так и среды и воспитателей на процесс самообразования старшеклассников. Анализируя события и процессы, происходящие вокруг подростков и молодёжи, он делает выводы. В это время они определяют, какие действия являются неправильными, а какие правильными, и становятся нравственными носителями положительных характеристик. Также нормы и правила, изменяющиеся в зависимости от направления развития общества, вызывают инновации в образовательном процессе. Важную роль в обеспечении будущей жизни и деятельности подростков и молодёжи играет процесс самовоспитания человека, идущего в ногу с уникальными нравственными, духовно-этическими правилами и нормами каждой эпохи. Для того, чтобы самообразование осуществлялось, старшеклассники должны постоянно повышать уровень своего развития. Правильное построение самообразовательной работы старшеклассников помогает им правильно оценивать себя, осознавать свой характер, личностные качества, формировать самосознание.

Ключевые слова: старщеклассник, самодисциплина, факторы, влияющие на самодисциплину, движущие силы, воля, положительные и отрицательные характеристики, характер, учитель.

THE ISSUE OF SELF-EDUCATION OF HIGH SCHOOL STUDENTS

ABSTRACT
The means that ensure the formation of self-education come from the needs of a person. High school students are moving towards an active life. In this way, they pay more attention to themselves, their interests, behaviour, actions and personal characteristics. Adolescents and young people try to replace the negative features formed in their character with positive features as a result of the self-oriented process. This is possible as a result of their cricital attitude towards themselves, self-control, self-analysis and strong will. Proper self-education of high school students ensures that they take a decent position in society, in various collectives and groups. The support and guiding influence of both educational institutions and the environment and nurturing persons on the process of self-education of high school students id of great importance. Analyzing events and processes happening around teenagers and young people, he draws conclusions. At this time, they determine which actions are wrong and right and become moral bearers of positive characteristics. Also, norms and rules that change depending on the development direction of the society cause innovations in the education process. The process of self-education a person who keeps up with the unique moral, spiritual and ethical rules and norms of each era plays an important role in ensuring the future life and activities of teenagers and young people. In order for self-education to take place, high school students must constantly improve their level of development. The correct construction of self-education work of high school students helps them to evaluate themselves correctly, to consciously understand their character, personal qualities and to form self-awareness.

Key words: high school student, self-discipline, factors affecting self-discipline, driving forces, will, positive and negative characteristics, character, teacher.

YUXARI SİNİF ŞAGİRDLƏRİNİN ÖZÜNÜTƏRBİYƏSİ MƏSƏLƏSİ.

Tərbiyə insanın inkişafı, onun şəxsiyyət kimi formalaşdırılması üçün mühüm amillərdən biridir. İnsan cəmiyyəti yarandığı gündən etibarən tərbiyə də mövcud olmuşdur. Tərbiyəni qısa şəkildə belə ifadə edə bilərik: tərbiyə təcrübənin ötürülməsidir. Bu tərifi geniş mənada açsaq, tərbiyə yaşlı nəslin öz təcrübələrini, özlərinin bilik və bacarıqlarını, örnək ola biləcək müsbət nümunələrini gənc nəslə ötürməsi prosesidir.

Tərbiyə prosesi müxtəlif amillərin zidiyyətli təsiri əsasında baş verir. Bu isə onun idarə olunan proses olmasına dəlalət edir. Tərbiyədə iki cür: həm daxili, həm də xarici idarəetmə imkanları mövcuddur[1].

Xarici zidiyyətlər, idarəetmə imkanları dedikdə pedaqoji kollektivin və insanı əhatə edən mühitin təsirləri nəzərdə tutulur. Bu cəhətdən pedaqoji kollektivin işinin düzgün təşkili və düzgün tərbiyəvi mühitin qurulması şagirdlərin inkişafında və şəxsiyyət kimi formalaşdırılmasında vacib amillərdən biridir. Bu zaman şagirdlərin daxili, həmçinin mənəvi aləminə nüfuz etməyi bacarmaq əsas şərtlərdən biridir.

Daxili idarəetmə isə fərdin, şəxsin özünün daxili imkanları hesabına özünü tərbiyə etməsinə əsaslanır. Bu zaman insan şüurlu şəkildə qarşısına qoyduğu məqsədlərindən, rəhbər tutduğu prioritetlərindən asılı olaraq fəaliyyət göstərir və bu fəaliyyət nəticəsində öz şəxsiyyətində əsaslı dəyişikliklər əmələ gəlir. Daxili zidiyyətlərin nəticəsində insan özünün hərəkətlərinə, davranışlarına diqqət edir ki, bunun nəticəsində də mənfi keyfiyyətləri aşkarlayıb onları aradan qaldırmağa, müsbət keyfiyyətlərin inkişafına, həyatda öz mövqeyini düzgün istiqamətləndirməyə səy göstərir. Əgər ümumi tərbiyə prosesində tərbiyə edən və tərbiyə olunan olaraq iki tərəf iştirak edirsə, özünütərbiyə prosesində bu tərəflər sadəcə bir şəxsdə, tərbiyəolunanın özündə cəmləşir. Özünü dərk etmək, mənfi xüsusiyyətlərini müsbət xüsusiyyətlərə çevirmək üçün insanın güclü iradəyə sahib olması və bu iş üçün böyük səy göstərməsi vacibdir. İnsan xüsusiyyətlərini müsbətə doğru dəyişdiyi zaman bəzi davranışları, hərəkətləri qəbul etməyə özünü məcbur edir ki, bu da bir sıra ziddiyyətlərin yaranmasına səbəb olur. Bu zidiyyətlər isə insanın özünütərbiyəsinin inkişafı üçün əsas hərəkətverici qüvvə rolunu oynayır.

Ümumilikdə tərbiyə prosesi kimi onun bir qolunu təşkil edən özünütərbiyə prosesinin də əsası ailədə valideynlər tərəfindən qoyulur. Valideynlər ilk dövrlərdə kiçik yaşlı övladlarına velosiped sürməyi öyrədirlər. Bu zaman valideyn uşağın yıxılmaması üçün velosipedi tutur, yavaşca onu irəlilətməyə başlayır. Uşaq müəyyən qədər müvazinətini saxlamağa çalışır. Bu zaman valideyn zaman-zaman əlini velosipeddən çəkir. Bu uşağın velosipedin üzərindəykən

müvazinətini saxlaması məqsədi daşıyır. Artıq uşaq müstəqil şəkildə velosipedi sürməyə başladıqda valideynin yardımına ehtiyacı qalmır. Özünütərbiyə də bu prosesə bənzərdir. Valideyn övladını tam kiçik yaşlarından başlayaraq düzgün istiqamətləndirərsə, onun normal inkişafını təmin edərsə, sağlam mənəvi-psixoloji mühitdə böyüməsi üçün şərait yaradarsa, onun gələcəkdə müstəqil şəkildə özünütərbiyə etmək bacarıqlarına yiyələnməsinə nail olacaqdır[5].

Tərbiyə prosesinin əsaslı və düzgün təşkil olunması təlim müəssisələrinin payına düşür. Təlim müəssisələri tərbiyə prosesini cəmiyyətin tələbləri, dəyərləri, normaları əsasında düzgün istiqamətdə formalaşdırmalıdır. Şagirdlərin təlim müəssisələrində cəmiyyətin müəyyən olunmuş dəyər, qayda və normaları əsasında tərbiyələndirilməsi prosesi təşkil olunur ki, bu prosesdə şagirdlərin müsbət əxlaqi keyfiyyətləri şüurlu şəkildə mənimsəyərək özününküləşdirməsi, mənfi, özü, cəmiyyət və ətrafı üçün yararsız olan davranış və hərəkətlərdən uzaqlaşdırılması vəzifəsi təmin olunur. Təlim müəssisələrində həyata keçirilən şagirdlərin tərbiyəsi onların daxili aləminə nüfuz edir və "öz malına" çevrilir. Qazanılmış tərbiyəvi keyfiyyətlər şagirdlərin həyatında, özünüidarəsində, özünü təkmilləşdirməsində mühüm rol oynayır.

Özünütərbiyə prosesi bilavasitə tərbiyədən asılıdır. Özünütərbiyənin məqsədi, vəzifəsi, mahiyyəti insanın yaş dövrlərinə uyğun olaraq dəyişir. İnsanın meyl və maraqlarından, ehtiyaclarından, tələbatlarından, fərdi inkişaf xüsusiyyətlərindən, yaşadıqları mühitdən, şəraitdən asılı olaraq özünütərbiyə bəzilərində yavaş, bəzilərində isə sürətli şəkildə gedir[1]. Bu, həmçinin özünütərbiyə nəticəsində qəbul olunmuş, qazanılmış yeni xüsusiyyətlərin insan tərəfindən necə dərk olunmasından asılıdır. Ümumilikdə isə özünütərbiyə uşaq yaşlarından başlanır. Bu dövrdə uşaqlar istər ailədə nənə və babanın, valideynlərin, bacı və qardaşlarının, istərsə də müəllimlərinin, tərbiyəçilərinin xüsusiyyətlərini götürməyə, onları təqlid etməyə, hərəkət və davranışlarını təkrarlamağa çalışırlar. Bu dövrdə özünütərbiyə prosesi nisbətən yavaş tempdə davam edir. Lakin yaş ötdükcə şagirdlərin hərtərəfli inkişafından asılı olaraq özünütərbiyənin xarakteri dəyişir və daha konkret şəklə düşməyə və məqsədyönlü istiqamət almağa başlayır.

Şagirdlərin ən önəmli yaş dövrü yeniyetməlik dövrüdür. "Böhran dövrü" adlandırılan bu dövrdə şagirdlərin hərtərəfli inkişafına, tərbiyə məsələlərinə xüsusi diqqət yetirilməlidir. Yeniyetməlik dövründə şagirdlərdə anatomik-fiziki cəhətdən bir sıra dəyişikliklər baş verir: baş gicəllənməsi, halsızlıq, tez yorulma, əzələlərin sümükləşməsi prosesi, həmçinin cinsi yetişkənliklə bağlı dəyişikliklər[6]. Bu zaman baş verən anatomik-fiziki dəyişikliklər özü ilə birgə bir sıra mənəvi-psixoloji dəyişikliklər də gətirir. Yeniyetmə oğlan və ya qızlar özlərini

hamıdan üstün görməyə, həmçinin "özlərinə kənardan baxmağa", davranış və hərəkətlərini qiymətləndirməyə, istək və arzularını, düşüncələrini, ideallarını, maraqlarını, ehtiyac və tələbatlarını, özlərinin xarakterik xüsusiyyətlərini şüurlu şəkildə müəyyən etməyə çalışırlar. Bu zaman isə onlar ictimai, cəmiyyət tərəfindən qəbul olunmuş ideallara diqqət yetirir, rəftarını, davranışını, danışıq tərzini, geyimini ona uyğun təşkil edir. Həmçinin yeniyetmələrin öz şəxsiyyətlərini inkişaf etdirmək, mənfi xüsusiyyətləri müsbət keyfiyyətlərlə əvəz etmək, özünü mənəvi cəhətdən zənginləşdirməyə çalışmaqları da bu dövrə təsadüf edir. Bu səbəbdən də yeniyetməlik dövründə şagirdlərin özünütərbiyəsi prosesi daha intensiv surətdə təmin olunur. Yeniyetməlik dövründə şagirdlərə kənardan verilən tərbiyəyə də xüsusi diqqət və qayğı yetirilməlidir. Şagird şəxsiyyətinin formalaşması və sonrakı inkişafı üçün tərbiyə və özünütərbiyə prosesinin paralel şəkildə aparılmasına xüsusi diqqət yetirilməlidir.

Müasir dövrdə yuxarı sinif şagirdlərinin özünütərbiyəsi məsələsi aktual mövzulardan biridir. Hər dövrün öz ehtiyac və tələbatlarından asılı olaraq tərbiyənin mahiyyəti, məzmunu, tələbləri də durmadan dəyişir. Bu gün durmadan artan tələbatlar bütün sahələr kimi təhsilə, xüsusilə də pedaqogika sahəsinə təsirsiz ötüşmür[3].

Digər yaş qruplarından fərqli olaraq, yuxarı sinif şagirdlərinin özünütərbiyəsi daha açıq və sürətli şəkildə təmin olunur. Çünki, bu yaş qrupuna məxsus şagirdlər artıq ilkin gənclik dövrünə qədəm qoymaq üzrə olurlar. Onlar lazımi bilik, bacarıq və vərdişlərlə təmin olunurlar. İstər ümumi təhsil müəssisələrində, istər ailədə, istərsə də ətraf mühitdə onlara aşılanan bilik, bacarıq və vərdişlərlə onlar öz şəxsiyyətlərini, daxili aləmlərini, mənəvi hisslərini, düşüncələrini dəyişməyə, zənginləşdirməyə cəhd göstərirlər. Çünki, yuxarı sinif şagirdləri artıq daha çox qayğı ilə böyüyüb alışdıqları mühitdən fərdi mühitə doğru addımlayırlar. Onlar mövcud olan paxıllıq, qorxaqlıq, yalançılıq kimi mənfi xüsusiyyətləri islah edərək müsbət xüsusiyyətləri özlərində formalaşdırmağa çalışırlar. Bu zaman şagird özünə sadəcə bioloji varlıq kimi deyil, sosiallaşa bilən, cəmiyyətdə öz layiqli mövqeyini tutmağa qadir olan, yeniliklərə açıq və özünü daim təkmilləşdirə, inkişaf etdirə bilən, cəmiyyətin qəbul etdiyi tələb və normaları qəbul edib onlara əməl edən, yaradıcı və məntiqi düşünə bilən şəxsiyyət kimi baxır. Bu proses zamanı şagirdlərin sosial-psixoloji inkişafının düzgün istiqamətləndirilməsi əhəmiyyətli dərəcədə vacibdir.

Yuxarı sinif şagirdləri özünütərbiyə prosesində özlərinin xarakterik xüsusiyyətlərini, meyl və maraqlarını, qabiliyyət və imkanlarını müəyyənləşdirir, özü, ailəsi, xalqı, Vətəni qarşısındakı vəzifələrini şüurlu şəkildə dərk edir, müsbət hərəkət və davranışlar qazanmaq üçün səy göstərir [4].

Özünütərbiyə mənəvi, psixoloji, əxlaqi, sosial, fiziki, iradi və s. cəhətdən həyata keçirilə bilər. Yuxarı sinif şagirdləri yalnız cəmiyyət tərəfindən qəbul olunan ictimai əxlaq qaydalarına riayət etməklə kifayətlənmir, həmçinin onları özününküləşdirərək bu tələblərin mənəvi daşıyıcısına çevrilirlər.

Qeyd etmək lazımdır ki, şagirdlərin özünütərbiyəsini düzgün inkişaf etdirmək üçün düzgün, sağlam mənəvi-psixoloji şərait qurulmalıdır. Çünki nəinki özünütərbiyə prosesinə, həmçinin ümumilikdə tərbiyənin təşkilinə çoxlu amillər təsir göstərir [3]. Tərbiyə prosesində şagird şəxsiyyətinin düzgün istiqamətdə formalaşdırılması zamanı mühitin və tərbiyəolunanın rolu xüsusi qeyd edilməlidir. Həmçinin, özünütərbiyə zamanı şagirdin ətraf mühiti, ətrafında gedən proseslər, yaşanan hadisələr, ona edilən təsirlər, həyat şəraiti, maddi və mənəvi sıxıntılar, digər insanlar, üzvü olduğu kollektivlər, ailə əsaslı dərəcədə önəmli rol oynayır.

Kollektiv daxilində özünütərbiyə məsələsi də diqqət mərkəzində saxlanılmalıdır. Bu işin təşkili zamanı müəllim əsas aparıcı qüvvə kimi çıxış edir. Müəllim sadəcə yeniyetmə və gənclərə özünütərbiyə məsələlərinin vacibliyi ilə bağlı məsələləri aydınlaşdırmaqla kifayətlənməməli, həmçinin, onları bu tərbiyəvi fəaliyyət istiqamətində düzgün yönləndirməyə çalışmalıdır. Bəzi hallarda yeniyetmə və gənclər onlarda yaranan mənfi xüsusiyyətləri görüb qəbul etməkdən, dəyişdirməyə çalışmaqdan çəkinirlər. Bu zaman onlarda özünə tənqidi yanaşma, özünə kənardan başqasının gözü ilə baxmaq, mənəvi və əqli cəhətdən kamilləşmək, zənginləşmək kimi xüsusiyyətlər yaratmağa səy göstərmək lazımdır. Nəticədə, yeniyetmə və gənclər özlərini tanımaq cəhətdən xeyli imkanlar əldə edirlər: nöqsanlarını görür, mənfi cəhətlərini müəyyənləşdirir, onları aradan qaldırmağa çalışır. Bu proses yeniyetmələrdən, gənclərdən mənəvi güc, iradi səy tələb edir. Iradi cəhətdən düzgün şəkildə inkişaf edən insan çətinliklərin öhdəsindən asanlıqla gələ bilir. Belə ki, onda cəsarətlilik, qorxmazlıq, mərdlik, dözümlülük kimi müsbət əxlaqi, fiziki keyfiyyətlər formalaşır [1].

İradi səy göstərməklə özünü tərbiyə etməyə tarixən mövcud olmuş dahilərdən də nümunə göstərmək olar. Belə ki, dahi yunan filosofu, natiqi Demosfen nitqində olan problemləri özü aradan qaldırmışdır [1]. O, hər səhər dəniz kənarına getmiş, dilinin altına xırda daşlar qoymuş və ucadan danışmağa başlamışdır. Bir müddət sonra isə o, bu yolla nitqindəki qüsuru aradan qaldırmışdır. Bununla kifayətlənməyən Demosfen məhkəmədə nitq söyləyərək mahir natiq kimi şöhrət qazanmışdır [6]. Nümunədən də göründüyü kimi, insanın özünü inkişaf etdirməsi, gələcək həyatını müəyyənləşdirməsi onun bu gün nə qədər çalışmasından, öz üzərində nə qədər işləməsindən, həmçinin özünü nə dərəcədə tanımasından asılıdır.

Özünütərbiyənin əsas şərtlərindən biri də özünü dərk etməkdir. Özünü dərk edə bilən insan hər

zaman nə istədiyini bilir, cəmiyyətdəki rolunu, mövqeyini, öz məqsədlərini, bu məqsədlərə çatmaq yollarını asanlıqla müəyyənləşdirməyi bacarır. Dahi italyan alimi, fiziki Qalileo Qalileyin dediyi kimi: "Ən ali hikmət – özünü tanımaqdır" [5]. Yeni həyata qədəm qoyan yeniyetmə və gənclərin bu istiqamətdə düzgün formalaşdırılması vacib məsələlərdəndir. Yuxarı sinif şagirdləri xarakter və xüsusiyyətlərinə bələd olmaqla yanaşı, özlərini düzgün qiymətləndirməyi də bacarmalıdır. Əks halda, onların müəyyən sosial mühitdə, cəmiyyətdə, müəyyən kollektiv daxilində mövcud olması, özlərini təyin etmələri mümkün olmayacaqdır. Bu məsələdə əsas vəzifə ailənin, ən əsası isə müəllimin üzərinə düşür. Əsas təsiredici vasitə isə kənarda mövcud olan müsbət nümunə olacaqdır. Çünki böyüklərin, valideynlərin, müəllimlərin yeniyetmə və gənclərə verdikləri öyüd - nəsihətlər, məsləhətlər nə qədər ibrətamiz olsa da, bəzən nəticəsiz ola bilər. Lakin yuxarı sinif şagirdləri kənarda baş verən hadisələri diqqətlə nəzərdən keçirib təhlil etməyi bacardıqları üçün onlara göstərilən müsbət və mənfi nümunələrin təsiri böyük olacaqdır. Bununla onlar hansı hərəkətlərin, davranışların yaxşı və pis olduğunu, mənfi və müsbət xüsusiyyətləri ayırd edərək özləri üçün nəticə çıxarır. Özünütərbiyə ilə bağlı əsaslı və sistemli iş apardıqda o, səmərəli nəticə verir. Hər bir müəllimin məktəb şagirdlərinin, xüsusilə də yuxarı sinif şagirdlərinin özünütərbiyəsi işinin təşkil edilməsinə, düzgün şəkildə istiqamətləndirilməsinə diqqət yetirməsi önəmli faktorlardan biridir [3].

Şagirdlərin yetişdirilməsi işi xüsusi diqqət tələb edir. Özünütərbiyə biliklərini aşılayan müəllim, valideyn sadəcə bununla bağlı bilikləri verməklə kifayətlənməməlidir. Yuxarı sinif şagirdləri müstəqil həyata doğru addımladıqları yolda müxtəlif situasiyalarla rastlaşa bilərlər. Həyatın fərqli zamanlarında onlar müxtəlif cür çətinliklərlə qarşılaşa, problemlərlə üz-üzə gələ bilərlər. Danılmaz həqiqətdir ki, məktəbyaşlı şagirdlərin kifayət qədər dünyagörüşü, təcrübəsi olmadığından onlar problemlərin həlli zamanı səhvlər edə bilərlər. Lakin özünü doğru yöndə istiqamətləndirməyi bacaran şagird harada səhv etdiyini görüb bundan özü üçün nəticə çıxarır. Bu prosesdə sadəcə şagirdin yaşadığı, üzləşdiyi çətinliklər deyil, həmçinin, onun ətrafında, içərisində olduğu fərqli kollektivlərdə, ünsiyyət qurduğu insanlar arasında baş verən yaxşı və ya pis hadisələr də önəmli rol oyanayır. Hadisələri kənardan izləyən şagird özü empatiya qurmağı bacarır, yanlışı doğrudan ayırd edir və nələrin zərərli ola biləcəyini görür.

Kollektiv daxilində özünütərbiyəni həyata keçirən zaman müəllim yeniyetmə və gənclərə sadəcə özünütərbiyənin məqsədini, hər bir şəxsin vəzifələrini izah etməklə öz işini məhdudlaşdırmamalıdır [4]. Şagirdlərdə özünütənqid, özünənəzarət zəifdirsə, əvvəlcə bu məsələ üzərində iş aparmaq zəruridir. Çünki öz hərəkət və davranışları, öz xarakterik xüsusiyyətləri haqqında kifayət qədər biliyə sahib olmayan yeniyetmə və gənclərlə aparılan

özünütərbiyə işi səmərəli nəticə verməyəcək, qarşıya qoyulan məqsədə nail olmaq mümkün olmayacaqdır.

Yeniyetmə və gənclərin özünütərbiyəsini təşkil edən zaman onlara məkətəbdə sistemli, məzmunlu və səmərəli şəkildə sosial tərbiyənin verilməsi, həmçinin onlarda əqli, əxlaqi və vətəndaşlıq tərbiyəsinin formalaşdırılması işinə xüsusi diqqət yetirilməlidir. Bu zaman fərqli yol və vasitələrdən istifadə etmək olar. Məsələn, çalışmaq lazımdır ki, hər bir yeniyetmə və ya gəncin özünün sevimli qəhrəmanı olsun, onun bütün müsbət keyfiyyətlərini özündə əks etdirməyə çalışsın, qəhrəmanının əldə etdiyi uğurlara nail olmağa çalışsın [1]. Bunun üçün şagirdlərin yazıçıların, şairlərin, tarixi şəxsiyyətlərin, tanınmış elm adamlarının, görkəmli incəsənət xadimlərinin həyat və yaradıcılığı ilə tanış etmək faydalı hesab oluna bilər. Həmçinin, müxtəlif vaxtlarda görkəmli şəxslərin məktəbə dəvət olunaraq şagirdlərlə görüşlərinin, söhbətlərinin təşkil olunması şagirdlərin özünütərbiyəsi işinə əhəmiyyətli dərəcədə müsbət təsir göstərir.

Özünütərbiyə prosesində əsas şərtlərdən biri kimi çalışmaq lazımdır ki, yeniyetmə və gənclər öz xarakterlərini tərbiyə etsin. Bu zaman onlar öz xarakterlərində müəyyən xüsusiyyətlər, əlamətlər, xüsusilə də müsbət keyfiyyətlər formalaşdırmağa və tərbiyə etməyə cəhd göstərəcəkdir. Zamanla formalaşan xarakter nəticəsində şagird ətraf mühitdə var olan hər şeyə: insanlara, əşyalara, müxtəlif canlılara, hadisə və proseslərə və s. münasibət bildirməyə başlayır. Yeniyetmə və gənclərin xarakterinin tərbiyəsi nəticəsində davranış və hərəkətlərin təhrikedici formada möhkəmlənməsi müşahidə olunur.

Yuxarı sinif şagirdlərinin özünütərbiyəsi onların düzgün istiqamətdə inkişafı ilə yanaşı, peşə seçmələrini də təmin edir. Belə ki, şagirdlər mənəvi kamilləşməklə fərqli qabiliyyətlər, bacarıqlar və vərdişlər əldə edirlər. Bu onların müxtəlif sahələrə maraq göstərməsinə və öz fəaliyyətlərini həmin sahələr üzrə inkişaf etdirmələrinə yol açır. Peşə seçimi yuxarı sinif şagirdlərinin həyatında önəmli faktorlardan biridir [2]. Gələcəyin səmərəli şəkildə təmin olunması və müəyyən sahələr üzrə ixtisaslı kadr kimi formalaşmaq üçün bu gün verilən qərar mühüm əhəmiyyət kəsb edir. Özünütərbiyə nəticəsində sağlam düşüncəyə sahib olan və istədiyi sahə üzrə özündə yeni bacarıqlar formalaşdırmağa səy göstərən şagirdi peşəseçmə üzrə düzgün istiqamətləndirmək lazımdır. Bu zaman yuxarı sinif şagirdlərinin məktəbdənkənar ictimai faydalı və kütləvi mədəni işlərə cəlb olunması öz effektiv nəticəsini verir. Həmçinin təhsil müəssisələrində dərsdənkənar dərnəklərin, məşğələlərin, müxtəlif bədii yaradıcılıq işlərinin təşkili şagirdlərin peşəseçmə işinə yanaşmalarını stimullaşdırmağa kömək edir [1].

Özünütərbiyənin təşkili xarakterin formalaşdırılması ilə paralel şəkildə həyata keçirilir.

Xarakterin inkişafı üçün isə şagirdin normal, sağlam mənəvi-psixoloji mühitdə yaşamasının, fəaliyyətinin qayğısına qalmaq lazımdır. Məlumdur ki, hər bir şəxsin xarakteri bir tərəfdən cəmiyyətin ictimai, sosial təsiri altında, digər tərəfdən isə onun psixoloji inkişafı əsasında tərbiyə olunur. Deməli, özünütərbiyənin şəxsin özünəməxsus prosesi kimi yanaşmaq anlayışı düzgün deyildir. O, göstərilən amillərin vəhdəti şəklində təmin olunan bir prosesdir [1].

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DİYARBAKIR İLİNDE BUĞDAY İŞLETMELERİNİN SOSYO-EKONOMİK YAPISININ BELİRLENMESİ

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ÖZET
Bu çalışmada Diyarbakır ilinde faaliyet gösteren buğday işletmelerini sosyo-ekonomik yapısı incelenmiştir. Çalışma kapsamında 30 buğday işletmesi ile yüzyüze anket çalışması yapılmıştır. Çalışmada elde edilen sonuçlara göre üreticilerin yaş ortalaması 47.4, tarımsal deneyim ortalaması 25 yıl, buğday üretimindeki ortalama deneyimi 21.4 yıl olarak tespit edilmiştir. Üreticilerin %56'sının bir veya birden fazla kooperatife ortak olduğu belirlenmiştir. Toplam buğday ekim alanı 54975 dekardır. İncelenen işletmelerde ortalama buğday verimi 312.10 kg/da, buğdayın ortalama satış fiyatı ise 2.95 TL olarak tespit edilmiştir. İşletmelerin küçük ölçekli olduğu ve üretimlerini aileden gelen alışkanlıklarla sürdürdüğü tespit edilmiştir.

Anahtar Kelimeler: sosyo-ekonomik yapı, buğday, tarım işletmeleri, Diyarbakır

DETERMINATION OF SOCIO-ECONOMIC STRUCTURE OF WHEAT FARMS: A CASE STUDY OF DIYARBAKIR PROVINCE

ABSTRACT

In this study, the socio-economic structure of wheat enterprises operating in Diyarbakır province was examined. Within the scope of the study, a face-to-face survey was conducted with 30 wheat enterprises. According to the results obtained in the study, the average age of the producers was 47.4 years, the average agricultural experience was 25 years, and the average experience in wheat production was 21.4 years. It has been determined that 56% of the producers are members of one or more cooperatives. The total wheat cultivation area is 54975 decares. The average wheat yield in the examined enterprises was 312.10 kg/da, and the average sales price of wheat was determined as 2.95 TL. It has been determined that the enterprises are small-scale and continue their production with the habits of the family.

Keywords: socio-economic structure, wheat, agricultural farms, Diyarbakır

1. GİRİŞ

Tarım sektörü, çeşitli besin maddelerini üreten, bu maddeleri işleyerek besin maddelerini çeşitlendiren, bireylerin de bu maddelere olan ihtiyacını karşılayan dolayısı ile toplumların sağlığı ve kalkınması üzerinde önemli etkiye sahip bir sektördür (Doğan ve ark., 2015). Buğday, tarım sektörünün en önemli bitkisel ürünlerinden biridir. Buğday tarım tarihi açısından insanın doğa ile girdiği ilişkide bilinen ilk bitki çeşididir. Buğday, insan ile beraber evrimleşmiş ve insanda buğday ile beraber sosyal yapısını şekillendirmiştir. Yaşanan 10000 yıllık bu süreçte insanın buğday ile kurduğu bu ilişki bugün her anlamda farklılaşmıştır (Yıldız, 2016). İnsanların yerleşik hayata geçiş sürecini hızlandıran, dünyada ve ülkemizde geniş ekim alanlarına sahip olan buğday; pek çok insanın gıda ihtiyacını karşılamasının yanı sıra hasat sonrası elde edilen artıklarıyla hayvanların yem ihtiyacını da büyük ölçüde karşılamaktadır. Bunun yanı sıra buğday saplarından kâğıt ve karton sanayisinde, mantar ve kerpiç kompostu hazırlamada da yararlanılır. Geniş üretim alanlarına sahip olan buğdayın insan ve insana dayalı sanayi kollarında çok fazla tercih edilmesi; adaptasyon yeteneğinin fazla olması, farklı iklim ve toprak koşullarında rahatlıkla yetiştirilebilmesi kendine tozlaşan bir bitki olması, kolay ve uzun süre depolanması gibi çok önemli faktörlere dayanır (Akıncı, 2021).

Türkiye'de, 2021 yılında 67.45 milyon dekarda buğday tarımı yapılmış ve 17.65 milyon ton buğday üretimi gerçekleştirilmiştir. Türkiye'de buğday üretim miktarı açısından Diyarbakır ili ilk on sırada yer almaktadır. 2021 yılında Türkiye'deki buğday üretiminin %3.28'i Diyarbakır ilinde gerçekleştirilmiştir (TÜİK, 2022).

Bugüne kadar tarım işletmelerinde farklı üretim dallarının sosyo-ekonomik yapısını ortaya koyan birçok çalışma yapılmıştır (Tok ve Kantar Davran, 2010; Şahin ve Karadağ Gürsoy, 2016; Üçeş ve Erişir, 2016; İpekçioğlu ve ark., 2016; Özsayın ve ark., 2018; Özsayın ve Everest, 2019; Gökdai ve Sakarya, 2020; Karlı ve ark., 2020). Ancak farklı ürünlerde ve farklı yörelerde bu yöndeki çalışmaların devam etmesi gerekmektedir.

Bu çalışmanın amacı Diyarbakır ilinde faaliyet gösteren buğday işletmelerini sosyo-ekonomik yapısını ortaya koymaktır. Bu amaç doğrultusunda 30 buğday işletmesi ile yüzyüze anket çalışması yapılmıştır. Verilerin analizinde yüzde, frekans dağılımları ve aritmetik ortalama kullanılmıştır.

2. ARAŞTIRMA BULGULARI

Üreticilerin demografik özelliklerine ilişkin bilgiler Çizelge 1'de sunulmuştur. Üreticilerin yaş

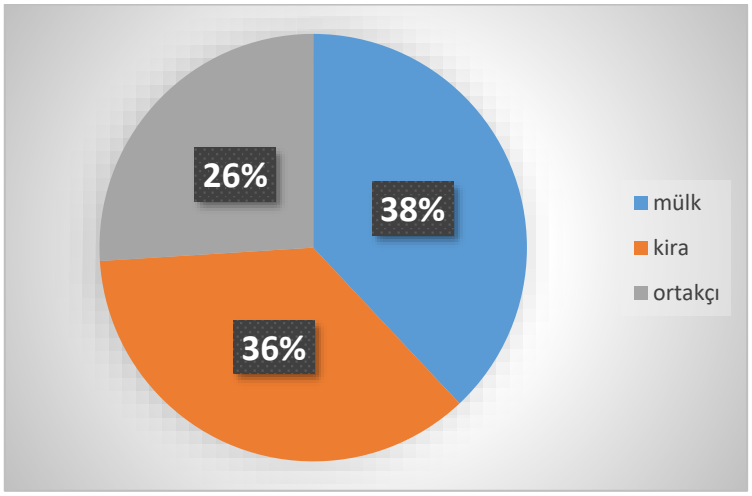
ortalaması 47.4, tarımsal deneyim ortalaması 25 yıl, buğday üretimindeki ortalama deneyimi 21.4 yıl olarak saptanmıştır. İlkokul mezunu olanların oranı %23.33'dür. Ortalama hane büyüklüğü 6 kişidir. Üreticilerin %56'sı bir veya birden fazla kooperatife ortaktır. İşletmelerin 13'ü Tarım Kredi Kooperatifine ortak olduğunu belirtmiştir.

Çizelge 1. Üreticilerin demografik özellikleri

Özellikler	
Yaş (yıl)	47.4
Tarımsal Deneyim (yıl)	25
Buğday Deneyim(yıl)	21.4
Aile birey sayısı	6
İlkokul mezunu oranı	%23.33
Kooperatife ortak olma oranı	%56.00

İşletme sahipleriyle görüşmelerde işletme yerinde aile üyeleri ve mevsimlik işçi çalışanların bulunduğunu belirtmişlerdir. İşletmelerde aile üyeleri olarak çalışanlar genellikle bir veya iki kişi olurken mevsimlik işçi sayısı ortalama 5.93 olarak hesaplanmıştır. Çalışan işçilerin yaş aralığı 20-60 olarak belirlenmiş, en fazla çalışan 12 kişi en az çalışan 2 kişidir.

İşletmelerde toplam arazi varlığı 67115 dekardır. Bunun %36 kira, %38.2i mülk, %26.2sı ortakçılıkla işletilen arazi konumundadır (Şekil 1). Buğday ekim alanı toplamı 54975 dekardır. İşletme sahipleri buğday dışında sebze ya da diğer serin iklim tahıllarını yetiştirmektedirler. İncelenen işletmelerin %77'si kuru tarım, %23'ü sulu tarım yapmaktadır. Diyarbakır ili karasal bir iklime sahip olduğundan yıl boyunca yağışlar kış-ilkbahar aylarında çoğunlukla yağışlı geçer. Yaz ayları ise kurak geçer. Bu nedenle işletme sahipleri buğday üretiminde kuru tarımı tercih etmektedir. Buğdayda susuz tarım yapılan bölgelerde verimi etkileyen en önemli faktör yağış miktarı ve yağışın dönemsel olarak dağılışıdır. Sulu tarımsa ise sulama miktarı ve zamanı önem taşımaktadır (Akıncı, 2021). İncelenen işletmelerde ortalama buğday verimi 312.10 kg/da'dır. 2020-2021 döneminde yaşanan kuraklık neden ile buğday üretiminde verim düşüklüğü yaşanmıştır. Bu durum da buğday fiyatlarında istikrarsızlığa neden olmuştur. Diyarbakır'da buğday fiyatları yıl içinde değişkenlik göstermektedir. İncelenen işletmelerde buğdayın ortalama satış fiyatı 2.95 TL olarak tespit edilmiştir. Temmuz-Ağustos aylarında 2-4 Tl arasında, Kasım-Aralık aylarında 4-6 TL arasında sattıklarını belirtmişlerdir. İşletmeler buğday hasadından sonra ürünü anlaşmalı olanlar anlaşmalı oldukları firmalara, diğerleri ise kooperatiflere, borsalara ve diğer üreticilere satmışlardır.



Şekil 1. Arazilerin Mülkiyet Durumu

İşletmelere buğday üretimine başlama nedenleri sorulmuştur. İşletmelerin %33.3'ü yörede yapılması, %33.3'ü alışkanlık, %6.67'si ekolojik koşulların uygun olması, %6.7'si karlı olması nedeniyle başlamıştır (Çizelge 2). 13 yıl ve altı tarımsal deneyime sahip olan işletmelerin büyük çoğunluğu yörede yapıldığı için, 50 yıl ve üzeri tarımsal deneyime sahip işletme sahipleri ise alışkanlık nedeniyle başladıklarını belirtmişlerdir. Deneyim sahibi fazla olan işletme sahipleri buğday üretimi dışında hiçbir tarımla uğraşmadıklarını ve sadece buğday üretimi yapacaklarını ifade ederken, tarımsal deneyimi daha az olan ve buğday üretimine yeni başlayan işletme sahipleri buğday üretiminin yanında diğer tahıl ürünlerine ve sebze üretimine geçebileceklerini belirtmişlerdir.

Çizelge 2. Üreticilerin Buğday Üretimine Başlama Nedenleri

Nedenler	**Sayı**	**%**
Karlı olması	2	6.67
Alışkanlık	10	33.33
Yörede yapılıyor olması	10	33.33
Pazarlamanın kolay olması	0	-
Ekolojik koşulların uygunluğu	2	6.67
Diğer	2	6.67
Cevapsız	4	13.33

İncelenen buğday işletmelerinin bina varlığına ilişkin bilgiler Çizelge 3'de verilmiştir. Bir işletme dışında diğer işletmeler hayvansal üretim yapmadığı için samanı saklamayıp satmaktadır. Ayrıca işletmeler hane halkına yetecek kadar tavuk yetiştirmektedirler.

Çizelge 3. İncelenen İşletmelerde Bina Varlığı

Bina Varlığı	**Alan (m^2)**
Ev	5690
Ahır	1118
Kümes	94
Ambar-depo	5090
Samanlık	768
Sera	198

Anket yapılan işletmelerden yalnızca bir işletme hayvansal üretim de gerçekleştirmektedir. Bu işletmede 49 büyükbaş hayvan bulunmaktadır. Yaş ortalaması 3.5, günlük süt verimi 1480 l, yıllık ortalama 3624,48 l'dir.

İncelenen işletmelerde alet-makine varlığına ilişkin bilgiler Çizelge 4'de yer almaktadır. Buna göre işletmelerde toplam 53 traktör, 39 pulluk, 32 tırmık, 22 diskaro, 33 pülverizatör, 48 römork, 35 gübreleme makinesi, 39 mibzer, 37 kültivatör bulunmaktadır (Çizelge 4).

Çizelge 4. İncelenen İşletmelerde Alet-Makine Varlığı

Alet-Ekipman	**Sayı (adet)**
Traktör	53
Pulluk	39
Tırmık	32
Diskaro	22
Pülverizatör	33
Römork	48
Gübreleme makinesi	35
Mibzer	39
Kültivatör	37

İncelenen işletmeler buğday üretiminde en çok kendi bilgi ve tecrübelerinden yararlanmaktadır. En az ise Radyo, TV programları ve Tarım ve Orman İl/ İlçe Müdürlüğü elemanlarının önerilerinden yararlanmaktadır.

3. SONUÇ

Bu çalışmada Diyarbakır ili buğday işletmelerinin sosyoekonomik yapısı ortaya çıkarılmıştır. Çalışmanın verileri Diyarbakır ilinde faaliyet gösteren 50 buğday işletmesiyle yüz yüze gerçekleştirilen anket çalışması yolu ile elde edilmiştir. İncelenen işletmelerin eğitim durumlarının çoğunlukla ilkokul mezunu seviyesinde olduğu, işletmelerin küçük ölçekli olduğu ve üretimlerini aileden gelen alışkanlıklarla sürdürdüğü tespit edilmiştir. İşletmelerde toplam arazi varlığı 67115 dekar, buğday ekim alanı toplam 54975 dekardır. İncelenen işletmelerin %77'sinin kuru tarım yaptığı belirlenmiştir. İncelenen işletmelerde ortalama buğday verimi

312.10 kg/da, buğdayın ortalama satış fiyatı ise 2.95 TL olarak saptanmıştır. Örgütlenme düzeyinin düşük olduğu saptanmıştır. Üreticilerin örgütlenme konusunda teşvik edilmeleri gereklidir. İşletmelerin pazara ulaşma ve fiyat konusunda avantaj sağlaması açısından kooperatiflere üye olmaları önem taşımaktadır. Üreticiyi korumasının yanında tüketiciyi de koruyan kooperatiflerin faaliyetlerinin artırılması gereklidir.

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TÜKETİCİLERİN GIDA GÜVENLİĞİNE YÖNELİK BİLGİ DÜZEYLERİ: DİYARBAKIR İLİ ÖRNEĞİ

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ÖZET
Bu çalışmada Diyarbakır ilinde yaşayan tüketicilerin gıda güvenliği konusunda bilgi düzeylerinin ve gıda güvenliği konusundaki tutumlarının ortaya konulması amaçlanmaktadır. 50 tüketici ile anket çalışması yapılmıştır. Verilerin analizinde yüzde, frekans dağılımları ve aritmetik ortalama kullanılmıştır. Tüketicilerin %52'si kadın, %48'i 26 ve 45 yaş arasında, %36'sı üniversite mezunudur. Araştırmada elde edilen sonuçlarına göre tüketicilerin hepsi gıda güvenlik sistemleri ile gıdaların denetimini talep etmektedir. Tüketicilerin gıda güveliğinde en önemli bilgi kaynağı radyo ve TV'dir. Restoranlar tüketiciler için en güvenilir gıda tüketim yeridir. Tüketiciler satın aldıkları ürünlerin ambalajının sağlamlığına ilk sırada dikkat etmektedir. Bunu ürünleri alırken doğaya olan etkilerine, Satın aldığımız ürünlerin üretim yapıldığı yerdeki hijyenine, satın alınan ürünün sağlık riskine, gıda ürünleri alırken lezzetli olması izlemektedir. En az dikkate alınan özellik ise satın alınan ürünün doyurucu olmasıdır.

Anahtar Kelimeler: tüketici, gıda güvenliği, bilgi düzeyi, Diyarbakır

FOOD SAFETY KNOWLEDGE OF CONSUMERS IN DIYARBAKIR PROVINCE

ABSTRACT
In this study, it is aimed to reveal the level of knowledge and attitudes of consumers living in Diyarbakır about food safety. A survey was conducted with 50 consumers. Percentage, frequency distributions and arithmetic mean were used in the analysis of the data. 52% of consumers are women, 48% are between the ages of 26 and 45, and 36% are university graduates. According to the results obtained in the research, all of the consumers demand food safety systems and inspection of foods. The most important source of information for consumers in food safety is radio and TV. Restaurants are the safest place of food consumption for consumers. Consumers pay attention to the durability of the packaging of the products they buy in the first place. This is followed by the effects on nature when purchasing products, the hygiene of the products we buy at the place of production, the health risk of the purchased product, and the deliciousness of the food products. The least considered feature is that the purchased product is satisfying.

Keywords: consumer, food safety, level of knowledge, Diyarbakır

1. GİRİŞ

Günümüzde dünya nüfusunun hızla artmasıyla beslenmenin önemi de artmakta dolayısıyla gıda maddeleri talebi de yükselmektedir. Talebi karşılamak için ise birim alandan daha fazla verim alma gerekliliği ortaya çıkmış ve tarımsal üretimde yoğun girdi kullanılmıştır. Fakat yoğun girdinin beraberinde aşırı kimyasal kullanımı gıda güvenliğini riske atmaktadır (Madenci ve ark., 2019). Bu nedenle gıda güvenliği ile ilgili uluslararası bir takım uygulamalar başlatılmıştır. Bunlar; HACCP, GMP, GHP, ISO 9000:2000, ISO 22000, IFC, BRC, EUREPGAP gibi kalite güvence sistemlerinden oluşmaktadır. Kalite güvence sistemlerine, yoğun olarak gelişmiş ülkelerde rastlanılmakta ve son yıllarda, gelişmekte olan ülkelerde de katılımın arttığı görülmektedir (Dölekoğlu, 2003; Onurlubaş ve Gürler, 2016).

Diğer taraftan gıda güvenliği ile ilgili problemleri sorunları önleyerek ekonomik kayıpları azaltmak amacıyla bilinçli tüketici kavramı ortaya çıkmıştır (Yerlikaya ve ark., 2020). Gıda güvenliği; gıdalarda olabilecek fiziksel, kimyasal, biyolojik her türlü zararların bertaraf edilerek ürünlerin tüketiciye güvenilir bir şekilde sunulmasını ve bu zararların önlenebilmesi için alınan tedbirleri kapsamaktadır (Taşdan et. al., 2014; Türkmen var ark., 2017).

Toplumda bilinçli tüketici sayısının gittikçe artması tüketici davranışları kavramının önemini arttırmıştır. Tüketici davranışları kişilerin ihtiyaçlarını gidermek amacı ile satın aldıkları mal ve hizmetleri neden, nasıl ve ne zaman aldıklarını göstermektedir. Tüketici davranışlarının tam olarak belirlenmesi, tüketicinin ihtiyaç ve isteklerinin yönünün de doğru olarak saptanmasını sağlamaktadır (Yılmaz ve ark. 2009; Salicik ve Yıldırım Kumral, 2017). Bilinçli tüketiciler, insan sağlığı açısından risk oluşturmaması için gıdaların satın alınması, saklanması, hazırlanması ve tüketilmesi aşamalarında azami özen gösteren kişilerdir. Tüketiciye ait birçok özellik gıda satın alma kararında etkili olmaktadır. Tüketicilerin satın alma davranışlarında etkili olan özellikler; demografik (yaş, cinsiyet, medeni durum, gelir, eğitim ve meslek gibi bireysel özellikler), sosyo-kültürel (aile, danışma grupları, sosyal sınıf, kültür) ve psikolojik (güdüleme, algılama, öğrenme, tutum ve inançlar, kişilik) olarak sıralanabilir (Örücü ve Tavşancı, 2001; ;Aydın Eryılmaz ve ark., 2018).

Türkiye'de gıda güvenliğiyle ilgili tüketicilerin tutum ve davranışlarını inceleyen çok sayıda araştırma yapılmıştır (Gülse ve ark., 2006; Yılmaz, 2008; Gözener ve ark., 2009; Yalçın, 2012; Durmaz Dayılar, 2018; Açıkalın, 2019; Oğur, 2020; Çelik ve Çelik, 2020; Kırmacı ve Özçelik, 2021; Çolakoğlu ve ark., 2022). Diyarbakır ilinde bu konuya yönelik çalışmaya rastlanmamıştır.

Bu çalışmanın amacı Diyarbakır ilinde yaşayan tüketicilerin gıda güvenliğine ilişkin bilgi

düzeylerini, gıda tüketim yerleri ve gıda ürünlerine ilişkin tutumlarını incelemektir. Bu amaç doğrultusunda 50 tüketici ile anket çalışması yapılmıştır. Anket soruları önceki çalışmalardan yararlanılarak hazırlanmıştır. Verilerin analizinde yüzde, frekans dağılımları ve aritmetik ortalama kullanılmıştır.

2. ARAŞTIRMA BULGULARI

Araştırmaya katılan tüketicilerin %52'si kadın, %48'i erkektir. Tüketicilerin %48'i 26 ve 45 yaş arasındadır. Eğitim durumları incelendiğinde ise tüketicilerin %36'sının üniversite, %22'sinin lise mezunu olduğu görülmektedir. Araştırma kapsamına alınan tüketicilerin %30'u memur olarak çalışmakta, %26'sı işçi olarak çalışmakta, %14'ü serbest meslekle uğraşmakta, %8'i emeklidir ve %22'si çalışmamaktadır (Çizelge 1).

Çizelge 1. Tüketicilerin Demografik Özellikleri

Özellikler	**Sayı**	**%**
Cinsiyet		
Kadın	26	52.0
Erkek	24	48.0
Yaş		
18-25	8	16.0
26-35	9	18.0
36-45	15	30.0
46-55	8	16.0
56-65	7	14.0
65+	3	6.0
Eğitim durumu		
Okur-yazar değil	3	6.0
İlkokul	10	20.0
Ortaokul	6	12.0
Lise	11	22.0
Üniversite	18	36.0
Lisansüstü	2	4.0
Meslek durumu		
Memur	15	30.0
İşçi	13	26.0
Serbest meslek	7	14.0
Emekli	4	8.0
Çalışmıyor	11	22.0

Tüketicilerin bilgi olduğu gıda güvenliği ile ilgili sertifikalara ilişkin dağılım Çizelge 2'de verilmiştir.

Çizelge 2. Tüketicilerin bilgi sahibi olduğu gıda güvenliği ile ilgili sertifikalar*

Sertifikalar	**Sayı**	**%**
HACCP	12	24.0
İyi Tarım Uygulamaları	28	56.0
ISO 90001	18	36.0
ISO 14001	3	6.0
ISO 22000	6	12.0

*Birden fazla seçenek işaretlenmiştir.

Tüketicilerin tamamı gıdaların gıda güvenlik sistemleriyle denetlenmesini istemektedir. Çizelge 2 incelendiğinde tüketicilerin %56'sının iyi tarım uygulamalarından haberdar olduğu, %36'sının ISO 90001, %24'ünün HACCP, %12'sinin ISO 22000 ve %6'sının ISO 14001 sertifikaları hakkından bilgi sahibi olduğu saptanmıştır. Ayrıca tüketicilere helal gıda kavramı ve GDO kavramını duyup duymadıkları sorulmuştur. Tüketicilerin %76'sı helal gıda kavramını, %82'si de GDO kavramını duyduğunu ifade etmiştir (Çizelge 2).

Çizelge 3. Tüketicilerin gıda güvenliği konusunda bilgi edindiği kaynaklar

	Sayı	%
Radyo, TV programları	20	33.0
Gazete, dergi	8	13.0
Bilimsel yazı ve kitap	7	11.5
Ahbap, eş, dost	6	10.0
Konu uzmanları	16	26.0
Bilgim yok	4	6.5

Tüketicilerin %33'ü radyo ve TV programlarından, %26.2'si konu uzmanlarından, %13,1'i gazete ve dergilerden, %11.5'i bilimsel yazı ve kitaplardan, %10'u yakın çevresinden gıda güvenliği hakkında bilgi edindiğini belirtmiştir. Tüketicilerin %6.5'i soruyu yanıtlamamıştır (Çizelge 3).

Çizelge 4. Tüketicileri meyve ve sebzelerin içerdikleri maddeler (kalıntı, hormon, koruma vb.) bakımından risk değerlendirilmeleri

Risk Grupları	**Sayı**	**%**
Risksiz	5	10.0
Az riskli	9	18.0
Riskli	13	26.0
Çok riskli	16	32.0
Hayati derecede riskli	7	14.0

Tüketicilerin %32'si Türkiye'de satılan meyve ve sebzeleri içerdikleri maddeler açısından çok riskli bulmaktadır (Çizelge 4).

Çizelge 5. Tüketicilerin gıda tüketim yerlerinin güvenirliliğine ilişkin düşünceleri

Gıda Tüketim Yerleri	**Ortalama**
Restoranlar	3.82
Fast-food restoranlar	2.70
Kantinler	2.40
Seyyar satıcılar	2.12
Lokantalar	3.02
Yemekhaneler	2.50
Kafeteryalar	2.96
Pastaneler	2.80
24 saat açık yerler	2.02
Süpermarketler	3.36
Kasaplar	3.52
Balıkhaneler	2.64
Bakkallar	3.06
Semt pazarları	3.02
Diğer (büfe, dürümcüler, vb.)	2.18

*1: Çok güvenilir, 2: Güvenilir, 3: Az güvenilir, 4: Güvenilmez, 5: Hiç güvenilmez

Tüketiciler sırasıyla 24 saat açık yerler, seyyar satıcılar, büfe ve dürümcüler, kantinler, yemekhaneler, balıkhaneler, fast-food restoranları az güvenilir bulurken, restoranlar, kasaplar süpermarketler ve semt pazarlarını daha güvenli bulmaktadır (Çizelge 5).

Çizelge 6. Tüketicilerin ürün satın alımına ilişkin görüşleri

İfadeler	**Ortalama**
Ürünleri alırken doğaya olan etkilerine dikkat ederim.	4.30
Gıda ürünleri alırken lezzetli olması önemlidir.	4.22
Gıda ürünlerinin ambalajının sağlamlığını kontrol ederim.	4.42
Satın alınan ürünün kökeni önemlidir.	4.04
Gıda ürünlerini talimatlarına uygun şekilde pişirip saklarım.	4.20
Gıda ürünlerini satın alırken düşük fiyatlı olmasına dikkat ederim.	3.62
Satın aldığımız ürünlerin üretim yapıldığı yerdeki hijyeni önemlidir.	4.30
Gıda ürünlerinde kullanılan ambalajların sağlığa zararlı olmaması gereklidir.	4.18
Satın aldığım ürünün doyurucu olması gereklidir.	3.50
Satın alınan ürünün sağlık riskini göz önünde bulundururum.	4.24
Satın aldığım gıda ürününün besin değeri önemlidir.	3.92

*1: Çok önemli, 2: Önemli, 3: Biraz önemli, 4: Önemsiz, 5: Hiç önemli değil

Tüketiciler ilk olarak satın aldıkları ürünlerin ambalajının sağlamlığına dikkat etmektedir. Daha sonra sırasıyla, ürünleri alırken doğaya olan etkilerine, Satın aldığımız ürünlerin üretim yapıldığı yerdeki hijyenine, satın alınan ürünün sağlık riskine, gıda ürünleri alırken lezzetli olmasına dikkat etmektedir. Satın alınan ürünün doyurucu olması en az dikkate alınan özelliktir (Çizelge 6).

3. SONUÇ

Gıda güvenliği giderek önemi artan bir halk sağlığı konusudur. Tüm dünyada hükümetler gıda güvenliğini arttırmak için yoğun bir çaba göstermektedirler. Bu çabalar büyüyen gıda güvenliği sorunlarına ve artan tüketici endişelerine karşılıktır (Kayacan ve Demirbaş, 2021). Küresel anlamda çeşitli işbirlikleriyle alınacak tedbirler gıda güvencesi ve güvenliğinin sağlanması açısından zorunludur. Aksi takdirde, yakın gelecekte yeterli, sağlıklı ve güvenli gıdalara ulaşılması oldukça güçleşecek; çeşitli hastalıklar ve açlık olgusu hızla yayılacaktır (Koç ve Uzmay, 2015). Ancak güvenilir gıdaya ulaşmak dünya nüfusu arttıkça daha zor hale gelmektedir. Bu çalışmada Diyarbakır ilindeki tüketicilerin gıda güvenliği hakkındaki bilgi düzeyleri genel olarak incelenmiştir. Çalışmada 50 tüketici ile anket çalışması gerçekleştirilmiştir. Çalışmanın en önemli kısıtı örnek hacminin düşük olmasıdır. Tüketicilerin gıda güvenliği hakkındaki bilgi düzeylerini daha ayrıntılı yorumlamak için daha büyük örnek büyüklüklerine sahip ek araştırmalara ihtiyaç vardır. Bu çalışmada elde edilen sonuçlara göre tüketicilerin gıda güvenliği bilgi düzeyleri orta düzeydedir. En önemli bilgi kaynaklarının radyo ve TV olması düşündürücüdür. Tüketiciler kantinleri, yemekhaneleri, seyyar satıcıları, 24 saat açık yerleri daha güvensiz bulurken restoranları daha güvenli bulmaktadır. İlk olarak satın aldıkları ürünlerin ambalajının sağlamlığı tüketiciler için önem taşımaktadır. Tüketicilerin çoğunluğu satılan meyve ve sebzelerin içerdikleri maddeler bakımından riskli olduğunu ifade etmiştir.

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SUPPORTİNG COOPERATİVE LEARNİNG SKİLLS FOR PRE-SERVICE TEACHER EDUCATION ENHANCES PROFESSIONAL DEVELOPMENT IN THE INCLUSIVE CLASSROOM SETTINGS

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ABSTRACT

The present study supports cooperative learning (CL) skills for preservice teacher education (TE) and enhances professional development (PD) in inclusive classroom settings. CL has been identified as a crucial skill for success in the twenty-first century and a prerequisite for reinforcement learning among preservice teachers in inclusive classroom settings. CL challenges learners to apply together to accomplish goals, and the ensuing interdependence among group members inspires them to assist and support one another. Development of social skills in listening, helping, disagreeing respectfully, and achieving compromise when they work together as a team. Preservice teachers are essential for the successful implementation of CL in inclusive classrooms. This includes knowledge of how to structure collaborative learning in groups, including their size and composition, the type of task assigned, student conduct expectations, individual and group responsibilities, and the role of the preservice teacher in monitoring the process and outcomes of the social community. The current state of CL is explored as it relates to teacher preparation in this paper. In addition, self-efficacy and CL adoption are examined. Outcomes indicate that CL is a highly valued teaching technique among primary school students, yet, preservice teachers must choose to cooperate during their learning processes. Preservice teachers' use of CL is moderately successful. CL is used infrequently in TE, and preservice teachers need to be actively educated on the pedagogical application of CL for future inclusive classroom training. This term refers to preservice teachers enrolled in a TE and working toward certification. Under the guidance of teachers and cooperating teachers, they engage in CL teaching practicums. These people have received teacher preparation in higher education institutions but have limited classroom experience. TE is a continuous process in which the preservice and PD components are interrelated. The outcomes of this study will inform future development planning and preservice teacher PD in inclusive education (IE) with specific concerns and ideas. Preservice teachers' PD can significantly boost teaching quality and, ultimately, children's learning outcomes in inclusive classroom settings.

Keywords: Supporting, Cooperative Learning Skills, Pre-service Teachers, Teacher Education Enhances, Professional Development, and Inclusive Education.

INTRODUCTİON

The true purpose of CL in TE is examined in this study. The use of CL and one's effectiveness are also taken into account. These outcomes indicate that CL is a highly prized educational approach among primary school students. Moreover, preservice teachers have diverse study choices. preservice teachers' trust in using CL is moderate. It is essential that TE acquire advanced training in the educational usage of CL. As part of a teaching technique known as "cooperative learning," students actively involve and meaningfully in small groups to enhance their learning and that of their peers (Ishler, Johnson, and Johnson 1998). A recent CL study shows that this approach is effective in traditional schooling (Lopata, Miller, and Miller 2003). In the following conceptual framework, we shall detail CL's several potential forms in the teaching process. Even though it is frequently used in technology-based environments (De Wever, 2006; Suthers & Hundhausen, 2003), we emphasize face-to-face CL in the current dissertation as it is suitable for primary school students who may not yet have mastered enough technology-related skills and knowledge. Numerous studies examining the educational benefits of CL indicate that it has a favourable effect on children's intellectual behaviour and overall integration (Johnson et al., 2001; Lopata, Miller, and Miller, 2003; Slavin, 1996, 2004; Veenman et al., 2002). However, teachers' pedagogical practices significantly impact the success of CL in educational practice (Gillies, 2006; Gillies & Boyle, 2008; Meloth & Deering, 1999; Veenman, Kenter, and Post, 2000). PD is essential for training teachers to fully integrate CL (Brody & Davidson, 1998; Lunenberg & Korthagen, 2005). As per Murray and Male (2005), integrating CL into TE should occur in two steps In their classrooms, teacher educators can implement CL as a teaching approach. Additionally, they can advise preservice teachers on how to perform the same tasks. Ensuring that teachers serve as admirable role models for their students is the responsibility of preservice teachers (Angelides, Stylianou, and Leigh, 2007). Therefore, a key element of preservice teachers' training and preparation must include teaching-learning strategies tied to the sociocultural context (Niemi, 2002). Preservice instructors can employ CL in the classroom to increase student achievement and foster pleasant interactions between students. All students will be able to participate fully in the learning process. The goal of universal IE is hard to realize in modern society. This study aims to ascertain how CL impacts IE in the classroom in light of CL's relevance in the development of IE. The preservice teachers will also address CL's challenges in promoting inclusive learning in schools. The present study will focus on PD in preservice TE using CL. Because most of the evidence from effect research on CL was obtained at the elementary school level, we chose preservice TE for primary school

teachers in inclusive classroom settings.

The Concept of Cooperative Learning

The CL method enables students to work in small groups while expanding their knowledge. Unlike our existing educational system, which is built on rivalry, CL promotes cooperation. Most people think that people work together more than they do against one another. People are brought together by their shared love and cooperation, and it is this trait that ensures human life. The concept and key elements of CL are discussed in the current study. CL is one of the initials for effective learning options. Teachers-in-training cooperates in small groups while learning as they go in CL. CL places more value on cooperation than our current educational system, which is built on competition. It was once thought that the absence of rivalry made people cooperative. When a person becomes more competitive, logically and naturally, they become less cooperative. Singh and Agrawal (2011) define CL as the learning process when people study in small groups with each other's assistance. In line with Singh and Agrawal's theory, Ramos and Pavón (2015) defined CL as a teaching strategy in which students from various backgrounds work together to achieve a shared objective. Based on the definitions mentioned above of CL, the teacher uses this instructional strategy to raise their students' performance on classroom assignments. Moreover, CL promotes positive relationships between students and teachers by allowing each student to actively engage in learning and benefit from one another's classroom. Most people believe that cooperation is the norm rather than an exception. People come together out of compassion and cooperation, and this quality ensures human life. The opinions of those one comes in contact with are deeply influenced by those people. Despite the plethora of available resources to educate ourselves, the vast majority of our values and convictions are formed via the interactions of the others. As per Tran (2014), CL advised students to continue their academic efforts. Students were more enthusiastic about working in groups because it was obvious that they were discussing their assignments in small groups. Their group involvement motivates them to understand the subject matter and learn more. Cooperation is therefore considered to be CL during the teaching-learning process. Between teachers and students as a whole. Effective teachers promote interaction throughout the teaching-learning process by giving students a chance to voice their thoughts before the teacher starts to teach. To enable all preservice teachers to attain their full potential, CL is an alternative technique that strongly focuses on academic, social, and emotional development.

Cooperative Learning for Preservice Teacher Education

In addition to looking into the preservice teachers' opinions, beliefs, and levels of self-efficacy,

the present study looked into how CL is used in TE. Students interact with one another during CL, or small-group teaching, to enhance their own and one another's learning (Johnson & Johnson, 1994). Students are expected to defend, discuss, and evaluate one another's prior knowledge in CL seminars and explain anything they do not understand. CL frequently takes the place of individual practice, study, and seatwork, but not teacher-led teaching. When lessons are carefully designed, students in CL groups ensure that every group member has a firm grasp of the concepts being taught (Slavin, 1995). Despite the wide acceptance of economic theories, research indicates that good educational reforms have been challenging to implement (Fullan, 2001; Lunenberg & Korthagen, 2003). Baines, Blatchford, and Kutnick (2003) state that teachers often resist adopting CL. They might be unable to handle this independently and may not know how to (Gillies, 2006; Slavin, 1999; Veenman, Kenter, and Post, 2000). The current study examines preservice educators' underlying factors, beliefs, and self-efficacy regarding how CL is included in preservice TE. This is because teaching CL to a brand-new teacher cohort is challenging for preservice TE. These features have been noted as potential factors in determining whether educational innovations are adopted favourably (Ghaith & Yaghi, 1997; Glass & Putnam, 1989; Guskey, 1988; Rich, 1990). As per earlier studies, the amount of CL applications and CL views of preservice and prospective teachers are connected to their background characteristics, such as gender (Donche & Van Petegem, 2007) and year of training (Donche, Vanhoof and Van Petegem 2003). In contrast, Lopata, Miller, and Miller (2003) found that preservice teachers employ CL more frequently. Based on a different study, the "apprentice program of observing" or "consistency" problem is one many teachers struggle with (Geddis & Wood, 1997). We also measured CL application from the perspective of teacher educators, but we also looked at CL's adoption in TE in relation to other pedagogical methods from the perspective of preservice teachers. Even though the vast majority of teacher educators still employ conventional techniques, the outcomes illustrate that CL utilised in TE enhances PD in inclusive classrooms.

The Role of Preservice Teachers in the Cooperative Learning Process

This study explored the perceptions and educational experiences of preservice teachers adopting the CL approach. In practice, CL calls for cooperation to achieve a common goal. Continuous learning, TE forums, and CL are all related to the idea of CL. As an outcome, preservice teachers may adopt that perspective and cooperate with others to improve their PD. These lines discuss the importance of department people enrolled in CL activities as preservice teachers (Lyman and Davidson2004). Preservice teachers' opinions about CL are particularly

important since they affect how well the method works. There has been much research on CL, but most of them have focused on how it improves academic performance, is personally tailored, and reduces pressure (Sachs et al., 2003; Gömleksiz, 2007; Okparlam, 2010; Farrell, 2008; Bölükba, 2014; Ning and Hornby, 2014; Slavin, 2015). When asked about their use of CL with students, over half of the preservice teachers in one research said they used it only rarely or never. Preservice teachers have even fewer opportunities to gain familiarity with CL and its possible applications in the classroom. Almost 3% of faculty members routinely employ this strategy. We looked at the impact of CL in TE from the perspectives of both experienced teachers and those just starting in the field. While CL is used more frequently in TE, most teachers still receive their training the traditional way. As an outcome, these preservice educators have a better understanding of the challenges of the classroom, the needs of their students, and the value of lifelong learning. The respondents' imagined roles as educators were referred to as "self as a teacher" in this investigation. By executing the CL requirement, all preservice teachers were given a chance to examine their teaching tenets in light of current learning philosophy, increase their understanding of effective pedagogical methods, identify possibilities for improvement, put those tenets to the test, and finally acquire more CL. Children who are just starting school and without a solid sense of who they are more likely to suffer because they will try to conform to the expectations of their teachers rather than find what makes them unique. If these young people grow up to become teachers and establish their schools, we have a bright future ahead of us. While preservice teachers' perspectives on CL are important to the strategy's success, they are indeed significant. It is possible to draw their attention to the perceptions and differences between preservice teachers' expectations and the real situation. They might realize that some of the inadequacies of CLs may result from their lack of knowledge or education regarding its essential components. Preservice teachers may use the findings of the current study to understand students' perspectives and make suggestions for improving the course design in light of the knowledge attained from the study. The program's preservice teachers may consider providing training on CL to the preservice teachers and the trainers to address the problems caused by a lack of comprehension of CL's essential elements. Preservice teachers understand that they will partake in a set activity to help them obtain the personal and CL skills essential for PD. Outcomes from preservice instructors using CL may add to what is previously known. The study provided an in-depth review of the subject and highlighted preservice teachers' opinions and CL practices in inclusive classroom settings.

Cooperative Learning in Inclusive Education

Evidence from the study suggests that CL can be used effectively in the classroom. A rise in "cooperative learning," which is "a teaching style that supports learning that learners instead of the teacher assists," may suggest a shift away from traditional instructional classrooms and toward environments that are more suitable for classroom instruction (Hinson, 2015). Olsen and Kagan (1992) define CL as a pedagogical strategy in which students learn from one another through collaborative activities such as discussions and content sharing. Learners take personal ownership of their education and are actively encouraged to contribute to the education of their peers. Learners can use their newly acquired CL in IE for critical thinking in group and paired initiatives. A variety of factors must converge for a school-based IE program to be successful positive attitudes and beliefs plans for special equipment to access the education system an external framework that is more accessible to students with disabilities a support system preservice teachers working together with subject teachers society backing a teaching approach that integrates a CL strategy in inclusive classroom settings. Integrating CL into the classroom can ensure that our future educators' voices are heard and valued while also increasing our expectations for their academic performance. There is no way to achieve IE for everyone in the environment today. The primary purpose of this study is to examine if and how CL may be used to enhance IE teaching in more traditional educational settings. The next generation of teachers will discuss the value of CL in the classroom and its implications for educating future generations of IE experts. In addition, we will discuss the challenges associated with relying on CL to complete IE. This study defines the key methods that would be used to enhance CL as a tool to achieve IE in the classroom (Paschal, M. J., Nyoni, T. T., & Mkulu, D. G, 2021). The impact of CL on obtaining IE in the classroom challenges IE, and fundamental strategies for promoting CL among aspiring teachers are addressed. While CL has benefited students' social, motivational, and cognitive development, Buchs et al. (2017) note that this method is more complex to implement. However, it is often taken for granted that schools and teachers have the means and knowledge to offer IE when this is only sometimes the case. Potential challenges may develop when future educators try to adopt the standard. For IE to be successful, preservice teachers need to shift their attention from preparing and delivering lessons to encouraging student learning. Rows and columns of seating do not aid disabled students. Everyone involved here needs to develop a unique strategy for success. Since this development, there are now various standards for preparing future instructors. While there is a significant amount of study on CL, more must be done to highlight the specific challenges experienced by preservice

teachers when they try to implement IE in their classrooms. The issue then becomes, what should teachers keep in mind as they introduce CL to their classrooms? This begs the question: how can a teacher who enables learners from all walks of life to join together foster a sense of society? It does not matter if a teacher finds it challenging to implement all CL skills for preservice TE and enhances PD in inclusive classroom settings.

Professional Development with Cooperative Learning

Since it is adaptable, CL can be used effectively with many different kinds of preservice teacher populations. Learners cooperated in a variety of smaller groups to complete the tasks. This study aimed to gain insight into teachers' views on CL by observing them in the classroom. The study's secondary aim was to explain how institution PD may be used to enhance the IE program. Methods for increasing teachers' subject-matter expertise are provided in What Works for PD in CL, which also addresses the challenges of achieving systemic change. Cooperatively managed public schools are the greatest way to achieve their goal of helping students "continue experiencing the moment." Promising approaches to PD in CL are described, and the challenges and opportunities of instituting these shifts are addressed. When designing and implementing a PD program for inclusive classrooms, speaking with preservice teachers who are already working in the field as though they were experts is essential. Those preservice teachers who contributed the most during the PD session were the ones who walked away with the most important knowledge. Most preservice TE programs fall short of preparing future teachers to address the challenges of successful teaching and learning in today's classrooms, despite a large number of fully competent learners in these environments (Hansen & Feldhusen, 1994; Moon & Rosselli, 2000; Parke, 1989; Tomlinson, Tomehin, Callahan, et al., 1994). Expectations for preservice teachers' knowledge of current concerns in the area, dedication to PD, ethical conduct in the classroom, and effective management of lessons are discussed at length in various texts. Preservice teachers can benefit greatly from various PD opportunities, including seminars, mentoring relationships, and preservice training (Tanning & Abu, 2014). The future teachers were unanimous in their belief that the lack of challenge did not damage the gifted students. Many would-be teachers fail to perform their thorough study and erroneously think that "naturally gifted" children already possess the knowledge necessary to succeed. If future teachers need to get more hands-on experience in the classroom and the fields, then it will be clear that insufficient PD is being given to them. Preservice teachers face challenges in higher education, including a lack of time, the pressure to make fast decisions, and norms. Teachers-in-training misses out on some of the best learning opportunities since they only experience the

full complexity of professional activity and teamwork during the adaption period. The vast array of TE skills of preservice teachers could be CL into a clear narrative about their profession. Preservice teachers can use the CL as a basis for PD, reconsidering their methods in light of the needs of diverse learners and making plans for future changes in inclusive classroom settings.

CONCLUSİON

In this regard, the current study aimed to investigate the primary factors in the PD of undergrad teachers and teacher educators, such as CL beliefs, perceptions, and self-efficacy. Moreover, this experiment aimed to examine the level of use of CL as a teaching strategy in TE. Understanding CL can assist you in creating a positive social environment in your classroom. In this study, we will examine some common CL strategies, explain the benefits of using these strategies for PD among preservice teachers, and provide you with some key points on using CL in the inclusive classroom. CL structures integrated into classroom procedures encourage preservice teachers to engage in active learning as part of their PD. Such frameworks are incredibly useful for learners who need additional practice, confirmation, and learning strategies throughout the classrooms. CL frameworks continue to encourage inclusive practices while fostering academic and social skills development. Preservice teachers work together to improve academic performance and social acceptance for all learners. Preservice teachers are trained in TE programs to be outstanding teachers for our children. Some of those classmates will have wished to use CL for appropriate preservice teacher PD opportunities but were unable to do so due to a lack of teacher training. Preservice teachers are educated about the necessities and characteristics of learners through the TE program. This is more important than ever in the age of inclusive classrooms. A program like the one studied in this study could serve as a model for future opportunities to pair preservice teachers with learners, giving them direct experience of their needs and abilities to bring into inclusive classrooms.

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DIFFERENCES BETWEEN URBAN AND RURAL CITIZENS' SHOPPING HABITS DURING COVID-19 IN THE MEKONG RIVER DELTA VIETNAM

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ABSTRACT
This research was conducted in order to compare the behavior and perception of traditional market shoppers in urban and rural areas of the Mekong River DeltaVietnam. Primary data was collected from 400 market-shoppers in Can Tho representing urban areas, including 3 markets, namely Cai Khe, O Mon, Co Do; and An Giang province, representing the rural areas including four markets, namely Chau Doc, Tinh Bien, Tri Ton, and Long Xuyen. Comparative methods, the Likert scale, T-test, and linear regression model were employed to evaluate and compare the behavior and perception of market shoppers between urban and rural areas and identify the determinants affecting post-translational cognitive change. Interestingly, the results reveal that the level of application of hygiene and safety practices at the market before the pandemic was higher in urban areas than in rural areas, whereas after the pandemic was higher in rural areas than in urban areas. There are two main factors affecting the change in awareness after the Covid-19 pandemic: the degree of application of pandemic prevention and control measures by market shoppers and the favorable factor for pandemic prevention and control at the market. Based on the results of this research, the authors propose different management solutions to match the differences between urban and rural areas in order to improve the effectiveness of these measures in disease prevention in the future.

Keywords: Mekong River Delta, shopping, traditional market, urban and rural.

1. INTRODUCTİON

The Mekong River Delta is an area with a lot of traditional markets, and traditional markets are considered the most popular form of commercial organization. Markets are an important part of the distribution network of goods, promoting production, expanding and developing the market for goods exchange, serving the people's daily life and generating budget revenue. At the same time, the traditional market reflects quite clearly the socio-economic development speed and the unique cultural identity of each region and region. The consumption style of the people in this region and especially the traditional market contributes to preserving the long-standing historical culture of our nation. For rural areas, the market is the gathering place, the starting point of agro-forestry-fishery products, food and vegetables to supply large consumer markets such as industrial parks or to urban areas to serve the people, serving consumption in the people's daily life. For urban areas, markets are associated with the daily life of each family, providing consumer goods for residential areas.

Currently, in the face of the complicated situation of the Covid-19 epidemic, which has seriously affected the economy, especially the health and lives of people in 220 countries and territories around the world (Ministry of Science and Technology, Ministry of Health, 2021) including Vietnam. As of February 28, 2021, the world has more than 109 million infections and more than 2 million deaths from Covid-19 (Ministry of Health, 2021). One of the great risks leading to the rapid increase in the number of Covid-19 infections in Vietnam may be due to the source of the disease from traditional markets where the disease is most contagious. At the time when there was no Covid-19 epidemic, many people coming to the market were still subjective, not wearing masks, spitting, not covering their mouth and nose when coughing and sneezing, not too concerned about hygiene and disinfection, wash hands after handling, exchanging money and goods at the market. However, in the context that the Covid-19 epidemic has been affecting the health and lives of people, the awareness and behavior of market-shoppers have changed to be able to adapt and protect themselves before the Covid-19 pandemic.

Besides, the awareness and self-protection behavior of market-shoppers in urban and rural areas is not consistent due to many potential factors affecting the perception between two groups of market-shoppersin urban and rural areas in the Mekong Delta.

Therefore, the topic focuses on comparison of behaviors and perceptions of traditional market shoppers in urban and rural areas in the Mekong River Delta to find out the differences in perception and behavior, thereby proposing solutions, and promoting specific measures to

improve safe hygiene practices in the context of the Covid-19 epidemic among market-shoppersat traditional markets in the Mekong Delta.

2. METHODOLOGY

Primary data was used in the paper collected through the design of questionnaires and direct interviews with 400 market-shoppersat traditional markets in Can Tho area, including 3 markets: O Mon, Co Do, Cai Khe and An Giang area includes 4 markets: Long Xuyen, Chau Doc, Tri Ton, Tinh Bien. Random sampling method stratified by research object are number of regular market-shoppers, small traders selling goods at the market and market managers. The sample size is based on the sampling method according to the linear regression model, according to Haris (1985) that the suitable sample size to run the multivariable regression model must be equal to the number of independent variables plus at least 50. Thus, for this study, it is estimated that 12 independent variables are included in the model, so the minimum sample size is n=50+12=62 observations. Besides, according to Hair et al (2014), the minimum sample size should be in the ratio 5:1, ie 5 observations for an independent variable. Thus, the minimum sample size is n=5x12= 60 observations. The survey sample in this study is 400, this sample size is much larger than the minimum sample size required to use the linear regression model, the larger the sample size, the lower the error in the estimate will be, the more representative the population, the better this sample size will be to generalize to the population.

Descriptive statistics are used to describe the basic characteristics related to the perceptions, behaviors and attitudes of market-shoppers, providing simple summaries of the collected data, statistics socio-economic situation in the Mekong River Delta and in Can Tho and An Giang where traditional markets are located. The comparative method is used to synthesize the common features as well as separate the characteristics of market-shoppers between the two groups of urban and rural areas. A linear regression model (OLS) was established to determine the factors affecting the change in awareness about hygiene and safety practices of market-shoppers in the Covid-19 epidemic, with the form as: after:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_i X_i + \varepsilon$$

Where Y is the change in awareness about hygiene and safety practices of market-shoppers in the Covid-19 epidemic, β_0 is constant, β_i is estimated coefficient, Xi are factors affecting the change in awareness about hygiene and safety practices of market-shoppersafter the Covid-19 epidemic and ε is random error.

Multivariate regression analysis: Carrying out the partial test of the regression coefficients with

the significance level of the partial regression coefficients with a confidence level of at least 95% (Sig < 0.05), then the conclusion is statistically significant between independent variable and dependent variable.

Test the fit of the model to see if there is a linear relationship between the independent variables and the dependent variable, using the analysis of variance at the significance level with at least 95% confidence (sig< 0.05), then we accept hypothesis H1 so that the model is considered suitable. The method of building a Likert scale aims to assess the behavior and perception of traditional market-shoppersin the area of market-shoppers' behavior between two groups of rural and urban areas, on that basis, the following aspects can be assessed. are still limited and need more promotion to contribute to providing timely solutions to improve hygiene and safety practices in the context of the Covid-19 epidemic.

Using Stata 11.0 software to calculate frequency, calculate percentage, mean, standard deviation, T-test with 95% significance level to clarify the difference in perception and behavior. Using the SWOT matrix to summarize the strengths, weaknesses, opportunities and challenges of the market, as a basis for proposing solutions to improve hygiene and safety practices in the context of the Covid-19 epidemic. In urban and rural areas in the Mekong Delta, the study employed a 5-level Likert scale, which is the most commonly used scale in socio-economic. T-test method was also employed to synthesize common features as well as differences in perception.

3. RESULTS AND DİSCUSSİON

3.1 Characteristics of market shoppers

The characteristics of market-shoppersare statistically described in Table 1.

Table 1: Some characteristics of market-shoppers in two areas of Can Tho and An Giang

Characteristics	**Can Tho and An Giang**							
	Mean		**St. Dev.**		**Max.**		**Min**	
Age	37.62	38.45	1.249	1.202	71	18	71	16
Income	6604.6	7012.1	7887.9	3779.3	90000	20000	0	1500
Career	4.41	4.405	2.921	2.778	9	1	9	1

Statistical results from the survey data show that the youngest and oldest age in Can Tho area of the respondents is 18 and 71 years old, respectively. Besides, in An Giang area, the youngest age is 16 years old. The average age of market-shoppersis quite young, which shows that young people are more and more inclined to buy goods at traditional markets. Safety will be better,

thus affecting the change of perception after the Covid-19 epidemic. At the same time, the occupation of the respondents is mainly housewives, they are the ones who go to the market often, so they have the ability to receive more information, which affects the change in perception. The income of the smallest and the largest marketer in Can Tho area is 0 and 90 million, respectively, in An Giang area, the largest income is 20 million and the smallest is 1 million 500 thousand. Income plays an important role in proactively equipping with good hygiene and safety practices, when economic conditions are better, market-shoppersare better prepared to practice hygiene and safety. than. Statistical results also show that Can Tho area has 24% male respondents, 76% female respondents, in contrast, An Giang area has 35.5% male and 64.5% female respondents, lower than 11. 5% compared to Can Tho.

3.2 Comparison of behavior and awareness of market-shopperson hygiene and safety practices between urban and rural areas

Comparing the difference in the level of use of epidemic prevention and control measures by market-shoppers between the two groups in Can Tho and An Giang.

According to professional officials of the management board of traditional markets in Can Tho and An Giang areas, most market-shoppers are aware of the impact and epidemic situation in their areas of residence. In that case, epidemic prevention and control measures come first, specifically, the difference in the level of application of epidemic prevention and control measures through the actual survey of 400 market-shoppers is shown in Table 2 as follows.

Table 2: Comparison of the difference in the level of use of anti-epidemic measures by market-shoppers between the two groups in Can Tho and An Giang

Indicators	**Can Tho and An Giang**	
	Diff	**Pr(|T| > |t|)**
Use a mask	-0.15**	0.0201
Use hand sanitizer	-0.045^{ns}	9.6487
Keep a distance of 2 m	0.005^{ns}	0.9661
Cover your mouth when coughing, sneezing,...	-0.13^{ns}	0.1628
Avoid touching your eyes, nose and mouth to avoid infection	-0.155^{ns}	0.1209
Health declaration	0.115^{ns}	0.2668
Do not spit indiscriminately	-0.01^{ns}	0.9254
Dispose of the mask after use (for disposable masks)	0.095^{ns}	0.3654
Do not go to the market when there are signs of fatigue, fever, cough, difficulty breathing	0.095^{ns}	0.3483
When sitting at the restaurant, keep the prescribed distance	0.25**	0.0171
Average	0.007^{ns}	0.9072

Note: (***), (**) and (*) have statistical significance at 1%, 5% and 10%, respectively; (ns) has no statistical significance **Source**: Survey data, 2021

Table 3. Comparison of use of hygiene and safety practices at markets in Can Tho and An Giang areas before and after the epidemic

Indicators	Before		After	
	Diff	**Pr(|T| > |t|)**	**Diff**	**Pr(|T| > |t|)**
BP1	0.04^{ns}	0.7091	-0.005^{ns}	0.9385
BP2	-0.22*	0.094	0.165**	0.0239
BP3	-0.17^{ns}	0.1346	-0.02^{ns}	0.8483
BP4	-0.12^{ns}	0.2975	0.205**	0.0332
BP5	0.05^{ns}	0.7175	0.125^{ns}	0.1707
BP6	0.06^{ns}	0.6152	-0.07^{ns}	0.3019
BP7	-0.13^{ns}	0.2003	0.23*	0.0506
BP8	-0.19^{ns}	0.1551	0.095^{ns}	0.2097
BP9	-0.02^{ns}	0.8912	0.478***	0.0000
BP10	-0.05^{ns}	0.6871	0.025^{ns}	0.7227
BP11	-0.04^{ns}	0.7545	0.075^{ns}	0.3442
BP12	-0.12^{ns}	0.2293	0.29***	0.0082
BP13	-0.17^{ns}	0.2318	0.16*	0.0570
BP14	-0.37***	0.0037	0.165*	0.0965
BP15	0.06^{ns}	0.5864	0.025^{ns}	0.7830
BP16	0.09^{ns}	0.4013	0.13^{ns}	0.2168
BP17	0^{ns}	1.000	0.175*	0.0544
BP18	-0.11^{ns}	0.3521	0.115^{ns}	0.2483
BP19	-0.11^{ns}	0.3503	0.15^{ns}	0.1650
BP20	-0.19^{ns}	0.1426	-0.065^{ns}	0.4200
BP21	-0.11^{ns}	0.3876	0.2**	0.0371
BP22	-0.3**	0.0158	0.013^{ns}	0.8422
BP23	-0.39***	0.0019	0.015^{ns}	0.8205
BP24	-0.165^{ns}	0.2208	0	1.0000
BP25	-0.575***	0.0000	0.185**	0.0302
Average	-0.13*	0.084	0.114**	0.0217

Table 2 shows that in criterion MD1 of using masks, the average value is -0.15, which is statistically significant at the 5% level of significance, or in other words, the overall average of the use of masks by market-shoppers. There is a difference between the two groups of urban and rural areas, specifically, the overall average level of mask use in An Giang area is 0.15 lower than in Can Tho area. Accordingly, market-shoppers in the Can Tho area are more interested in using masks, possibly because the average income of market-shoppers in Can Tho is higher, so wearing masks to prevent and control the epidemic made more efficient. Similar to the criterion MD10-when sitting at the food lines, keeping the prescribed distance, we can see the mean value of 0.25 has statistical significance at the 5% level of significance, or in other words, there is a difference in the overall average level of application when sitting at the food stalls, keeping the prescribed distance by market-shoppers between the two groups of urban and rural areas, there is a difference, specifically, the overall average level of sitting tt the food stalls, the distance prescribed by market-shoppers in An Giang area is 0.25 higher than in Can Tho area. This can be explained because the markets in An Giang are located near the border

where there is a high risk of spreading the Covid-19 epidemic, so the markets in An Giang will have to tighten the epidemic prevention and control work. However, in general, Pr(|T| > |t|) is greater than 10% in most of the criteria, so the coefficients are not significant, thereby showing no difference in the overall mean in terms of levels. the use of epidemic prevention and control measures by market-shoppers between two groups of urban and rural areas.

Based on table 3, in BP2 we can see that the mean value is -0.22, which is statistically significant at the 10% level of significance, or in other words, the overall average of the measures of the management board. There is a difference in the sanitary situation in the market between the two groups of urban and rural areas, specifically, on average, the market management board pays attention to reminding the sanitary situation in the market of An Giang area is 0.22 lower than Can Tho area.

Similarly in BP14, we can see that the mean value is -0.37, which is statistically significant at the 1% significance level, or in other words, the overall mean on the measure of market organization training, information, There is a difference in communication for all workers and traders at the market between urban and rural groups, specifically, the overall average in An Giang area is 0.37 lower than in Can Tho area.

In BP22, we can see that the mean value of -0.3 is statistically significant at the 5% level of significance, or in other words, the overall mean of the market measures that collect and treat garbage every day. There is a difference between the two groups of urban and rural areas, specifically, the overall average in An Giang area is 0.3 lower than in Can Tho area.

Similarly in BP23, we can see that the mean is -0.39 is statistically significant at the 1% significance level, or in other words, the overall mean of the measure The market with full arrangement of trash cans in convenient places is different between the two groups of urban and rural areas. In particular, the overall average in An Giang area is 0.39 lower than in Can Tho area.

In BP25, we can see that the mean value is -0.575 has statistical significance at 1% significance level, or in other words, the overall mean of the Department of Health has periodic check-ups for prevention and surveillance. There are differences in epidemic diseases between urban and rural groups, specifically, the overall average in An Giang area is 0.575 lower than in Can Tho area.

The comparison results show that the level of application of hygiene and safety practices before the epidemic is lower at the market in An Giang than in Can Tho.

Differences in the use of hygiene and safety practices at markets in Can Tho and An Giang

areas after the epidemic:

Based on Table 4, in BP2 we can see that the mean value is 0.165, which is statistically significant at the 5% level of significance, or in other words, the overall average measure of the market's management board's attention and reminders. Regarding the sanitary situation in the market, there is a difference between the two groups of urban and rural areas, specifically, on average, the measures taken by the market management board (MBU) to remind about the sanitary situation in the market in An Giang area. Giang is 0.165 higher than Can Tho area.

Similarly in BP14, we can see that the mean value is -0.37, which is statistically significant at the 1% significance level, or in other words, the overall mean on the measure of market organization training, information, There is a difference in communication for all workers and traders at the market between urban and rural groups, specifically, the overall average in An Giang area is 0.37 lower than in Can Tho area.

In BP4, we can see that the mean value is 0.205, which is statistically significant at the 5% level of significance, or in other words the overall mean of interest in fever, cough, runny nose, shortness of breath of people between urban and rural groups has a difference, specifically, the overall average in An Giang area is 0.205 higher than in Can Tho area.

Similarly in BP23, we can see that the mean value is -0.39, which is statistically significant at the 1% significance level, or in other words, the overall mean of the Cho measure with full arrangement of trash cans. There is a difference in convenience between urban and rural areas, specifically, the overall average in An Giang area is 0.39 lower than in Can Tho area.

In BP7, we can see that the mean value of 0.23 is statistically significant at the 10% level of significance, or in other words, the overall mean of the Management Board that provides free masks for those who go to the market/urinary. Trade between urban and rural groups has a difference, specifically, the overall average in the management board that provides free masks for market-shoppers/small traders in An Giang area is 0.575 higher than in Can Tho area.

The comparison results show that the level of application of hygiene and safety practices after the epidemic is higher at the market in An Giang than in Can Tho.

This result is consistent with the fact that because the markets in An Giang are located close to the border area, there is a higher risk of exposure to the Covid-19 epidemic than in Can Tho, so the government and the market management board are especially strict. stricter epidemic prevention and control or hygiene and safety practices than in the Can Tho area.

3.3.3 Comparison of favorable factors for epidemic prevention and control between two groups of urban and rural areas

The analysis results show that, in the element of market-shoppers with high education, we can see the average value is equal to -0.2 is statistically significant at the 10% level of significance, or in other words, the overall average of market-shoppers with a high level of education between the two groups of urban and rural areas has a difference, specifically the average Overall, market-shoppers with a high level of education in An Giang area are 0.2 lower than in Can Tho area.

Similarly, in the element of market-shoppers who have a good sense of compliance with epidemic prevention measures, we can see that the mean value is 0.19, which is statistically significant at the 5% level of significance, or in other words, the mean value is 0.19. On average, market-shoppers have a good sense of compliance with epidemic prevention measures between the two groups of urban and rural areas, specifically, on average, market-shoppers have a good sense of compliance with preventive measures. Anti-epidemic in An Giang area is 0.19 higher than in Can Tho area.

However, in general, Pr(|T| > |t|) is greater than 10% in most of the criteria, so the coefficients are not significant, thereby showing that there is no overall mean difference in factors. favorable for epidemic prevention and control between two groups of urban and rural areas, between two groups of urban and rural areas.

Table 5: Comparison of measures to improve hygiene and safety practices in the future in Can Tho and An Giang areas

Indicators	**Can Tho and An Giang**			
	Diff		**Pr(|T| > |t|)**	
NC1	0.015^{ns}		0.8612	
NC2	0.105^{ns}		0.1241	
NC3	0.07^{ns}		0.3414	
NC4	-0.04^{ns}		0.5241	
NC5	0.015^{ns}		0.8139	
NC6	0.24*		0.0008	
NC7	-0.02		0.7370	
NC8	-0.01		0.8596	
Average	0.046^{ns}		0.2446	

The analysis results show that, in the factor NC6-If necessary, the Management Board can propose tougher measures for small traders and market-shoppers to well implement measures to prevent and control the epidemic. We can see that the mean value of 0.24 is statistically significant at the 1% significance level, or in other words, the overall mean if necessary, the Management Board can propose tougher measures to small businesses and traders. Market-shoppers have well-implemented epidemic prevention and control measures. There is a

difference between the two groups of urban and rural areas, in particular, in An Giang area, it is 0.24 higher than in Can Tho area.

However, in general, Pr(|T| > |t|) in most of the criteria is greater than 10%, so the coefficient is not significant, thereby showing that there is no difference in the overall mean of the required measure. implemented to improve hygiene and safety practices in the future between the two groups of urban and rural areas. The results indicate that market-shoppers in both regions have similar perceptions of what measures should be taken to improve hygiene and safety practices in the future.

3.3 Compare determinants affecting the change of awareness about epidemic prevention and control measures of market-shopper between urban and rural area

Table 6: Results of multivariable regression analysis of factors affecting the change of awareness about epidemic prevention and control measures of market-shopper

Variables	Coeff.	Std. Err.	Sig.	VIF
X1: Age	-0.00006^{ns}	0.0021	0.978	1.12
X2:Gender	0.053^{ns}	0.060	0.376	1.07
X3:Ethinic	0.065^{ns}	0.056	0.250	1.07
X4:Number of family member	-0.008^{ns}	0.031	0.789	1.11
X5:Occupation	-0.012^{ns}	0.008	0.137	1.12
X6: Income	-7.92e-07^{ns}	3.49e-06	0.821	1.08
X7: Location	0.148 ***	0.055	0.008	1.14
X8: Market shopping time	-0.034 **	0.013	0.011	1.12
X9: Level of application of anti-epidemic measures by market-shoppers	0.231***	0.054	0.000	1.32
X10: Favorable factors for epidemic prevention and control X11: Un-favorable factors for epidemic prevention and control	0.635*** -0.04 ^{ns}	0.065 0.039	0.000 0.317	1.24 1.09
X12: Favorable factors for epidemic prevention and control	-0.046^{ns}	0.057	0.415	1.19
Constant	0.928	0.397	0.020	
Sig.F	0.000			
Adjusted R^2	0.5568			

The results of regression analysis of factors affecting the change in awareness about hygiene and safety practices of market-shoppersafter the Covid-19 epidemic are presented in Table 6.

The results of the regression analysis show that the adjusted R2 coefficient is 0.5568, which proves that the independent variable in the model explains 55.68% of the variation of the variable Y- The change in perception of market-shoppersabout Hygiene and safety practices of

market-shoppersafter the Covid-19 epidemic. The coefficient Sig.F = 0.000 is much smaller than the significance level 5%, so the regression model is significant, that is, the independent variables affect the dependent variable. Besides, the variance exaggeration coefficient (VIF) of the variables in the model is much smaller than 10, so we conclude that the variables included in the model do not have multicollinearity (Mai Van Nam, 2008). There are 3 factors that affect in the same direction and 1 factor in the opposite direction on the change in awareness about hygiene and safety practices of market-shoppersafter the Covid-19 epidemic. Accordingly, while factor X7: Location; X9: The level of application of epidemic prevention measures by market-shoppersand X10: Favorable factors for epidemic prevention and control have the same effect, increasing the change in awareness about hygiene and safety practices after the epidemic. of market-shoppers, the factor X8:Number of visits to the market reduces the change in awareness of hygiene and safety practices after the epidemic because the sign of the coefficient of marginal impact is negative and opposite to the initial expectation. The higher the degree of application of anti-epidemic measures by market-shoppers and the more favorable factors, the higher the awareness of market-shoppers will change after the epidemic. Covid-19 in crowded places is very high, so limiting going to the market is also a measure to contribute to epidemic prevention as well as raising awareness. In which, X9 and X10 both have the lowest P - value of 0.000, which means that the degree of application of epidemic prevention measures by market-shoppers and the favorable factors for epidemic prevention and control has the strongest impact on the change in perception. marketer's consciousness. Besides, the factor that has the weakest impact on the change in perception of market-shoppers, P-value with a value of 0.011 is the factor X8-Number of market visits.

4. RECOMMENDATİON

From the results of comparing the behavior and awareness of market-shoppersin urban and rural areas in the Mekong River Delta and analyzing the factors affecting the change in awareness about hygiene and safety practices of market-shoppers. After the Covid-19 epidemic, a number of important conclusions were pointed out. First, the majority of market-shoppers in both areas know and regularly use epidemic prevention and control measures, and the survey results show that the level of application of epidemic prevention and control measures in both areas region. Next is an assessment of the level of application of hygiene and safety practices at the market before the outbreak and after the epidemic, specifically according to the results of the T-test showing the level of application of these measures. Hygiene and safety practices at the market

before the outbreak were higher in urban areas than in rural areas, and vice versa, the level of application of hygiene and safety practices in urban areas after during the Covid-19 epidemic was lower than in rural areas. The results also show that before the epidemic the level of application of hygiene and safety practices.

Safety at the market is very low, after the Covid-19 epidemic, the level of application of hygiene and safety practices is higher.

Regression results show that two main factors affecting the change in awareness about hygiene and safety practices of market-shoppers after the epidemic are the degree of application of epidemic prevention measures by market-shoppers. In addition, the regression model also shows two additional factors affecting the change in awareness after the Covid-19 epidemic, namely the number of times to go to the market and the location, the factors that affect the change of perception after the Covid-19 epidemic. The rest did not play an important role in this study data.

The research results show that in order to raise the awareness of market-shoppers about hygiene and safety practices at the market, a number of measures are proposed as follows:

(1) The market management board actively deployed information and communication activities, conveyed messages through loudspeakers and television screens, in addition to many forms, golf tapes, and practical instruction boards. take steps to prevent and control the epidemic, and equip more equipment and tools for epidemic prevention and control.

(2) Promote technology in monitoring through the installation of more CCTV cameras in the aisles of the market to make it more convenient to monitor trading activities and the number of people entering and leaving the market.

(3) It is necessary to diversify equipment for epidemic prevention and control, so instead of using cloth masks or regular medical masks, people can find masks with reasonable prices but guaranteed quality, convenience for activities at the market.

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IDENTİFİCATİON OF BİOACTİVE COMPOUNDS AS POTENT İNHİBİTORS İN THE TREATMENT OF POLYCYSTİC OVARY SYNDROME THROUGH COMPUTATİONAL ASSESSMENT

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ABSTRACT
Polycystic ovary syndrome (PCOS) is one of the most common disorders that occur in women of any age due to an endocrine hormone imbalance. There is an urgent need for the development of novel natural PCOS medications free from adverse effects because the underlying cause of this condition has not yet been discovered. It was observed from a literature review on medicinal plant species that the phytochemicals present in the plants have the ability to increase the function of hormones for fertility. The goal of the onzgoing research is to identify novel medication candidates from the medicinal plants that could be used to treat the target PCOS protein. An assessment of the medicinal plants revealed 145 phytochemicals that have been discovered through research. After *insilico* screening for its druglikness and structural reaction towards biological functions, only 22 compounds of the medicinal plants demonstrated the oral drug response, while other compounds failed to pass oral drug tests. Using docking studies, these compounds were further examined for their ability to bind to the PCOS protein Cytochrome P450 (CYP). The current findings suggest that the strongest binding affinity interactions with the target protein are only present in two compound. Based on the findings of this study, the predicted plant components can be identified and extracted for additional *in vitro* and *in vivo* testing to establish the safe dosage for PCOS patients.

Keywords: PCOS, Indian Medicinal plant, Bioactive compounds, virtual screening, Docking.

INTRODUCTION

Polycystic ovary syndrome (PCOS) is a mysterious reproductive disorder that causes menstrual abnormalities. The prevalence of this condition in women's endocrine glands was discovered to be between 5 and 10% on average (Patten R, 2020). Obese or overweight PCOS women are more likely than other women to acquire Type 2 diabetes and infertility (Teede HJ, 2018). A thorough investigation into the mechanism of inheritance and the function of genetic variables in the PCOS condition has yet to be conducted (Oberg E 2019). The genes involved in altered expression in PCOS lead to genetic aberrations that affect signal transduction, affecting, among other things, chronic inflammation, energy homeostasis, insulin action and secretion, gonadotrophin action and control, and steroid genesis (Deepthi G, 2017; Otto-Buczkowska E 2018).

According to numerous studies, hyperandrogenism is one of the most noticeable clinical features of patients with polycystic ovarian syndrome and has been linked to a variety of phenotypes with different genetic variations (Chaudhary H, 2021). The prognosis for PCOS is that it involves an enzyme deficit in the steroidogenesis pathway. A subset of the CYP genes encodes enzymes necessary for the production of steroids. Among them, the CYP19A1, CYP17A1, and CYP11A1 genes have received the majority of research attention (Zhang J, 2021). A cytochrome P450 family member enzyme is encoded by the CYP19A1 gene. The creation of lipids, steroids, cholesterol and the metabolism of medicines all include members of the cytochrome P450 family of enzymes. The last step in steroid biosynthesis is catalysis, which is where the cytochrome P450 protein is found on the endoplasmic reticulum network (Lee SJ, 2010). The CYP17A1 gene, which produces the cytochrome P450 protein, is involved in several chemical processes, such as steroidogenesis and the synthesis of androgens, glucocorticoids, and progestins (Xia J, 2021). The CYP11A1 gene, which codes for a member of the cytochrome P450 family, produces a protein that catalyses the first step in steroid hormone synthesis and changes cholesterol into pregnenolone. This protein is found in the inner membrane of the mitochondria (Kaur R, 2021).

Herbal remedies are sophisticated treatments with the potential for both positive and negative interactions between constituents (Kwon CY, 2020). The complexity of effects within the body can also be seen in concurrent interactions with different body systems, both biochemically and via changing organ function (Ashkar Fatemeh, 2019; Sudhakar Pachiappan, 2017). For the treatment of women with irregular menstruation, hyperandrogenism, and PCOS, entire herbal medicine extracts having direct effects on reproductive endocrinology are used (Iervolino M,

2021; Aquino CI, 2014). Determine which herbal remedies are supported by current scientific evidence for their use, as well as which herbal remedies are supported by current scientific data for their explanation of certain reproductive endocrinological effects in PCOS and hyperandrogenism (Venkateswara Rao P, 2017). Various studies were conducted in order to inform clinical decisions in integrative settings and to meet clinicians and consumer' preferences for pragmatic herbal management within a holistic, individualised treatment framework (Frabasile S, 2017; Wawrzkiewicz-Jałowiecka A, 2020; Hong Y, 2019).

Pharmaceutical companies currently employ a variety of computational approaches, including databases and tools from the bioinformatics field, to find potential therapeutic candidates and move those compounds into clinical trial candidates based on their efficacy and safety (Sumudu P Leelananda, 2016; Supreet Kaur Gill, 2016). The docking methodology, which predicts the binding affinities of tiny compounds to their suitable target binding sites and consequently blocks the target functionality (Xuan-Yu Meng, 2011), is one of the most crucial and often used strategies in structural-based drug development. (Chaudhary KK 2016). Predicting the form of a receptor-ligand complex, where the receptor is often a protein or nucleic acid and the ligand is typically a small molecule or another protein, is frequently done via molecular docking (Radha Mahendran S, 2014). The selection of the most suitable pharmacological lead candidate for the target was assumed to be highly dependent on the docking analysis (Jeyabaskar Suganya, 2017). The aim of this work is to use in silico docking to evaluate the phytochemicals as an infertility inhibitor against the protein Human Cytochrome P450 CYP17A1.

MATERIALS AND METHODS

Prediction of active site in receptor:

The CYP17A1 gene, which encodes the cytochrome P450 protein, catalyses multiple reactions including the production of steroidogenesis, androgens, glucocorticoids, and progestins. The three dimensional structure of the protein was retrieved using Protein Data Bank (PDB) (https://www.rcsb.org/) and Protein Data Bank archive has served as the single repository of information about the 3D structure of protein, nucleic acids, and complex assemblies (Parasuraman S, 2012).

Using CASTp (http://sts.bioe.uic.edu/castp), the active sites of small molecules that must be the ligand-receptor binding sites were predicted to be present in the protein (Wei Tian, 2018). By measuring concave surface regions on three-dimensional protein structures, the Computed Atlas of Surface Topography of Proteins Server seeks to offer an online resource for locating,

defining, and thoroughly describing topographic features.

Filtering of Small Molecules

The small molecules for 145 compounds were identified through literature search for the medicinal plants using PubMed (Liang Z, 2021). PubMed (https://pubmed.ncbi.nlm.nih.gov/) comprises more than 29 million citations for biomedical literature from MEDLINE, life science journals, and online books. It is developed and maintained by the National Center for Biotechnology Information (NCBI) at the National Library of Medicine (NLM).

For further computational analysis, the compounds should have at least 2D structure. Using PubChem database (https://pubchem.ncbi.nlm.nih.gov/) the structures are retrieved. It is a database of chemical structures of validated small molecules. The database contains entries for PubChem entities which are grouped by structural identity and similarity (Kim S, 2016).

The retrieved 145 compounds were screened for its drug likness properties using Molinspiration server (www.molinspiration.com) . The server evaluate the oral The Lipinski's Rule of Five is used by the server to assess how similar the molecule is to various drugs, and the rules are as follows: H-bond donors (HBD) lesser than 5, H-bond acceptors (HBA) lesser than 10, molecular weight (MW) should be lesser than 500 Daltons, logP should be less than 5 (Jeyabaskar Suganya, 2022).

Molecular Docking using Argus Lab:

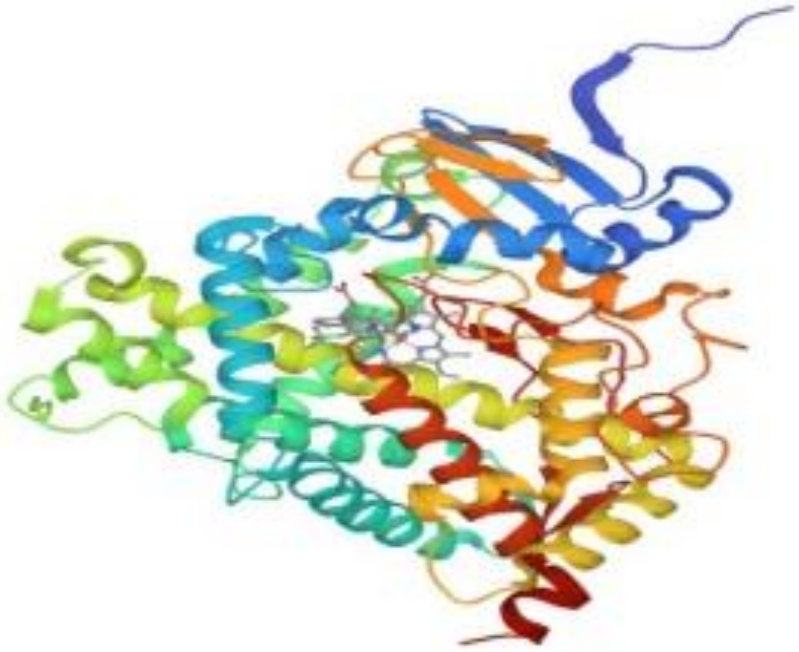
After the preparation of the Protein and Ligand, molecular docking studies were performed to evaluate the interaction using Argus lab software (Jeyabaskar Suganya, Anburaj.R 2022). Molecular docking is a study of how two or more molecular structures, for instance, drug and catalyst or macromolecule receptor, match along to be a perfect fit of protein. Argus Lab is a molecular modelling, graphics, and drug design program. It is the new drug docking code. Contains both GADock and ArgusDock docking engines and the A score scoring function with a preliminary set of parameters. Argus lab is a free molecular package that runs under windows. It is installed on all public computers in Shoker Science Center (an icon should be on your desktop), and you may also download it for personal use from www.arguslab.com/downloads.htm. The program allows you to draw very complex protein configurations, obtain helical chains of amino acids and folded leaves etc. Argus Lab uses a tree system to organize all the elements to add to any structure before representing this data as a drawing, allowing you to analyses it a visual manner. The docking was carried out for the protein Cytochrome P450 CYP17A1 and the 22 compounds of medicinal plants using the software Argus Lab.

RESULTS AND DISCUSSIONS:

Prediction of active site in receptor:

The Protein Data Bank (PDB) database was used to get the three-dimensional structure of 3RUK, which was identified as a multiple chain (Chain A, B, C, D) oxidoreductase inhibitor protein by X-ray diffraction with resolution of 2.60Å containing the sequence length of 494 amino acid (Figure 1).

Figure 1: 3D Structure of Human Cytochrome P450 CYP17A1



From the 3 D structure - chain B, C, D, bounded ligands, complicated compounds, hetero atoms, and non-essential water molecules were removed using PyMol software for predicting the better interaction between receptor and its ligands. The active sites of 3RUK are as follows: VAL37, GLY38, LEU40, GLU290, PRO41, PHE42, LEU43, PRO44, ARG45, ILE276, HIS46, GLY4, HIS48, GLU297, MET49, HIS60, ASN51, PHE54, LYS55, ASN300, LEU56, GLN57, LYS58, ALA294, TYR40, GLY61, ASN216, GLN148, THR152, LEU153, ASN300, MET156, HIS160, GLY162, SER164, ILE165, LYS280, ASP166 are retrieved using the CASTp 3.0.

Filtering of Small Molecules:

Out of 145 phytochemicals retrieved from through PubMed, only 22 phytochemicals clears the oral drug properties (Table 1) where as other compounds fails to clear the properties.

Figure 2: Phytochemicals which clears the oral drug properties

COMPOUNDS NAME	PUBCHEM ID	MW	LOGP	HBA	HBD	PSA	ROTB
2-Furancarboxaldehyde,5-(hydroxymethyl)	237332	126	1.2	3	1	50	2
Diosgenin	99474	414	4.2	3	1	38	0
Eugenol	3314	164	2.4	2	1	29	3
Thymol	6989	150	2.7	1	1	20	1
Linalool	6549	154	154	2	1	1	2
Carvacrol	10364	150	2.7	1	1	20	1
Apiole	10659	222	3	4	0	36	4
Sabinene hydrate	62367	154	2.4	1	1	20	1
5-Methyl-2-heptanol	41143	130	1.8	1	1	20	4
Menthyl chavicol	70235324	272	5	1	1	20	4
Methyleugenol	7127	178	2.9	2	0	18	4
Terpene	186030	316	3.3	4	0	56	1
3-methoxyphenyl acetonitrile	142643	163	1.6	3	1	53	3
Nerolidol	5284507	222	4.2	1	1	20	7
Spathulenol	92231	220	3.2	1	1	20	0
Cedrenol	119831	220	3.2	1	1	20	0
α-Cadinol	12302222	222	3.2	1	1	20	1
β-Dihydro-ionone	35821	194	3.5	1	0	17	3
Dl-Menthol	1254	156	2	1	1	20	1
Diethyl phthalate	6781	222	2.3	4	0	52	6
Cedran-8-ol	522667	222	3.3	1	1	20	0
3-Cyclopentane-1-ethanol,2,2,4-trimethyl	565700	154	2.3	1	1	20	2

Docking Interactions:

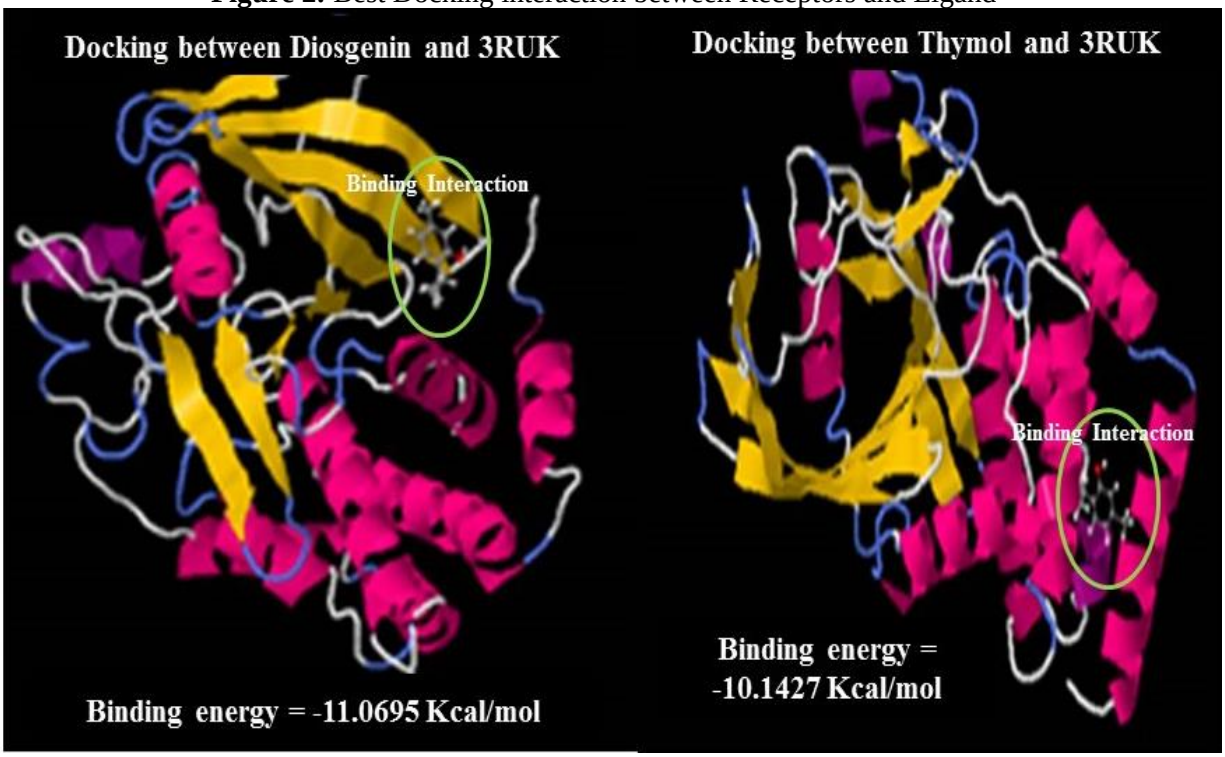
The predicted 38 active residues were used as the binding sites for 22 natural compounds which satisfy the oral drug properties for docking studies. To understand the binding interactions between the protein and its compounds, ArgusLab 4.0.1 were used to explore their binding affinity, docking study was performed using Argus dock (Table 2).

Table 2: Docking Interactions of the ligands and receptor.

S.No	Pubchem ID	Phytochemical Compounds	Binding energy Kcal/Mol
1.	99474	Diosgenin	-11.0695
2.	6989	Thymol	-10.1427
3.	12302222	α-Cadinol	-8.70932
4.	522667	Cedran-8-ol	-849296
5.	92231	Spathulenol	-8.36
6.	186030	Terpene	-8.33889
7.	6781	Diethyl phthalate	-8.28629
8.	119831	Cedrenol	-8.2506
9.	35821	β-Dihydro-ionone	-7.63
10.	1254	Dl-Menthol	-7.36949
11.	5284507	Nerolidol	-7.15672
12.	41143	5-Methyl-2-heptanol	-6.30135
13.	142643	3-methoxyphenylacetonitrile	-6.10668
14.	565700	3-Cyclopentane-1-ethanol,2,2,4-trimethyl	-6.69785
15.	3314	Eugenol	-5.15982
16.	237332	2-Furancarboxaldehyde,5-(hydroxymethyl)	-5.13534

- The docking scores were highest for 2 compounds: Diosgenin with pubchem ID (99474) - 11.06 Kcal/Mol, Thymol with pubchem ID (6989) - 10.14 Kcal/mol, (Figure 2)

Figure 2: Best Docking interaction between Receptors and Ligand



- The docking scores was in the range between -8 Kcal/mol for 6 compounds: α-Cadinol with pubchem ID (12302222), Cedran-8-ol with pubchem ID (522667), Spathulenol with pubchem ID (92231), Terpene with pubchem ID (186030), Diethyl phthalate with pubchem ID (6781), Cedrenol with pubchem ID (119831).
- The docking scores were in the range between -7 Kcal/mol for 3 compounds: β-Dihydro-ionone with pubchem ID (35821), Dl-Menthol with pubchem ID (1254), Nerolidol with pubchem ID (5284507).
- The docking scores were in the range between -6 Kcal/mol for 3 compounds: 5-Methyl-2-heptanol with pubchem ID (41143), 3-methoxyphenylacetonitrile with pubchem ID (142643), 3-Cyclopentane-1-ethanol,2,2,4-trimethyl with pubchem ID (565700).
- The docking scores were in the range between -5 Kcal/mol for 2 compounds: Eugenol with pubchem ID (3314), 2-Furancarboxaldehyde,5-(hydroxymethyl) with pubchem ID (237332).

- The docking score were very low, Score falls below-5 Kcal/mol for 6 compounds: Linalool with pubchem ID (6549), Carvacrol with pubchem ID (10364), Apiole with pubchem ID (10659), Sabinene hydrate with pubchem ID (62367), Menthyl chavicol with pubchem ID (70235324), Methyleugenol with pubchem ID (7127).

Docking results revealed that above 2 compounds can enter the substrate-binding region of the active site of target protein (Figure 2). Finally, the results revealed clearly that 2 compounds accurately interact with Cytochrome P450 CYP17A1.

CONCLUSION

In order to treat PCOS, one of the most prevalent disorders for women that directly or indirectly affects fertility hormones. The main goal of this current research work is to find a novel therapeutic molecule derived from natural components for PCOS with no adverse effect on women. When compared to other natural compounds, molecular docking studies confirmed that the two compounds (Diosgenin and Thymol) have a significant binding affinity with the human cytochrome P450 CYP17A1 receptor (3RUK). Thus, the results of this study strongly imply that diosgenin and thymol can be used in *in vitro* and *in vivo* studies in subsequent studies, which will surely help in the discovery of a new potential drug for treating PCOS.

CONFLICT OF INTEREST

The authors declare they have no competing interests.

ACKNOWLEDGEMENT

We acknowledge Vels Institute of Science, Technology, and Advanced Studies (VISTAS) for providing us with required infrastructure and support system.

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REDESIGN OF CLOTHES WITH FUR TRIM - A NEW FASHION TREND

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ABSTRACT
Fur clothing is perceived by many modern consumers as a luxury item, especially if the design of the product corresponds to the fashion trend. The high cost of natural fur products does not allow average buyers to often change their fur wardrobe. However, the wear resistance and maintainability of the fur allows you to use clothes for several seasons. Fashionable fur clothing is also becoming a subject of redesign. The article discusses the advantages of using digital tools at the stage of graphic redesign of garments. Fragments of used fur products can be used as a creative decoration for clothes made of textile materials.

Keywords: fur garments, redesign, digital fitting, fur.

INTRODUCTION

The frequent and rapid launch of fashion collections of the Fast fashion class (fast fashion) stimulates consumers to constantly update their wardrobe [1]. However, the packaging of fashionable products mainly with synthetic low-quality materials has a detrimental effect on the environment. Unprofitable disposal of large volumes of unclaimed low-grade clothing can be replaced by recycling [2]. The new ethics of consumption, formulated in the concept of upcycling, calls for the recycling of used things, the recycling of materials in improved design models, which will lead society to update environmental standards [3]. Fast fashion is gradually being replaced by slow (or sustainable) fashion (Slow fashion), the main motto of which is "reasonable and responsible attitude to natural resources".

The objects of the presented research are new images of products with fur trim. To improve the aesthetic properties of the fur surface of a used item, various finishes and methods of influencing the hairline of a furry semi-finished product are aimed [4]. The texture of the fur is changed with a haircut, color combinations and new methods of dyeing are used, combined with textiles, knitwear [5]. An analysis of the creative upcycling collections of the latest fashion seasons showed that appliqué with fur elements for textiles and knitwear is in demand, and the places of damage to the fur fabric can be hidden using inlay.

The wear resistance of natural fur allows you to successfully restore used things, or use them to create completely new products or creative upcycling finishes [6]. The mentality of domestic consumers with low and middle income levels is characterized by a persistent reluctance to part with garments made from natural fur. Many people are interested in extending the life of things, ready to pay material costs for the restoration of damaged areas of the hairline in order to preserve the wardrobe item, or to transform it into a new, more fashionable product.

Эстетический редизайн меховой одежды – новое научно-практическое направление, привлекающее специалистов швейно-меховой отрасли. Актуальность эстетического редизайна объясняется экономичностью и экологичностью услуги, безотходностью производства. Оставшийся после реставрации или редизайна меховой лоскут всегда востребован. Меховые остатки могут быть использованы в качестве материала для аппликации или инкрустации швейного изделия, а также в производстве аксессуаров (рис. 1).



Figure 1 - Examples of the use of fur waste

Within the framework of the present study, a female sheepskin headdress of domestic production was chosen as the object of redesign (Fig. 2). Hat-"cap", rounded soft shape. The fur of the product is evenly trimmed, black, thick, with the angle of inclination of the hair close to straight. The height of the fur is 13 mm, the thickness of the leather fabric is 1.2 mm. An analysis of the degree of wear of the cap fur revealed small abrasions along the perch line. In general, the hairline is not changed. It was decided to disassemble the fur parts of the headdress along the line of seams and use it for finishing the women's vest. A large fragment with a floral ornament in the front of the cap has not lost its aesthetics and is in demand as the compositional center of the product - an inlaid pocket.

The search for the proportions and shape of the designed shoulder product and the dimensions of the upcycling trim was carried out in the CLO3D 3D simulator. Rendering was used to visualize the fur surface. Previously, a graphical primitive, a single hair, was built in the conjugated planar CAD system. The object is given properties such as length, thickness, broken shape/segments, hairline, color, glossiness. Further, by repeated repetition of the graphic primitive in the CLO3D environment, a fur surface was formed (Fig. 2c). In the course of graphic work, it turned out that the setting range of the Density tool is 0-999 inch2 [7], the thickness of the sheepskin hairline is 4-5 thousand pieces. per 1 cm2. Since digital tools do not allow recreating the natural density of fur, it was decided to use the Density parameter in the range of 935-950 units.

The result of the graphic construction was evaluated by a group of experts (teachers, students, designers and designers of sewing fur enterprises). It has been established that the image of a digital twin of a sheared sheepskin has a high degree of reliability [8].



a **b** **c**

Figure 2 - Full-scale sample and digital analogue: a, b - fur hat; c - digital analogue of upcycling trim

At the stage of virtual fitting in the CLO3D environment, a search was made for the harmony of the image of the product with variations in the positioning of the fur trim on the surface of the designed vest model (Fig. 3).



Figure 3 - Options for positioning the upcycling finish on the surface of the designed vest model

Digital fitting is not only an achievement of IT technologies. The greatest advantage of virtual design lies in saving the material and labor resources of the enterprise, increasing the environmental friendliness of clothing production by eliminating intermediate full-scale prototyping. In addition, the process of forming the design of a future product, including redesign, ceases to be one-sided. Online communication with customers and instant visualization of the image contribute to the optimization of production. Digital tools allow you to get an image of the design object as close as possible to the full-scale analogue, which increases customer satisfaction with the result of the work and their loyalty.

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ARAŞTIRMAYA DAYALI EĞİTİM ORGANİZASYONUNDA AKTİF ÖĞRENME YÖNTEMLERİ KULLANMAK.

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ÖZET
Ülkemizde demokratik bir toplum inşa etme sürecinde, kişiliğin kapsamlı gelişimi, insanlık sorunu, durumu ve geleceği, bir kişilik ve bireysel kader olarak gelişimi, çevre üzerindeki aktif ve giderek artan güçlü etkisi, sosyal sorunlarla birlikte. Bugün insanlığın yaşamının temelleri ile ilgili problemler, geleceğin öğretmenin pedagojik kültürünün gelişmesi için beklentilerin belirlenmesi de özel bir öneme sahiptir. Azerbaycan Cumhuriyeti'nin "Eğitim Üzerine" Yasası, yaratıcı bir kişilik ve vatandaş oluşturma sorunlarını tanımlar. Kanun, eğitimin temel amacının Azerbaycan devletine karşı sorumluluklarını anlayan, halkının milli geleneklerine ve demokratik ilkelerine, insan hak ve özgürlüklerine saygılı, vatanseverlik ve Azerbaycancılık fikirlerine bağlı vatandaşlar ve şahsiyetler yetiştirmek olduğunu belirtmektedir. , bağımsız ve yaratıcı düşünenler (Eğitim Kanunu 2012). Bu ana hedefin gerçekleşmesinin beklenen sonucu, Azerbaycan'ın aktif vatandaşlarının yetiştirilmesidir. Son zamanlarda her alanda olduğu gibi eğitimin sosyo-kültürel önemi artmış ve kalite yönetiminde yeni yaklaşım arayışları büyük önem arz etmektedir. Bu durum modern toplumda yaşamın her alanında ve eğitim alanında yaşanan hızlı değişimlerle doğrudan ilişkilidir. Kalite iyileştirme, yeni eğitim felsefesinin ana fikri olmuştur. Toplumun gelişme ve varlık koşulları arasındaki uyumsuzluğun artması ve eğitim sisteminin bu değişikliklere hızlı bir şekilde adapte edilememesi ile birlikte, kaliteyi iyileştirme ihtiyacı, bunu gerçekleştirme araçlarının etkililiği ve yönetimi özellikle güçlenmiştir. Toplumun gelişme ve varlık koşulları arasındaki uyumsuzluğun artması ve eğitim sisteminin bu değişikliklere hızlı bir şekilde adapte edilememesi ile birlikte, kaliteyi iyileştirme ihtiyacı, bunu gerçekleştirme araçlarının etkililiği ve yönetimi özellikle güçlenmiştir. Eğitim, başlangıcından bu yana gelişerek toplum için önemini ve önemini korumayı başarmıştır. Medeniyetler faaliyet kaynağını eğitimden almış ve onun desteğiyle şekillenmiştir. Günümüzde eğitim sadece insanların ihtiyaçlarına odaklanmakla kalmıyor, aynı zamanda yeni özellikleriyle de ilgi uyandırıyor. Toplumun sorunlarının çözümüne katılarak gelişimini teşvik eder ve yeni bir bağlamda oluşmasını sağlar. Amerikalı eğitimci Ken Robinson'ın belirttiği gibi, "19. yüzyılda sanayileşmenin ihtiyaçlarını karşılamak için inşa edilen eğitime değil, bugün karşı karşıya olduğumuz zorlukları aşabilecek ve içimizde yatan gerçek yetenekleri ortaya çıkarabilecek yeni bir eğitim sistemine ihtiyacımız var. ve 20. yüzyılın başlarında."

Anahtar kelmeler: ülke, eğitim, demokratik, sosyal, öğretmen

ACTIVE IN RESEARCH-BASED EDUCATION ORGANIZATION USING LEARNING METHODS

ABSTRACT

In the process of building a democratic society in our country, the comprehensive development of the personality, the problem of humanity, its condition and future, its development as a personality and individual destiny, its active and increasingly powerful influence on the environment, along with social problems. Problems related to the foundations of human life today, determining the prospects for the development of the pedagogical culture of the future teacher are also of particular importance. The Law "On Education" of the Republic of Azerbaijan defines the problems of creating a creative personality and citizen. The law states that the main purpose of education is to raise citizens and personalities who understand their responsibilities to the Azerbaijani state, respect the national traditions and democratic principles of its people, human rights and freedoms, and adhere to the ideas of patriotism and Azerbaijan, independent and creative thinkers (Education Law 2012). The expected result of the realization of this main goal is the training of active citizens of Azerbaijan. Recently, as in every field, the socio-cultural importance of education has increased and the search for new approaches in quality management is of great importance. This situation is directly related to the rapid changes in all areas of life and education in modern society. Quality improvement has been the main idea of the new educational philosophy. With the increasing incompatibility between the development and existence conditions of the society and the education system not being able to adapt to these changes quickly, the need to improve the quality, the effectiveness and management of the means to achieve this has especially strengthened. Education has managed to maintain its importance and importance for the society by developing since its inception. Civilizations have taken their source of activity from education and have been shaped by its support. Today, education not only focuses on the needs of people, but also arouses interest with its new features. By participating in the solution of society's problems, it encourages its development and enables it to be formed in a new context. As the American educator Ken Robinson has stated, "We do not need education built to meet the needs of industrialization in the 19th century, but a new education system that can overcome the challenges we face today and bring out the true talents that lie within us."

Key words: country, education, democratic, social, teacher

TAM MƏTN

Ülkemiz, araştırmaya dayalı eğitim organizasyonunda araştırma yürütme alanında zengin deneyim biriktirmiştir. Şu anda, bu deneyimin eğitimde başarılı ilerleme kaydetmede büyük rolü var. Bugün bile, klasik pedagojik araştırma geleneği, toplumun eğitim inşasında hala referans alınmaktadır

Temel ve pedagojik araştırmalardan yararlanılır. Bununla birlikte, modern zamanlarda toplumun hızlı değişimi ve yeni eğitim sisteminin kurulması, pedagojik araştırmaların bu zorluklara cevap vermesini kaçınılmaz olarak bir görev haline getirmektedir. Bütün bunlar, pedagojik araştırmanın en son gereksinimlere göre yürütülmesini belirler.

Hem tarihsel hem de çağdaş deneyimler, pedagojik araştırmanın her şeyden önce konuyla ilgili olması gerektiğini göstermektedir. Zamanın gereklerine göre belirlenmelidir. Bu gereklilik hala önemlidir. Konuyla ilgisi olmayan hiçbir araştırma, pasif bir pozisyon alarak gelişmeyi ilerletemeyeceği veya destekleyemeyeceği için fazladan çalışma sonucunda bir kenara bırakılacaktır.

Artık dünyanın eğitim bilimciler ve eğitim araştırmacıları, eğitimin daha geniş anlamda anlaşıldığına dikkat çekiyor. Bu fikrin modern bir bakış açısıyla doğru olduğu herkes tarafından yadsınamaz bir önerme olarak bilinir. Ayrıca faaliyetlerimizde bu yaklaşımı daha da geliştirerek, toplumun medeni bir toplum olarak oluşmasında bir etken olarak görüyoruz. Gerçekten de eğitim her şeyden önce bir değerdir ve kendi nitelikleriyle ölçülebilir. Bunu ortaya çıkarmak için seviyesini değerlendirmek gerekir. Bu değerlendirme ile seviyesi belirlenir.

Yeni eğitimin inşası da bir takım sorunların gecikmeden çözülmesini gerektirmektedir. Bu problemler doğası gereği daha geneldir ve eğitimin tüm aşamaları ve seviyeleri için geçerlidir. Kendi başına bir meydan okuma olarak yeni eğitim içeriği oluşturmak, standartların ve müfredatların geliştirilmesini gerektirir. Bunun için standartların ve müfredatların bilimsel-pedagojik temelleri araştırılmalı ve mevcut uygulamalardan hareketle yeni içerik bileşenleri (standartlar, müfredatlar) geliştirilmelidir. Eğitimin her kademe ve kademesinde öğretim-yöntem tabanını güçlendirmek ve yeni bir metodoloji geliştirmek için araştırmalar yapılmalıdır. ihtiyaç var.

Pedagojik araştırma alanında zengin deneyim birikmiştir. Şu anda, bu deneyimin eğitimde başarılı ilerleme kaydetmede büyük rolü var. Bugün bile klasik pedagojik araştırma geleneği, toplumun eğitim yapılanmasında hala başvurulmaktadır. Temel ve pedagojik araştırmalardan yararlanılır. Bununla birlikte, modern zamanlarda toplumun hızlı değişimi ve yeni eğitim sisteminin kurulması, pedagojik araştırmaların bu zorluklara cevap vermesini kaçınılmaz olarak

bir görev haline getirmektedir. Bütün bunlar, pedagojik araştırmanın en son gereksinimlere göre yürütülmesini belirler.

Uzun yıllardır var olan ve günümüzde de devam eden pedagojik araştırmaların uzun vadeli planlanması bilgi toplumunun gereksinimlerini karşılamamaktadır. Araştırma tamamlanıncaya kadar alaka düzeyini yitirir veya elde edilen sonuçlar gelişmelerin gerisinde kalır, onların önüne geçemez. Bu nedenle araştırmaların, özellikle uygulamalı araştırmaların süresinin kısa bir süreliğine belirlenmesi çağın bir gereği olarak karşımıza çıkmaktadır. **A**rtık dünyanın eğitim bilimcileri ve eğitim araştırmacıları, eğitimin daha geniş anlamda anlaşıldığına dikkat çekiyor. Bu fikrin modern bir bakış açısıyla doğru olduğu herkes tarafından yadsınamaz bir önerme olarak bilinir. Ayrıca faaliyetlerimizde bu yaklaşımı daha da geliştirerek, toplumun medeni bir toplum olarak oluşmasında bir etken olarak görüyoruz. Gerçekten de eğitim her şeyden önce bir değerdir ve kendi nitelikleriyle ölçülebilir. Bunu ortaya çıkarmak için seviyesini değerlendirmek gerekir. Bu değerlendirme ile seviyesi belirlenir. Pedagojik personel eğitiminin içeriği ve organizasyonu hakkında araştırma yapmak, günümüzde ana yönlerden biri olarak daha alakalı hale geliyor. Başlangıç öğretmen eğitimi, öğretmen profesyonelliği veya ek eğitimin herhangi bir yönü hakkında araştırma yapmaya ihtiyaç vardır. Günümüzde bir öğretmenin itibarını artırmak ve kariyerini geliştirmek de ciddi pedagojik problemler olarak kabul edilmektedir.

Modern dersler birçok yönden geleneksel derslerden farklıdır. Modern ders, aktif (etkileşimli) bir ders olarak tanımlanır. Aktif (etkileşimli) dersin ana ayırt edici özellikleri şunlardır:

Modern dersin amacı, öğrencilerin etkinlik ve bağımsızlık koşullarında bilgi, beceri ve yaşam becerilerinin bilinçli ve sağlam bir şekilde özümsenmesini ve yaratıcı bir kişilik olarak gelişmesini sağlamaktır. Aktif (etkileşimli) ders, yeni gereksinimlere - geleneksel dersten farklı ilkelere - dayanmaktadır. Bu ilkeler de devletin bir gereği olarak ortaya konmuştur. . Modern dersler aktif (etkileşimli) öğrenme yöntemlerine dayanmaktadır: öğrenciler, yöntemler yardımıyla yeni bilgilerin aktif olarak edinilmesi üzerinde çalışırlar, ilgili öğrenme aktivitelerini ve görevlerini yerine getirirler, problem çözme üzerinde çalışırlar, fikir alışverişinde bulunurlar ve en önemlisi bilgiyi bağımsız olarak öğrenirler. Araştırma, aktif (etkileşimli) bir derste öğrenme sürecinin merkezi etkinliğidir (açıklayıcı-açıklayıcı bir karaktere sahip geleneksel bir derste, öğrenme sürecinin merkezi etkinliği öğretmenin yorumudur); Geleneksel bir derste yeni bilgiler dersin başında hazır olarak verilirken, aktif (etkileşimli) bir derste bu bilgiler ders sırasında öğrenenlerin kendileri tarafından bağımsız olarak kazanılır

Aktif derste standart dışı ders türlerine geniş yer verilir.Aktif dersin özelliklerinden biri de öğretmen-öğrenci ilişkisinin yeni bir düzeyde kurulması ile ilgilidir. Modern derste bu ilişkiler, geleneksel derste olduğu gibi tabi olma-bağımlılık ve otoriter üslup konumunda değil, eşit konu-özne konumunda, demokratik ve hümanist bir tarzda kurulur: öğretmen işbirlikçi bir şekilde etkileşime girer. öğrenci ile diyaloğa girerek ortam oluşturur. Modern derste öğrenci, öğrenmenin merkezi faktörü olarak hareket eder; hazır bilgiyi alan pasif bir nesne olarak değil, aktif bir özne, bir araştırmacı olarak hareket eder. Ve öğretmen modern derste bir rehber, rehber, danışman, rehber görevi görür.Aktif (etkileşimli) derste, tüm dikkat öğrencinin gelişimine, bağımsız ve yaratıcı bir kişilik olarak oluşumuna odaklanır. Öğretmen, öğrencilerin entelektüel, zihinsel ve ruhsal gelişimlerinin yanı sıra bireysel yetenek, ilgi ve yeteneklerinin gelişimi için uygun koşullar, normal bir manevi ve psikolojik iklim, destekleyici bir ortam yaratır ve onlara saygı, özen ve şefkatle davranır. Yeni öğrenme teknolojilerinde öğrenenlerin entelektüel ve ahlaki gelişimine öncelik verilir. Eğitimde yeni teknolojilerin uygulanması, öğrencilerin fikirlerini açık ve mantıklı bir sırayla ifade etmelerini sağlar. Bu yöntemler öğrencilerin yaratıcılıklarının gelişmesini sağlar ve onlarda yüksek bir iletişim kültürü oluşturur.

Yeni öğrenme teknolojileri ile bağımsız olarak bilgi edinen öğrenciler, sadece düşüncelerini geliştirmek ve şekillendirmekle kalmaz, aynı zamanda yaratıcılıklarını da geliştirirler. Belirtilen doğrultuda öğrenci oluşumunun sağlanabilmesi için eğitim sürecinde birçok gerekliliğe uyulması gerekmektedir özgürce bilgi edinmeyi, çalışmayı ve yaratıcı bir şekilde uygulamayı öğreten görevler olmalıdır;

Entegrasyon: Disiplinlerarası ilişkilerin içeriğe yansıması, farklı disiplinlerden konuların yüksek verimli, çoklu öğretim konuları ile ilişkili bir şekilde öğrenilmesini amaçlamalıdır.

ACTIVE IN RESEARCH-BASED EDUCATION ORGANIZATION USING LEARNING METHODS.

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FULL TEXT

Our country has accumulated rich experience in the field of conducting research in the organization of research-based education. Currently, this experience plays a major role in making successful progress in education. Even today, the classical pedagogical research tradition is still referenced in the educational construction of society. Basic and pedagogical research is used. However, the rapid change of society in modern times and the establishment of a new education system inevitably make it a task for pedagogical research to respond to these challenges. All this determines the conduct of pedagogical research according to the latest requirements. Both historical and contemporary experience show that pedagogical research must first and foremost be relevant. It should be determined according to the requirements of the time. This requirement is still important. No irrelevant research will be set aside as a result of overwork, as it cannot advance or support development by taking a passive position. .Educational scientists and educational researchers around the world now draw attention to the broader understanding of education. That this idea is true from a modern point of view is known to everyone as an undeniable proposition. In addition, we further develop this approach in our activities and see it as a factor in the formation of a civilized society. Indeed, education is above all a value and can be measured by its own qualities. To reveal this, it is necessary to evaluate its level. With this assessment, the level is determined. The construction of new education also requires that some problems be solved without delay. These problems are more general in

nature and apply to all stages and levels of education. Creating new educational content as a challenge in itself requires the development of standards and curricula. For this, scientific-pedagogical foundations of standards and curricula should be investigated and new content components (standards, curricula) should be developed based on existing practices. Research should be conducted to strengthen the teaching-method base and develop a new methodology at all levels and levels of education there is heed. Rich experience has been accumulated in the field of pedagogical research. Currently, this experience plays a major role in making successful progress in education. Even today, the tradition of classical pedagogical research is still applied in the educational structure of society. Basic and pedagogical research is used. However, the rapid change of society in modern times and the establishment of a new education system inevitably make it a task for pedagogical research to respond to these challenges. All this determines the conduct of pedagogical research according to the latest requirements Long-term planning of pedagogical research, which has existed for many years and continues today, does not meet the needs of the information society. Until the research is completed, it loses its relevance or the results obtained fall behind the developments and cannot get ahead of them. For this reason, determining the duration of research, especially applied research for a short period of time, emerges as a necessity of the age. Educational scientists and educational researchers around the world now draw attention to the broader understanding of education. That this idea is true from a modern point of view is known to everyone as an undeniable proposition. In addition, we further develop this approach in our activities and see it as a factor in the formation of a civilized society. Indeed, education is above all a value and can be measured by its own qualities. To reveal this, it is necessary to evaluate its level. This assessment determines its level. Research on the content and organization of training of pedagogical personnel is becoming more relevant today as one of the main directions. There is a need for research on initial teacher education, teacher professionalism, or any aspect of further education. Increasing a teacher's reputation and improving his career are also considered serious pedagogical problems today. Modern lessons differ from traditional lessons in many ways. The modern lesson is defined as an active (interactive) lesson. The main distinguishing features of the active (interactive) lesson are: The aim of the modern course is to ensure that students consciously and firmly assimilate knowledge, skills and life skills in the conditions of activity and independence and develop as a creative personality. The active (interactive) lesson is based on new requirements - different principles from the traditional lesson. These principles were also put forward as a requirement of the state. . Modern lessons are based on active (interactive)

learning methods: students actively work on the acquisition of new knowledge with the help of methods, perform relevant learning activities and tasks, work on problem solving, exchange ideas and most importantly learn knowledge independently. Research is the central activity of the learning process in an active (interactive) lesson (in a traditional lesson with an explanatory-explanatory character, the central activity of the learning process is the teacher's interpretation); In a traditional lesson, new information is given ready at the beginning of the lesson, while in an active (interactive) lesson, this information is gained independently by the learners themselves during the lesson. İn the active lesson, non-standard lesson types are given wide coverage. One of the features of the active lesson is the establishment of the teacher-student relationship at a new level. In the modern lesson, these relations are not established in the position of subordination-dependency and authoritarian style, as in the traditional lesson, but in the position of equal subject-subject, in a democratic and humanistic manner: the teacher interacts in a collaborative way. creates an environment by entering into a dialogue with the student. In the modern lesson, the student acts as the central factor of learning; acts not as a passive object receiving literal knowledge, but as an active subject, a researcher. And the teacher acts as a guide, guide, adviser, guide in the modern lesson. In the active (interactive) lesson, all attention is focused on the development of the student, on his formation as an independent and creative personality. The teacher creates favorable conditions, a normal spiritual and psychological climate, a supportive environment for the intellectual, mental and spiritual development of students, as well as the development of their individual talents, interests and abilities, and treats them with respect, care and compassion. Intellectual and moral development of learners is given priority in new learning technologies. The application of new technologies in education allows students to express their ideas in a clear and logical sequence. These methods enable students to develop their creativity and create a high communication culture in them. Students who acquire knowledge independently with new learning technologies not only develop and shape their thinking, but also develop their creativity. In order to ensure the formation of students in the specified direction, many requirements must be complied with in the educational process; Integration: The reflection of interdisciplinary relations in the content should aim to learn subjects from different disciplines in a highly productive way in relation to multiple teaching subjects.

Key words: Active, knowledge, technology, research, wire.

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RESISTANCE TO VIOLENCE AGAINST WOMEN IN AMMA DARKO'S *BEYOND THE HORIZON* AND CHIMAMANDA NGOZI ADICHIE'S *PURPLE HIBISCUS*

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ABSTRACT
All the way through history, women have generally got fewer legal rights and career opportunities than men. Wifehood and womanhood were considered as women's most significant professions, and they were long considered naturally as weaker than men. Their rights and their existence were taken for granted. Women were reduced to total silence and subjected to men's diktat but, with schooling and resistance to tradition, the silence seems to have been broken. This paper targets the different ways out of violence against women and the eventual outcomes of women's struggles in Amma Darko's *Beyond the Horizon* (1995) and Chimamanda Ngozi Adichie's *Purple Hibiscus* (2006)

Key words: rights, violence, traditions, resistance, feminism.

INTRODUCTION

In order to regain one's worth and fulfilment, women in general have not only resisted domination through writing, but they have also formed themselves into community that shares each other's stories and support one another. Education, coming together and forming groups for pursuing their plight are both a liberational act and a resistance to depression and loneliness. This study is inspired from a feminist theory and shows on the one hand, the acts of resistance that lead to women's self-assertion and to what those acts have resulted in, on the other hand.

1. Struggles for a Self-assertion

Seen that radical feminism seeks to denounce the domination of women through the patriarchal tradition, the first intension in the selected novels highlights the rhetorical success of the writers to persuade the reader that feminism does take place at all stages of the stories.

Adichie's writings make a strong focus that school education makes women acquire some autonomy in order to compete favourably outside the confines of patriarchy. This exposure to education lines up with the perception of Dickson B. (2013). According to him,

Education gives women a vision of humane experience beyond the narrow confines if their own lives; it bestows a kind of imaginative power and awareness of beauty, dreams, possibility. Even if they cannot literally escape the imprisoning restraints of their patriarchal world, they can imaginatively transcend them through the means of books (Dickson, 2013, p.253).

In *Purple Hibiscus,* female characters like Aunty Ifeoma and Aunty Philipa are educated and liberated women examples. Proofs of resistance are revealed to the narratee early with Ifeoma's opposition to marry again after the death of her husband. In fact, when Papa Nnukwu tells her about his prayers for her to find a good man to get married with, Ifeoma discredits him because what she requires most is a promotion to a senior lecturer (Adichie, 2006, p. 91). She feels free of males' influence and domination. Likewise, she is determined to enjoy her freedom as a sign of her forthrightness and her assertiveness gained from the power of her education.

As Bennett J. and Tamale S. (2017) put it,

"Feminist theory is the foundation of action and there is no pretense that theory can be neutral. Within feminist theory is a commitment to change oppressive structures and to connect abstract ideas with concrete problems for political action. There has to be a commitment to do something about the situation of women" (Bennett & Tamale, 2017, p.147).

In that view, Adichie here, presents Aunty Ifeoma as a character who is stable, firm, focused, reasonable and realistic. She is not alienated like her brother. Because of her tender cares for Papa-Nnukwu, he appreciates her so much: *"Where would I be today if my chi had not given*

me a daughter?" (Adichie, 2006, p. 91). From this quotation, it appears clear to the reader that she has succeeded where a man, precisely her brother Eugene, has failed

Akpabot S. (1986) defines culture as *"a way of thinking, feeling and behaving in any given society resulting in a behavioural pattern which gives that society a distinctive identity"*[1]. From this definition, it is apparent that Aunty Ifeoma, by taking care of her father, shows more interest to their cultural identity unlike his brother Eugene who has not only committed cultural suicide, but has also lost his cultural identity.

To show her protest against such treatment of women in many societies, the author gives us the character of Aunty Ifeoma, who is completely opposite to Beatrice. Ifeoma faces a lot of criticism from the society when her husband dies in a car accident from which she survives. For the society in which she lives, a widow or an unmarried woman who lives on her own is not given a respectable status (Adichie, 2006, p. 83). She is even blamed for her husband's death. We find Ifeoma many a times talking about this attitude of the society and making fun of them (Adichie, 2006, p. 82). She takes care of her entire family on her own, without any support even from her wealthy brother Eugene. Actually, this proof of self-sustenance and strength paints her as an unappreciated woman in her society.

In the narrative, we see that when Ifeoma visits Eugene's home, Kambili feels troubled to see the way she talks and walks in their house. For, the members of the house always talk in hush tones and walk noiselessly. But Ifeoma walks freely there and talks in a loud voice. She does not show any fear of Eugene and seems to be unaffected by the laws prescribed by him (Adichie, 2006, p. 85). She is clearly represented as a contrast to Beatrice, her sister-in-law, who totally depends on her husband because of the fact that she has no school education and no job. Beatrice suffers all the bad effects of patriarchal domination perpetuated in Igbo culture through Eugene.

Adichie portrays the miracle of school education to women empowerment through characters who are educated and other with less or no school education, so as to draw parallels and give some more freedom to the educated ones. Yes, Feminism is also a response to women's lives and experiences. Women who have been to school and got the required school education, are able to escape male oppression unlike the non-educated.

Similarly, the impressive case of Mara in Darko's *Beyond the horizon* is another evidence. She knows nothing about school. One of the trials of motherhood is seen in Mara's practice of

[1]Akpabot, Samuel Ekpe. *Foundation of the Nigerian Traditional Music*. Ibadan: Spectrum, 1986. p.91

prostitution. As soon as she lands in Germany, she get to be conscious that her husband is married to a European woman and so, automatically, she has to play the role of a sister-in-law for her own husband. Her trials continue when her job as a house help with a German family ends abruptly and her husband clandestinely introduces her to her next job, prostitution. Mara's moral deterioration takes only a short time. Within a month, she has become so used to her trade that at peak times she could engage in sex with as many as seven men in one day. When she gets to know that Akobi is using all the money she makes to pay for Comfort's rent and house-building for her at her hometown. Mara's skill at prostitution enables her to make enough money to hire the services of a private detective. With the information from the detective, Mara unleashes her fury at Akobi. The result is that Akobi is put into jail.

In Darko's *Beyond the Horizon*, Mara's realization to resist ideology is animated by her recognition of her loss of dignity. She realizes that she is left with nothing, she has lost virtually every form of meaning in her life, her relationship with her family, especially her mother and her two children. Worse still, Akobi the husband whom she has tried so much to please and serve, has robbed her of this dignity. It is at this point that Mara asks herself, *"Why couldn't I take control of my own life, since after all, I was virtually husbandless and, anyway, what did my husband care about a woman's virtue?"* (Darko, 1995, p. 118). These questions show clearly that Mara has awoken up from her slumbering, which prompts her to act distinctively. Her awakening is applauded acknowledged by Kaye, an older prostitute who watches over her at the brothel. Kaye puts it this way: *'At last, Mara! You have woken up'* (Darko, 1995, p. 119). In order to reverse her oppression in ideology, it is Kaye whom Mara engages. With the cunning, experience and assistance of Kaye, Mara has been able to plan a scheme aimed ultimately at liberating herself from the control of Akobi. Mara really demonstrates her first act of resistance when she tricks her pimp Pompey into believing that *"her capital is completely destroyed"* (ibid.) by one of her customers while she was having sexual intercourse with him. So, instead of sleeping with three men daily as her quota is, she appeals to her pimp to let her take on one man only for the next one month, until she is whole and restored again.

Pompey is *"a rigidly disciplined businessman"* (ibid) who will never go back on his contracts with Akobi. Hence, instead of reducing the quota of customers to one, Mara stealthily increases her count to seven men per day, just so she can make enough money to contract a marriage with a German man, obtain a five-year's resident visa, and buy herself out of *"subjugation*"(Darko, 1995, p. 120).

Mara's second act of resistance is revealed through her act of hiring the service of a private detective to extract

information on Akobi's *"financial deals, private arrangements, properties acquired, if any. Every deal and activity that you are capable of finding out about, I want to know"* (Darko, 1995, p. 133). Armed with this incriminating information she resolves to expose her estranged husband and split his liaison with Comfort. She pulls this off successfully, and Comfort is deported to Nigeria. According to Mara,

Akobi is in jail here in Germany. He attempted to sneak out while still owing money to the bank and a couple of mail order houses and was caught. I am sure that he was wanting to follow Comfort when she got deported. Everything he and Gitte owned has been taken by the bank. Gitte has divorced him and returned to her family. *(Darko, 1995, pp. 138-139)*

Mara achieves all she set out to do and regains her "subjectivity", yet it turns out that she is trapped in the dominant patriarchal practices of sexual objectification, as her determination to *"do the porn films and the stage shows and all there is to it*"(Darko, 1995, p. 131) demonstrates. Although she is freed from the pimp Pompey she ends up being stuck with another pimp Oves for the rest of her life (Darko, 1995, p. 139). Her "new" brothel-situation implicates her acknowledgement of and resignation to her subjection in ideology. She easily states: *"I have plunged into my profession down to the marrow in my bones. There is no turning back for me now"* (ibid.). Implicit in her statements is that although she has for the most part, resisted the dominant subject personified by Akobi and his friend Osey, she has become re-constituted by ideology to be subjected once again to a seemingly different dominant subject, in the person of Oves. At the end of Darko's narrative, what is left of Mara's resistance to ideology is a wasted, yet, this is to show that the way she turns the bad situation in which she lives, to her own profit, is quite amazing and courageous. It is not obvious that she could succeed in taking such a risky decision of hers.

Though Mara could have returned to her village after taking her revenge on Akobi, she still resolves to practise prostitution because she feels that she is an embodiment of all that is humiliating in a woman, and a mother. Instead of coming up with some strategies to end her predicament, she rather plunges herself into it, rationalizing that she is defeated by her trials, which is a very great and courageous decision to be taken.

Darko's *Beyond The Horizon* is an interesting story in the way it differentiates between the traditional and the modern ways of life of a wife and mother. Even though the inadequacies of both are revealed, the author invariably shows her preference for the traditional life. Traditionally, women are the appendage of their husbands and as such they take no decision without their husband's consent and approval. They stay at home and nurture children while

men go to farm. But in modern times, this ideology is going through some modifications. Women no longer stay at home for household chores only. They go out for work and money too as well.

As a whole, they stand for their own welfare through resistant actions whatsoever it may be. In *Purple Hibiscus*, Beatrice Achike, in a frantic bid to free herself and her family from the stifling relationship that was gradually grounding them emotionally and psychologically, poisons her husband and frees them from his misplaced patriarchal control.

The analepsis to Mara and Beatrice's lives shows that they are real heroes but who are inadvertently thrown into frustrating marriages because they want to fulfill the laws of nature as dictated here by tradition.

2. Outcomes of the struggles and others solutions to end up violence against women

Women still live in societies that support and favour female oppression and subjugation. Moreover, the marital institution yet appears to be nothing less than mindless and disturbing for women. For this situation, the main solution for women's transformation is change; a change which can pass through education and bonding. This is the possibility of a new way of culturation and education that raises awareness to the possibility of unstable relationships.

Education has given opportunities to women to think about legal strategies to fight for their freedom: feminist movements. Feminism comes from the Latin word "femina" which stands for woman. Consequently, it will not be wrongly appreciated to hold that feminism is first of all a women-oriented movement that concentrates on questions related to women. The main aim of this literary trend is to bring about a transformation in the society, particularly on the way women are treated. In the long run, it tends to dishearten discrimination and humiliation on women and emphasizes its battle on the emancipation of women because, most of the time, women are consigned to the back of the stage. Henceforth, feminism has been identified as embodying many aspects thanks to the fact that it diverges according to the cultural and historical circumstances surrounding it. For instance, all decisions by men are out of women opinion and an utmost African novels present female characters as sex objects, inferior beings, and those who must only obey the rules made by men.

This degrading representation of women will foster some scholars' ideal to coin the term feminism in their own ones' which can reflect on their realities. Thus, Chikwenye O. (1988) prefers to use womanism when she defines feminism as the movement that

Smacks of rebelliousness, fearlessness, political awareness of sexism and an unpardonable (from the male view point) drive for equality and equity between sexes. It therefore instills fear

in men though it thrills many women. The radical feminist can go as far as doing without the macho male to enjoy her liberty (Chikwenye, 1988, p.61).

On the same note, she describes Womanism as:

the Nigerian woman writer who is constantly aware of the negative connotations of feminist; the fear of being accused by the Nigerian males of allying with the white outsider has turned most Nigerian women writers towards womanism; a black outgrowth from feminism (Chikwenye, 1988, p. 65).

As she furthers her perception of the terms, she takes side for her origin.

Womanism is black centered, it is accommodationist. It believes in the freedom and independence of women like feminism; unlike radical feminism, it wants meaningful union between black women and black men and black children and will see to it that men begin to change from their sexiest stand (1988, p. 65)

She then, theorizes that "Womanism, with its myriad manifestation, is therefore a renaissance that aims to establish healthy relationships among people, despite ethnic, geographical, educational, gender, ethical, class, religious, military and political differences" (1996, p. 123).

Correspondingly, Walker A. (1984) chooses the concept of womanism and describes it as: "a black feminist or feminist of colour […] committed to survival and wholesomeness of entire people, male and female…not a separatist, except periodically, for health […] love struggle, loves the folk, loves herself [...]"[2]

In the same view to clarifying the concept of feminism, Obioma N. (2004) simply terms it as the "Nego-feminism" and defends in "Nego-Feminism: Theorizing, Practising, and Pruning Africa's Way" that:

Nego-feminism is the feminism of negotiation; second, nego-feminism stands for no-ego feminism. In the foundation of shared values in many African cultures are the principles of negotiation, give and take, compromise and balance…African feminism (or feminism as I have seen it practiced in Africa) challenges through negotiations and compromise. It knows when, where, and how to detonate patriarchal land mines. In other words, it know when, where, and how to negotiate with or negotiate around patriarchy in different contexts (Obioma, 2004, pp. 377-378).

In a nutshell, one can summarize that African therefore, must include issues around the woman's body, her person, her immediate family, her society, her nation, her continent and

[2] Alice, Walker. *In Search of Our Mother's Gardens*. London: The Women's Publishers. 1984. pp. xi-xii

their locations within the international economic order because those realities in the international economic order determine African politics and impact on the women.

A matter of fact, in her narrative, Adichie presented the two different types of feminism: African feminism which is often seen as being liberal and tolerates men and Radical feminism which uses violence in order to gain their freedom. The novels under study made it clear that Radical feminism is usually a reaction to violence. It is a measure taken by the victimized to gain his/her freedom. At the beginning, Mama (Beatrice Achike) tolerates the brutality and victimization from her husband as an African woman so as to be regarded as a good woman for the sake of tradition. In African tradition, it is a taboo to be a divorcee. From the opening of the novel, one can clearly predict the type of husband/father Eugene Achike will be to his household. Adichie begins the novel in this way to clearly describe the family as it will be seen all through the novel. Kambili's voice is used in telling us the events as they unfold. The opening of the novel through her voice made us know the kind of father she has when she posits that:

Things started to fall apart at home when my brother, Jaja, did not go to communion and Papa flung his heavy missal across the room and broke the figurines on the "étagère". We had just returned from church. Mama placed the fresh palm fronds, which were wet with holy water, on the dining table and then went upstairs to change. Later, she would knot the palm fronds into sagging cross shapes and hang them on the wall beside our gold-framed family photo. They would stay there until next Ash Wednesday, when we would take the fronds to church, to have them burned for ash. Papa, wearing a long, gray robe like the rest of the oblates, helped distribute ash every year. His line moved the slowest because he pressed on each forehead to make a perfect cross with his ash-covered thumb and slowly, meaningfully enunciate every word of "dust and unto dust shall you return" (Adichie, 11)

But Beatrice will cease, at the end of the story, to be the traditional good woman to a real woman who will not remain silent in the face of tyranny. It is obvious that she has endured a lot from his husband who refused to turn a new leave. She made up her mind to crush anything on his way to happiness not minding who. This is a deliberate attempt by the author in order to prove that those who choose a radical way to achieve their happiness must have given a warning sign before resorting to that way. She refused to take into consideration what the church and the society will say because she believes that they could not tame Eugene and as such, damned their consequences. Her children did not blame her for killing their father except Kambili who objected to her method of killing because, they usually take a sip from their father's sip and would have been killed as well but their mother was wise enough to know when to use the

poison.

Likely, Darko portrays the same picture of the real woman through Mara when she decides to free herself from the state of 'tolerate men' to think, really of herself: *"[…] the body being used and misused belonged to me. What had that got to do with Akobi?* (Darko, 1995, p. 118)

Darko and Adichie portray strong women who confront unfair traditional expectations of women. Ifeoma's determination to remain single and Mara's will to afford a new marriage in Germany can be seen as women's radical move to ridicule unfair cultural expectations. The end of the novels reveal that women can carve out dignified images for themselves apart from marriage and childbirth. These are obviously direct outcomes of women's self-assertion

But, in the view to gaining their worth fulfilment, women have not gone through resistance only. They also form themselves into association or into community. Working in group for support is vital to women since they feel better when they forget this social and affective dimension of their lives as a result of being busy. They have to be connected otherwise, they will no longer be considered as being social creatures. Bonding is so fundamental that the lack of communication, support and socialization is effectively painful. As the main characters Mara in *Beyond the Horizon* and Beatrice in *Purple Hibiscus* endure, there was no happy time, no gossip, no hang out, no public entertainment.

Of course, the short times' exchange that Mara used to have with Mama Kiosk prove to be very important to her development in the view that she starts thinking out about ways to earn money and to give herself a name in her close environment. This fact of sharing concerns with her neighbor is a need for bonding. Likewise, throughout her behaviors, Beatrice feels strong wills to express herself but she could not afford that unless Aunty Ifeoma urges her by trying to have serious and clear discussions with her. She ties closeness with Beatrice in an attempt to pull her out of the violence she endures. Ifeoma is even ready to take Jaja and Kambili to Nsukka so that Beatrice can think freely and leave her house oppression.

Similarly, women at the University of Nsukka find themselves concerned about the management and the different problems harassing the institution and woman like Philipa opts out of troubled water. This movement out of Nsukka to a probable America, enlarges the boundaries for women to face and even challenge oppression and domination. Ifeoma bonds well with those women and knows good information about the list of called disloyal lecturers long before she is fired out.

Another aspect of help found in the necessity of bonding, can be seen when Sisi gets Beatrice the poison that kills Eugene. By acting in such a way, she is giving a helping hand to Beatrice

to overcome her sufferance.

Silence hangs over us, but it is a different silence, one that lets me breathe. I have nightmares about the other kind, the silence of when Papa was alive. In my nightmares, it mixes with shame and grief and so many other things that I cannot name, and forms blue tongues of fire that rest above my head, like Pentecost, until I wake up screaming and sweating. *(Adichie, 2006, p. 309)*

Through these lines, the author enlightens us on the freedom that both mother and daughter can enjoy after the disappearance of the great source of their oppression. The new silence that grips this family up can favour them some freedom that allows them to breathe deeply. This support from Kambili to her mother is also analyzed as a band of heralding female bonding.

"In Africa, in the period before recorded history, women found close ties which helped to strengthen their position. In this way, they were able to take decisions and uphold them in matters that concerned their welfare." [3] This quotation explains how important it is for women to come together in the view to fighting for their welfare which has become nowadays, a common feature in feminist's writings. This same trend finds support from Chioma O. (2004) who advocates for women bonding and which she foresees as a facet of female power.

In fact, forming groups in order to achieve a goal is a process through which traditional Africans gain an energizing spirit since Africans develop a strong sense of life in community.

African women's self-identification focuses on positive collectivity. It also endorses the overt manifestation of womanhood and motherhood with no apologia. Consequently the average African woman's exaltation of marriage and family values and assertion of feminine outlook are important canons of African womanhood.[4]

Kolawole's contention above seeks primarily to address the particular needs of African women which cannot be subsumed under a global feminist agenda due to the African woman's peculiar challenges. Womanism reflects what most African women aspire to, in their bid to experience self-definition and self-assertion. Kolawole M. (1997) goes further to reiterate the main focus of African women's self-definition.

African woman's self-definition focuses on positive collectivity as opposed to individuality. It endorses the overt manifestation of womanhood with no apologia. Consequently, the average African woman's exaltation of marriage, family values, and assertion of feminine outlook are important canons of African womanhood. Nonetheless, these women are crying out for justice where these values and traditions are abused or where the ideals of African culture are perverted

[3] Eseigbo Akachi T. *Gender Issues in Nigeria:* A Feminist Perspective. Lagos; Vistas Books.1996 p.37
[4]Kolawole, Mary E.M. *Womanism and African Consciousness*. Trenton, N.J, African World Press Inc., 1997, p.197

in the patriarchal structure. To many, female bonding therefore consists of bringing out and enhancing common and positive African values, as opposed to building a wall around women in exclusion of men.

Kolawole's desire is that African women find wholeness and integration both in the private and in the public sphere that influenced her to propound this theory she refers to as African Womanism. Indeed it is our understanding of the tenants of African Womanism that has informed our choice of this theory as the single most appropriate theory that illuminates our understanding of both Amma Darko's and Adichie's novels. What these novels seek to do is clearly to use literature as a vehicle to transport values aimed at helping the African woman to experience self-retrieval, self- definition and self-assertion in positive cultural ways.

However, the best way to end violence against women and girls is to prevent it from happening in the first place by addressing its root and structural causes.

Prevention should start early in life, by educating and working with young boys and girls promoting respectful relationships and gender equality. *"Working with youth is a 'best bet' for faster, sustained progress on preventing and eradicating gender-based violence."*[5]

Prevention entails supporting the promotion of gender equality, women's empowerment and their enjoyment of human rights. It also means making the home and public spaces safer for women and girls, ensuring women's economic autonomy and security, and increasing women's participation and decision-making powers- in the home and relationships, as well as in public life and politics. Working with men and boys helps accelerate progress in preventing and ending violence against women and girls.

CONCLUSION

Darko and Adichie, have presented two different types of feminism: the Liberal and the Radical. Ifeoma was associated with the radical way of standing up for her right while Beatrice at the beginning of the novel was liberal but when it became obvious that her life is at risk, she dammed the consequences and went radical. This is a deliberate attempt by Adichie and Darko to prove that radical feminism is a reaction to some circumstances, they believe that one can't wake up and start crushing anything that stands in his/her way. It is sometimes due to situations that seem to overpower the person. Beatrice's radical way of ending her husband's life was

[5] UN Women's report on *Ending violence against women,* online article, April 18, 2016

prompted by his violent actions which she brought to an end by poisoning his tea.

Eventually, all these thoughts along with the different acts of resistance so far, seek the way to freedom. In the two novels, *Beyond the Horizon* and *Purple Hibiscus*, they are seen as a long way to self-assertion as required by feminism.

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SURVIVAL AND GROWTH PERFORMANCE OF *Heterobranchus bidorsalis* FINGERLINGS FED WITH VARYING LEVEL OF COMPOSITE FISH OFFAL

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ABSTRACT
This experiment was aimed to evaluate the growth performance and survival of *Hetrobranchus bidorsalis* fingerlings fed with diets containing various percentages of fish composite to determine the optimum level of composite fish offal inclusion in diets of *H. bidorsalis*. Five diets of T1(0%), T2(25%), T3(50%), T4(75%) and T5(100%) levels of composite fish offal substitutions were formulated to contain 40% crude protein and similar energy levels. The feeding trail was carried out for period of 56 days. The total of 150 fingerlings fish was randomly distributed into three replicates of five experimental groups in a 35liters capacity plastic bowl using Completely Randomize Design (CRD). Each replicate consists of 10 fish with a mean weight of (4.00±0.2g). At the end of the experiment, result showed that weight gain (WG), survival rate (SR), feed conversion ratio (FCR), specific growth rate (SGR), Gross Feed Conversion Efficiency (GFCE), protein efficiency ratio (PER) and Feed Efficiency (FE) of T1 were observed to be statistically $P>0.05$ similar with T2 and T3. The water quality parameters show that the culture medium was within the optimal level. The study showed that diets with inclusion rate of 25% to 50% composite fish offal gave similar result as that fed with control diet. Therefore, it was concluded that fish composite with inclusion rate of 25% to 50% could be fed to *H. bidorsalis* catfish without any negative effects on the growth and survival.

Keywords: *Hetrobranchus bidorsalis*, Fingerlings, Feeding, Growth, Survival, Diet, Composites Fish Offal

INTRODUCTION

Aquaculture is one of the fastest growing food production sectors in the world and provides significant supplement and substitute to wild fishes (Adebayo and Quadri, 2005). Fish are cultivated for food and are sources of revenue for the growing human population, restocking of streams, lakes, and rivers to curb the shortage due to the decline in the wild capture and for sport fishing (FAO, 2000). Aquaculture aims at production of fish to provide protein in the diet (Sugunan, 2002). Fish is easily digestible and has ability to prevent and manage heart disorders and neurological diseases (Tan *et al.,* 2007).

Fish is the cheapest source of animal protein and account for about 40% of the total protein intake by the average Nigerian (Atanda, 2007). The dynamics of Nigeria's demographic figure is in favor of perpetual increase with the attendant challenge on food security vis-à-vis increasing demand for dietary protein. This is evident in the rising consumption of fish which aquaculture now provides a substantial quantity of the fish protein consumed (FAO, 2016). Sustainability of the consistent expansion of Aquaculture industries depends on development of fish culture techniques in order to obtain the most efficient, safe and cost effective methods for producing aqua products (Sadiku, 2003)

Feed accounts for about 50-80% of fish production cost (Craig and Helfrich, 2009). The implications of high cost of feed are universal to both the fish culturists whose concerns are the production levels, operational costs and sustainability of their ventures and the consumers whose consideration is meeting their fish protein per capita within their convenient budgets. Dietary protein and energy are responsible for the high cost of feed for both fish and livestock (Khattab, *et al.,* 2004 and Medugu *et al.,* 2011). These have prompted researches into possible reduction of feed cost through utilization of cheaper alternative sources of dietary protein, reduction in the dietary protein levels and utilizing the available dietary protein and energy efficiently with assured improvement in the desired performance of the cultured fish (Abowei and Ekubo, 2011; De Silva *et al.,* 2016 and Lovell, 1989).

The use of fish offal whose composite include fish gut/intestine has been successfully used in fish nutrition to reduce cost of feeding. Tilapia offal has been reportedly used in aquaculture diets to feed fish (Fagbenro and Jauncey, 1994). In their study, Hossain *et al.,* (2003) replaced fishmeal with broiler offal in broiler diet at lowest feed cost per kg and observed a significant growth performance. More so, Lien and Ly (2001) reported that the use of fish silage with molasses could replace fishmeal in the diet for growing pigs. Fermented fish silage produced by addition of lactic acid, bacteria and a carbohydrate source was produced from Tilapia offal

and subsequently used in aquaculture diets to feed fish and significant growth performance was recorded (Fagbenro and Jauncey 1994).

One of the major problems facing the aquaculture industries today is the high cost of fish feed, which contributes more than 50% of the total cost of production in intensive culture systems (Ali *et al*, 2005). The studies conducted by (Omitoyin 2005 and Adeyemi *et al*.2004) revealed that majority of feed ingredients required for animal feeds can be met by using agro-industrial products, which are considered as wastes. The cost of feeding fish on artificial feed is very high only very few farmers can afford it. This problem has been attributed to high cost of fish meal and irregular supply of conventional fish feed ingredients. The method to reduce feed cost of fish meal with alternative cheaper protein sources is by substitution. However, composite of fish offal is readily available and economical. The use of composite of fish offal may allow greater flexibility in diet formulation without loss of fish performance.

The use of non-conventional animal feed ingredients to replace conventional type such as fishmeal as animal protein source in diets for cultured species had been explored widely by various researchers including maggot meal (Adewolu, 2010), poultry by-product meal (Turker *et al* 2005) and feather meal (Adewolu, 2010) among others. The high cost of feed ingredients makes it too expensive for an average farmer, and hence most fish farmers use agricultural waste as a fish feed (Devendra, 1988). Conventional feed stuff for feeding fishes are scarce and expensive, hence this resulted to the need to improve the production of the fish in captivity using cheap and available unconventional feed ingredients such as composite of fish offal which is usually sold to farmers at cheaper prices compared to fish.

The aim of this study is to evaluate the growth performance and survival of *Heterobranchus bidosalis* fingerlings fed with diets containing various percentages of fish offal composite.

The Specific Objectives are:

i. To analyze nutritive composition of composite of fish offal.
ii. To determine the survival and growth performance of *H. bidorsalis* fingerlings fed varying levels of composite of fish offal.

To determine the optimum level of composite of fish offal inclusion in diets of *H. bidorsalis.*

MATERIALS AND METHODS

Experimental Site

The experiment was carried out at Fisheries Laboratory Department of Forestry and Fisheries, Kebbi State University of Science and Technology Aliero, Nigeria located on latitude 110

7.91N and longitude 70 45.59 1E

Experimental Materials and Equipment

The materials and equipment that were used during the experimental period are 35liters plastic bowls, thermometer, sensitive weighing balance, siphoning tubes, pH meter and aerator.

Sample Collection

The Sample of the fish composite (offal) was obtained from fish seller at Jega market, Jega Local Government Area of Kebbi State, Nigeria. The composites contain (intestine, liver, eggs, babel, gill rakers etc) and they were removed with aid of knife and hand. The collected sample was subjected to 50^{o}C temperature for 10 hours until the moisture content and fat content was reduced and was room dried. The dried sample was grinded into meal and combined with the experimental diet ingredients included in fish feed at 25%, 50%, 75% and 100% respectively.

Experimental Fish

A total number of (150) fingerlings of *Heterobranchus bidorsalis* were purchased from Abdulsalam Fish Farm New Bussa, Niger State, Nigeria. The fish were sorted into uniform average size (4.0 ± 0.2g) using sensitive weighing scale (Model: XY300-2C) and were allocated randomly into 15 plastic bowls having 10 fingerlings each. The fish were acclimatized for 7 days in plastic bowl during this period they were fed with commercial diet of 40% crude protein.

Experimental Design

Fifteen (15) of 35liters capacity plastic bowls were used for this study, which contain five treatments replicated three times in a Completely Randomize Design (CRD). Fifteen (10) fingerlings were stocked per bowl and each diet were fed to three replication bowls. The weight of the fingerlings was measured before commencement of the feeding trial.

Experimental Diet

Five experimental diets of T1(0%), T2(25%), T3(50%), T4(75%) and T5(100%) percentage level of inclusion of fish composite were formulated at 40% crude protein and prepared for experiment.

Table 1: Gross Composition of Experimental Diets

Ingredient	**T1(0%)**	**T2(25%)**	**T3(50%)**	**T4(75%)**	**T5(100%)**
Wheat offal	7.69	7.69	7.69	7.69	7.69
Rice bran	22.31	22.31	22.31	22.31	22.31
Fish meal	15.38	11.54	7.69	3.85	0.00
Composite fish offal	0.00	3.85	7.69	11.54	15.38
Groundnut cake	23.08	23.08	23.08	23.08	23.08
Soyabean meal	26.16	26.16	26.16	26.16	26.16
Methionine	1.15	1.15	1.15	1.15	1.15
Lysine	1.15	1.15	1.15	1.15	1.15
Premix	1.15	1.15	1.15	1.15	1.15
Salt	0.39	0.39	0.39	0.39	0.39
Palm oil	1.54	1.54	1.54	1.54	1.54
TOTAL	**100**	**100**	**100**	**100**	**100**

Proximate composition

The collected sample and experimental diets were subjected to proximate analysis at the Agricultural physical laboratory in Faculty of Agriculture Usmanu Danfodio University Sokoto, Nigeria. The analysis includes Moisture content, Ash content, Crude fiber, Crude lipid, Crude protein and Nitrogen Free Extract (NFE) determination using standard methods (AOAC, 2000).

Table 2: Proximate Composition of Composite of Fish Offal and Experimental Diet

Parameters	**CFF**	**T1(0%)**	**T2(25%)**	**T3(50%)**	**T4(75%)**	**T5(100%)**
Moisture content	4.38	9.75	9.60	9.80	9.70	9.71
Crude protein	64.56	40.50	41.55	42.05	39.99	39.98
Crude fiber	2.21	7.96	8.54	8.65	9.10	9.12
Ether extract	11.95	13.70	10.66	11.60	11.45	11.47
Ash content	6.40	10.12	21.32	19.35	21.85	21.78
NFE	8.50	18.97	8.33	8.55	7.91	7.94

Key: CFF = Composite of Fish Offal

Feeding and Sampling

The experimental diets were randomly assigned to each treatment in triplicate. The fingerlings were fed to satiation at 3% body weight three times daily for 8 weeks. The sampling was done weekly to determine the new body weight.

Water Quality Parameters

The water quality parameters that were monitored during the experiment include: Temperature (^{o}C) which was determined using mercury thermometer. Dissolve Oxygen (DO) was determined using Winkler's method. The Hydrogen concentration (pH) was determined using (pH indicator paper).

Table 3: Water quality parameters monitored during the experimental period

Treatment	DO (mg/l)	Temperature (^{O}C)	pH
T1	7.00±0.00^{a}	24.33±0.00^{a}	6.33±0.00^{a}
T2	7.67±0.00^{a}	24.67±0.00^{a}	6.67±0.00^{a}
T3	8.00±0.00^{a}	24.67±0.00^{a}	6.67±0.00^{a}
T4	8.33±0.00^{a}	24.67±0.00^{a}	6.67±0.00^{a}
T5	8.67±0.00^{a}	25.00±0.00^{a}	6.67±0.00^{a}

Mean with the same superscript are not significantly different (P>0.05)
Key: DO = Dissolve Oxygen

Fish Performance Indices

1. Weight Gain (WG)

This was calculated as

Weight gain = $W_2 - W_1$

Where, W_1 = initial weight

W_2 = final weight

2. Specific Growth Rate (SGR %/day)

This was calculated as

$$SGR\% = \frac{InW2(g) - InW1(g)}{T} X\ 100$$

Where, W_1 = initial weight

W_2 = final weight

T = number of days in feeding period

In = natural logarithmic

3. Feed Conversion Ratio (FCR)

FCR is the ratio between the weights of the food consumed divided by the weight gain by the fish.

$$\text{FCR} = \frac{\text{Feed intake (g)}}{\text{Weight gain (g)}}$$

4. Survival Rate (SR %)

$$\text{SR \%} = \frac{\text{Nt}}{\text{N0}} \text{X } 100$$

Where, Nt = Number of fish that survived

N0 = Total number of fish stocked

5. Gross Feed Conversion Efficiency (GFCE)

$$\text{GFEC} = \frac{1 \text{ X } 100}{\text{FCR}}$$

6. Feed Efficiency (FE)

$$\text{FE} = \frac{\text{Weight gain (g)}}{\text{Feed intake (g)}}$$

7. Protein Efficiency Ratio (PER)

$$\text{PER} = \frac{\text{Mean Weight gain (g)}}{\text{Mean Protein intake (g)}}$$

Statistical Analysis

The data obtained from the growth and water quality parameters analyzed using Statistical Package of Social Sciences (SPSS Version 25.0). One-way analysis of variance (ANOVA) was used to calculate the mean. The differences in means were compared using Duncan multiple range test at ($P<0.05$) level of significance.

RESULTS

Proximate composition of composite of fish offal and experimental diet

Result from table 3.2 showed that composite of fish offal was found to have CP of (64.56%) which is relatively similar to CP of fish meal (65.5%), moisture content of (4.38%), ether extract level of (11.95%), crude fiber of (2.21%), ash content of (6.40%) and NFE of (8.50%). The proximate composition of the experimental diet from the result shows that the Moisture content has high value in T3 (9.80%) and low in T2 (9.60%). Crude protein was highest in T2 (41.55%)

and least in T5 (39.98%). The ether extract level in the diets has high value in T1 (13.70%) and low value in T2 (10.66%). The crude fiber level is higher in T5 (9.12%) and low in T1 (7.96%). The Ash content has no significant different (P<0.05) in all treatments but T4 (21.85%) has higher value and T1 (10.12%) has least value.

Water quality parameters monitored during the experimental period

Table 3.3 shows that the water quality parameters analyzed during the experiment were within the acceptable range of recommended for *H. bidosalis* and are not significantly different (P<0.05) in all treatments. The D.O has higher value in T5 (8.67±0.00) and least in T1 (7.00±0.00). The Temperature has higher value in T5 (25.00±0.00), T2, T3 and T4 has (24.67±0.00) while least value in T1 (24.33±0.00). Similarly, pH has high value in T2, T3, T4, T5 (6.67±0.00) and low value in T1 (6.33±0.00).

Growth performance of H. bidorsalis fed with composite of fish offal.

The survival of the fingerlings was high in the T1 (86.63%) and low in T5 (53.33%). Generally, the survival was good in all the treatments. This could be attributed due to proper handling during the whole experimental period. At the end of the experiment the result in table 4.1 shows that there is significant difference (p<0.05) in WG but T1 (6.20±1.00), T2 (5.94±0.87) and T3 (4.82 ±0.34) has the highest value and least in T4 (2.58±0.74) and T5 (1.24±0.54). The SGR has high value in T1, T2 and T3 and low in T5. The result further show that FCR in all treatments was significantly different (p<0.05) having high value in T5 (3.29±0.06) and low in T4 (2.49±0.06). The PER shows some level of significance (p<0.05) in T1 (1.55±0.06), T2 (1.28±0.06) and T3 (1.8±0.06) but has high value in T1 (1.55±0.06) and low value T5 (0.23±0.06). The FE in all treatments was significantly different (p<0.05) where T1 (0.15±0.01) has high value and T5 (0.03l±0.01) has low value. Similarly, GFCE has highest value in T1 (3.10±0.06) and least value in T5 (0.90±0.06).

Table 4.1 Growth performance of H. bidorsalis fed with composite of fish offal.

TRT	IW (g)	FW (g)	WG (g)	SGR %/day	SR (%)	FCR	GFCE	FE	PER
T1	4.00 ± 0.2^{a}	10.20 ± 0.45^{a}	6.20 ± 1.00^{a}	3.10 ± 0.06^{a}	86.67± 0.6^{a}	2.74 ± 0.06^{b}	36.50 ± 0.06^{b}	0.15 ± 0.01^{a}	1.55 ± 0.06^{a}
T2	3.98 ± 0.2^{a}	9.92 ± 0.52^{a}	5.94 ± 0.87^{a}	2.73 ± 0.06^{b}	80.00± 0.6^{a}	3.14 ± 0.06^{a}	31.86 ± 0.06^{d}	0.10 ± 0.01^{b}	1.28 ± 0.06^{b}
T3	4.00 ± 0.2^{a}	8.82 ± 0.32^{a}	4.82^{a} ± 0.34^{a}	2.20 ± 0.06^{b}	73.33± 0.6^{a}	2.87 ± 0.06^{b}	34.84 ± 0.06^{c}	0.08 ± 0.01^{b}	1.18 ± 0.06^{b}
T4	3.99 ± 0.2^{a}	6.57 ± 0.27^{b}	2.58 ± 0.74^{b}	1.13 ± 0.06^{c}	63.33± 0.6^{a}	2.48 ± 0.06^{c}	40.32 ± 0.06^{a}	0.04 ± 0.01^{c}	0.45 ± 0.06^{c}
T5	3.97 ± 0.2^{a}	5.22 ± 0.21^{b}	1.24 ± 0.54^{b}	0.90 ± 0.06^{d}	53.33± 0.6^{a}	3.29 ± 0.06^{a}	30.40 ± 0.06^{d}	0.03 ± 0.01^{c}	0.23 ± 0.06^{d}

Mean values on the same column with the same superscripts are not significantly different (P>0.05)
TRT = Treatment, IW = Initial Weight, FW = Final Weight, WG = Weight Gain, SGR = Specific Growth Rate, RGR = Relative Growth Rate, SR = Survival Rate, MR = Mortality Rate, FCR = Feed Conversion Rate, GFCE = Gross Feed Conversion Efficiency, FE = Feed Efficiency, PER = Protein Efficiency Ratio.

DİSCUSSİON

The crude protein contents of the experimental diets (39.98 – 42.05%) were within the range recommended in *H. bidorslis* formulated test diets and it met the protein requirements (30 - 40%) recommended as being optimum for growth in the *H. bidorslis* (Faturoti, 2000). This research shows that fish offal can replace fishmeal up to about 50% without any negative effect on growth. This is similar to the findings of Soltan *et al.* (2002) and Tegene *et al.*, (2018) who stated that fish offal meal represented a good protein source due to its high content of the essential amino acids which can replace the conventional diets of *O. niloticus*. This result agrees with the findings of Farahiyah *et al.*, (2015) who stated that commercial feed might contain compounds such as attractants to lure fish to consume more of the feed thus gaining weight, however the efficiency in converting the feed to meat and the efficiency of utilizing the protein content in the feed was not significantly different with fish fed with diet based on 100% fish offal meal inclusion.

Feed conversion ratio FCR feed per unit of body weight gain) is an important indicator of the quality of fish diets, a lower FCR indicate better utilization of the fish feed (Mary *et al.*, 2015). According to a research by Tegene *et al.*, (2018), fishes fed with soybean meal, poultry litter and fish offal had an FCR which were not significantly different from each other which may imply that the experimental diets had comparative nutritional value to control diet. FCR recorded in this research is similar to those reported by Tegene *et al.*, (2018), Stickney and McGeachin (1984). In addition, the PER of all the fish fed in this experiment was observed not to be significantly different. This result suggests that protein sources other than fishmeal could

be used to partially supplement for fish meal in fish diets.

The specific growth rate and relative growth rate recorded for fish fed three times daily in this study were also observed by Gabriel *et al.*, 2000 for *Heterobranchus bidorsalis* fingerlings fed at 3% body weight 3 times daily. However, reports show that feeding channel catfish twice/day produced similar growth rates compared to fish fed three times/day when grown in tank (Webster et al., 1998) or in ponds (Webster et al., 1999). Robinson *et al.* (1995) reported that when channel catfish were fed once daily, time of feeding had no significant impact on growth, feed conversion or body composition. The mean weight gain and weekly weight gain recorded in this experiment were very much lower than that reported for *Heterobranchus* and *Clarias* species in low input homestead concrete tanks and brackish water pond environment (Legendre, 1998; Egui, 1999), but similar to those observed by Gabriel *et al.* (2000).

All the water quality parameters analyzed during the experiment were within the acceptable rage of recommended range and considered suitable for the growth of African catfish as reported by (Legendre *et al.*, 2008) minimum and maximum temperature for tropical fish ranges from 25 - 32^0C. (Ovie and Adeniji 1990) also recommend the pH value to be 6.5 - 9.0. Survival in the present study was within the range reported by Webster *et al.* (2001) who observed that juvenile sunshine bass, *Morone chrysops X M. saxatifilis*, had survival percentages between 62-75%. All mortalities may be attributed to handling stress after weekly parameters handling.

CONCLUSİON

The result obtained from this study shows that the composite of fish offal can be used to replace fish meal partially in the diet of *Hetrobranchus bidorsalis*, where fish farmers cannot afford the high cost of fish meal. Moreover, the composite of fish offal can effectively replace fish meal to about 50%. Fish composite is readily available, affordable and economical. The use of fish composite may allow greater flexibility in diet formulation without loss of fish performance. In order to avoid excessive deposition of feed in the culture medium, replacement of up to 50% in term of weight gain and survival is therefore recommended for optimal growth performance and survival.

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A REVIEW: DISEASE PREDICTION USING MACHINE LEARNING

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ABSTRACT
Heart disease is a serious problem in many countries around the world. Coronary heart disease is Malaysia's number one killer, with 50 people dying from the health condition daily. The causes of cardiovascular disease range from structural defects, to infection, inflammation, environment and genetics. In order to help prevent cardiovascular disease, one must adopt a healthy lifestyle and avoid smoking, fattening foods and stress. Early diagnosis could be a big help to anyone who's experiencing heart disease symptoms. The amount of data collected by medical center could exceed thousands, even more millions per year, however, these data aren't mined properly to extract hidden pattern that could help in early diagnosing of heart disease. This paper will discuss all analytical methodologies for detecting relationships in health profiles intelligently, using the advantages and expertise of machine learning such as Artificial Neural Network, Fuzzy Logic and Random Forest. Each machine learning gives a different result accuracy, therefore there is variability in the accuracy obtained. The development of predictive models using machine learning has proven its widespread need in the field of health, therefore the construction of predictive models should be preceed according to various levels of complexity, using a collection of data from various sources to maximize the accuracy of the results obtained. This reveiews would conclude that the hybridization of few machine learning algorithms in prediction shows a promising prediction accuracy as compared to the use of single algorithms.

Key Words: Heart Disease, Neural Network, Fuzzy Logic, Random Forest,Prediction

1. INTRODUCTION

Contrary to cardiovascular disease which involves any problems related to the entire circulatory system, heart disease involves any condition that affects the structure and function of a heart. It can be fatal, but for some people, it is also preventable. It has been the leading cause of death worldwide. In United States, it is reported that heart disease has been the cause of 1 in every 4 deaths[1].

Heart disease is also often referred to as the silent killer [2] because the disease is not diagnosed as long as a person does not experience signs or symptoms of a heart attack or heart failure such as chest pain, extreme fatigue, shortness of breath etc.

Among the major risk factors for heart disease are high blood pressure, unhealthy cholesterol level, and smoking and it is said that about half of Americans have at least one of these three risk factors [1]. There are several risk factors for heart disease that are not controllable, namely age or family history. The National Heart, Lung, and Blood Institute (NLHBI) states the risk of heart disease increases at ages 55 and 45, in women and men, respectively. A person will be at a potentially greater risk if he or she has a close family member who has a history of heart disease.

However, other factors such as unhealthy eating habits, obesity and diabetes are factors that can be controlled by humans. While genetic factors and age can increase the risk of heart disease, unhealthy lifestyle choices also play a big role[1]. Therefore, if these factors can be well controlled, to a certain extent can reduce the risk of heart disease in an individual.

It has drawn the world's attention that heart disease is the leading cause of death worldwide. Therefore, the development of this model is critical to the many treatment guidelines available. The prognosis of heart disease can help doctors make more accurate decisions about the health of patients, coupled with the use of machine learning is very important to identify and understand the symptoms associated with heart disease.

1.1 Risk factors of heart disease

Among high risk factors for a heart complication are the patient with high blood pressure, unhealthy blood cholesterol level, smoking and also patient whose suffer of diabetesmellitus [1][3]. High blood pressure will occur when there is an increase in blood pressure in the arteries and other blood vessels. Blood pressure high can cause damage to the arteries by making them less elastic, thus minimizing the flow of blood and oxygen to the heart. This condition will lead to angina, heart failure and heart attack. Unhealthy blood cholesterol levels occur when there is

excessive cholesterol intake can cause a build-up in the walls of arteries [4], leading to a condition called atherosclerosis. It will cause the arteries to become narrow and slow or restrict blood flow to the heart muscle. Lack of oxygen and blood reaching the heart can cause chest pain.

Smoking habit when higher amounts of cigarettes smoked per day will affect the risk rate of CVD for an individual, especially when it persists for many years. Chemicals in cigarette smoke cause the cells that line blood vessels to become swollen and inflamed. The chemicals found in cigarette smoke will cause the cells lining the blood vessels to become swollen and inflamed, which will cause narrowing of the blood vessels. Meanwhile, diabetes mellitus will cause a buildup of sugar in the blood. Adults with diabetes are more at risk for heart disease than those without diabetes. Diabetes can cause changes in the chemical composition of some substances found in the blood as well as cause narrowing and blockage of blood vessels.

2. RELATED WORKS

The review of literatures is done by focusing the prediction algorithms in fuzzy, artificial neural network (ANN) and random forest (RF) of medical datasets.

2.1 Fuzzy application in medical

The proposed technique [5] used Fuzzy Inferense System seems to be promising becauseof possibility to describe in flexible manner patients' labels and absence of crisp borders between stages. Overall performance that was estimated using a k-fold cross-validation methodology is characterized by 80% and above for sensitivity, specificity, accuracy and positive predictive value for AD vs. Normal classification. Risk analysis of lung cancer and effects of stress level on cancer risk through Neuro-Fuzzy Model is the effort using ANFIS (Adaptive Network-Based Fuzzy Inference System) that enables prediagnosis of lung cancer to every patient who might have the risk of getting cancer due to their clinical and social condition with 94.64% performance [6]. The results of the study [7] indicated the effectiveness of the FDT classifier method to achieve low error rates in comparison with crisp DT with 94.98% accuracy using Fuzzy Decision Tree. Later, the work by [8] proposed a system via Fuzzy Inferense System that can help any dengue patients to take the right therapeutic measures timely in addition to the initial diagnosis of patients with the probability of dengue fever. Adaptive Network-Based Fuzzy Inference System is demonstrated in [9] to enable prediagnosis of lung cancer to every patient who might have the risk of getting cancer due to their clinical and social condition with 94.64% performance. Again, with Fuzzy Decision Tree, the results by [10] indicated the

effectiveness of the FDT classifier method to achieve low error rates in comparison with crisp DT with 94.98% accuracy. Other effort by [11] used Fuzzy Inferense System to help any dengue patients to take the right therapeutic measures timely in addition to the initial diagnosis of patients with the probability of dengue fever. The proposed approach can predict heart diseases with the maximum accuracy of 78% compared to existing work [12]. The authors implemented Rule-Based Fuzzy Logic Model as their algorithm. A combination of Fuzzy Logic and Genetic Algorithm is performed in [13] datasets are trained and tested using the tenfold method and gets an accuracy of up to 88.11% and because this model proves better results compared to some well-known classifiers so as to help domain experts and even field-related people to plan better diagnoses. The main contribution of this study is to produce precise ruleset to predict the level of risk of heart disease based on the given medical parameters. Then, the efforts from [14-15] use fuzzy logic. The authors demonstrate prediction of heart disease even before the angina pectoris arises (chest pain). It is the simplest and efficient way to diagnose the heart disease analysis and the prediction is 90% accurately more than the expert's statistical analysis [14] while the results of experiments on two different datasets indicated that the proposed method achieved good prediction accuracy (94.4%) for breast cancer [15]. By adopting Rule Based Fuzzy Logic [16], the findings illustrate the combination of fuzzy rule-based and CART techniques can improve disease diagnosis and help physicians to predict disease. In contrast, Genetic algorithm (GA) based trained recurrent fuzzy neural networks (RFNN) is the algorithm chose in [17] to achieve a testing set (45 instances) accuracy of 97.78% and an overall accuracy of 96.63%. Compared with the ANN-Fuzzy_AHP approach where the accuracy is 91.1% for the testing set (45 instances), the proposed approach is distinctively better. The most recent paper in [18] is absed upon Fuzzy Logic and Genetic Algorithm to efficiently handle the noisy data. It works efficiently even on huge number of attributes. Also, the proposed model avoids entrapment in local optimum. Table 1 depicts the overall dimensions between Authors (Year) vs the fuzzy and hybrid fuzzy algorithms used.

Table 1. Dimension between Authors (Year) vs the fuzzy and hybrid fuzzy algorithms used

Author (Year)	**Algorithm used**						
	Fuzzy Logic	**Fuzzy Inference System**	**ANFIS (Adaptive Network-Based Fuzzy Inference System)**	**Fuzzy Decision Tree**	**Rule-Based Fuzzy Logic Model**	**Fuzzy Logic and Genetic Algorithm**	**Genetic algorithm (GA) based trained recurrent fuzzy neural networks (RFNN)**
Igor Krashenyi, Anton Popov Javier Ramirez, Juan Manuel Gorriz **(2015) [5]**		√					
A. Yılmaz, S. Arı, Ü. Kocabıçak **(2016) [6]**			√				
Ilham KADI and Ali IDRI **(2016) [7]**				√			
Darshana Saikia and Jiten Chandra Dutta **(2016) [8]**		√					
G. Thippa Reddy and Neelu Khare **(2016) [9]**					√		
Purushottam Sharma, Kanak Saxena **(2017) [10]**						√	
M. Kowsigan, A. Christy Jebamalar, S. Shobika, R. Roshini and A. Saravanan **(2017) [11]**	√						
Mehrbakhsh Nilashi, Othman	√						

Ibrahim, Hossein Ahmadi, Leila Shahmoradi **(2017) [12]**							
Mehrbakhsh Nilashi, Othman bin Ibrahim, Hossein Ahmadi, Leila Shahmoradi **(2017) [13]**					√		
Kaan Uyar, Ahmet İlhan **(2018) [14]**							√
G. Thippa Reddy, M. Praveen Kumar Reddy, Kuruva Lakshmanna, Dharmendra Singh Rajput, Rajesh Kaluri Gautam Srivastava **(2020) [15]**						√	

2.2 Artificial Neural Network application in medical

The authors in [16] proposed a hybrid algorithm based on K-Means and ANN in predicting heart disease to improve prediction accuracy. The implementation result shows a higher accuracy rate of 97% of disease detection. Then, the Computer Aided decision making for heart disease detection is formulated [17] using Hybrid Neural Network-Genetic Algorithm. By using this method, CAD can be detected without angiography which can help eliminate high costs and major side effects. The achieved accuracy, sensitivity and specificity rates of 93.85%, 97% and 92% respectively. The proposed NN-FCA, which utilizes feature correlation analysis [18], was found to be better than (Framingham risk score) FRS in terms of CHD risk prediction. Furthermore, the proposed model resulted in a larger ROC curve and more accurate predictions of CHD risk in the Korean population than the FRS. An Artificial Neural Network based approach for the diagnosis of hepatitis virus that is adorementioned in [19]. Factors such as age,

sex, steroid, antivirals, fatigue, malaise, anorexia, liver big, liver firm splean palpable, spiders, ascites, varices, bilirubin, alk phosphate, SGOT, albumin, protine and histology, were then used as input variables for the ANN model. Test data evaluation shows that the ANN model is able to correctly predict the diagnosis of more than 93% of prospective patients. A heart disease prediction system using Artificial Neural Network backpropagation algorithm is proposed [20]. Total of 13 clinical features were used as input for the neural network which then was trained with backpropagation algorithm to predict absence or presence of heart disease. The result came out with accuracy of 95%. The model by [21] is giving precise results and a significant part of those results are positive results. The software is also able to provide explanations to the final user of the reasons why such diagnostic was made, based on weights determined during the training process and attributed to variables that have more contribution to the diagnostic. An ANN model was presented [22] for Parkinson's disease prediction to help specialist in the field and the accuracy reached 100%. A multi-level model has been proposed to predict Cardiovascular Heart Disease (CHD) using highly unbalanced clinical data, with both qualitative and quantitative attributes [23]. The research confirms that the proposed Convolutional Neural Network (CNN) architecture achieves the strength of correctly classifying CHD attendance of 77% while 81.8% is achieved in classifying the absence of CHD cases on test data precisely, making up 85.70% of the entire dataset despite of the high-class imbalance in the NHANES dataset. The proposed CNN model also predicts negative (Non-CBC) cases with higher accuracy and have a better balanced accuracy (79.5%) compared to other machine learning methods, such as SVM and Random Forest. Then, a work in [24] proposed a deep learning-based Heterogeneous Modified Artificial Neural Network (HMANN) method for the segmentation and early diagnosis of chronic renal disease on the Internet of Medical Things (IoMT) platform. It is classified as a Support Vector Machine and Multilayer Perceptron (MLP) with a Backpropagation (BP) algorithm. The proposed method has been shown to reduce noise and help identify the location of kidney stones clearly by segmenting the kidney picture. In kidney segmentation, the proposed HMANN method achieves an accuracy to 97.50% and reduces the time to draw contours impressively. Finally, paper by [25] highlighted a neural network classification model to estimate the association among gender, race, BMI, age, smoking, kidney disease and diabetes in hypertensive patients. Artificial neural network techniques applied to large clinical data sets can provide meaningful data driven approach to categorize patients for population health management, and support in the management and detection of hypertensive patients, which are part of a critical factor for heart

disease. The results from an imbalanced dataset of 24,434 with (69.71%) non-hypertensive patients, and (30.29%) hypertensive patients indicate a sensitivity of 40%, a specificity of 87%, precision of 57.8% and a measured AUC of 0.77 (95% CI [75.01–79.01]). This paper shows results that are to some extent more effective than previous studies performed by the authors using a statistical model with similar input features that presents a calculated AUC of 0.73. Our literatures are summarized in Table 2.

Table 2. Artificial Neural Network application in medical

Author (Year)	**Algorithm used**					
	Neural Network (NN)	**Artificial Neural Network (ANN)**	**K-Means + ANN**	**Neural Network + GA**	**Support Vector Machine (SVM) + Multilayer Perceptron (MLP) with Back Propagation (BP) algorithm**	**Convolutional Neural Network (CNN)**
Kalyani Kadam, Pooja Kamat **(2017)[16]**			√			
Zeinab Arabasadi, Roohallah Alizadehsani, Mohamad Roshanzamir, Hossein Moosaei, Ali Asghar Yarifard **(2017)[17]**				√		
Jae Kwon Kim and Sanggil Kang **(2017)[18]**	√					
Najla' Fathi Metwally, Eman Khaled AbuSharekh, Samy S. Abu-Naser **(2017)[19]**		√				
Tülay Karayilan Özkan Kilic **(2017)[20]**	√					
W. L. Costa, L. S. Figueiredo, and E. T. A. Alves **(2019)[21]**		√				
Ramzi M. Sadek,		√				

Salah A. Mohammed, Abdul Rahman K. Abunbehan, Abdul Karim H. Abdul Ghattas, Majed R. Badawi, Mohamed N. Mortaja, Bassem S. Abu-Nasser, Samy S. Abu-Naser **(2019)[22]**						
Aniruddha Dutta, Tamal Batabyal, Meheli Basu, ScottT. Acton **(2020)[23]**						√
Fuzhe Maa, Tao Sun, Lingyun Liu, Hongyu Jing **(2020)[24]**					√	
Fernando López-Martínez, Edward Rolando Núñez-Valdez, Rubén González Crespo & Vicente García-Díaz **(2020)[25]**		√				

2.3. Random Forest application in medical

Prediction of fatty liver disease using machine learning algorithms is the effort of [26] using Random Forest (RF), Naïve Bayes (NB), Artificial Neural Networks (ANN), and Logistic Regression (LR). However, the Random Forest model showed higher performance with 87.48% than other classification models. An experiment was conducted using various datasets related to variation diseases such as breast cancer, diabetes, heart disease, heart spectrum, thyroid, surgery, dermatology and liver disorders to test the effectiveness of the K-NN model, Support Vector Machine, Decision Tree, Random Forest, and MLP [27]. Dermatology datasets that have used Random Forest have achieved a maximum accuracy of 97.26%. On average, Random Forest have provided very accurate results for each dataset considered. The research in [28] proposed a computational method using protein information sequences, and classifies feature vectors based on random forests to identify Alzheimer's disease genes. The gene protein information is extracted by adaptive k-skip-n-gram features. The accuracy attained from the model is up to 85.5% on the selected UniProt dataset. Rare algorithm used by [29] where they

propose a fine-tuned Random Forest model boosted by the AdaBoost algorithm which uses the COVID-19 patient's geographical, travel, health, and demographic data to predict the severity of the case and the possible outcome, recovery, or death. The model has an accuracy of 94% and a F1 Score of 0.86 on the dataset used. The data analysis reveals a positive correlation between patients' gender and deaths, and also indicates that the majority of patients are aged between 20 and 70 years. The forecasting incidence of infectious diarrhea using Random Forest in jiangsu province, china is the effort in [30]. The RF model fitted the dynamic nature of an infectious diarrhoea epidemic well and delivered an ideal prediction accuracy. It comprehensively combined the synchronous and lagged effects of meteorological Factors. It also integrated the autocorrelation and seasonality of the morbidity. The RF model can be used to predict the epidemic level and has a high potential for practical implementation. It has been observed that Random Forest gives consistently better accuracy than other algorithms. Tuning is done on the Random Forest algorithm to further improve the accuracy of prediction system [31]. The research proposed a model with features selection methods such as Pearson Correlation, Recursive Features Elimination and Lasso Regularization applied on Machine learning tree-based classifiers algorithms which are M5P, Random Tree, Reduced Error Pruning and Random Forest ensemble method to analyse classification accuracy, precision and sensitivity [32]. There are three experimental setups involved where the first one is by applying Pearson Correlation, followed by Recursive Features Elimination and lastly Lasso Regularization on above four tree- based algorithms, respectively. The result shown that feature selection methods Pearson correlation and Lasso Regularization with random forest ensemble method provide better results with 99% accuracy. The researcher also stated that Random Forest ensemble method predicted better result compare to other algorithms in their previous year's works. Then, a Recursion Enhanced Random Forest with an Improved Linear Model (RFRF-ILM) model is proposed to detect heart disease and diagnose the factors leading to cardiovascular disease [33]. The support vector machine is utilized to enhance the performance of the algorithm. The result show that diabetes provides further aspects that must be considered in the occurrence of coronary artery disease with 96.6% accuracy. This model is proven to save cost and diagnostic time while improving the accuracy of the treatment process. A recent work by [34] builds a 3-year risk assessment of CVD prediction model using several methods such as multivariate regression model, classification and regression tree (CART), Naïve Bayes, Bagged trees, Ada Boost and Random Forest. The benchmark used for the performance evaluation is the multivariate regression model which is Area under the curve, AUC = 0.7143.

Random Forest was proved to be superior to other methods with an AUC of 0.787 and reached a notable improvement over the benchmark. This model provides a reference for the prognosis and treatment of CVD in China. As to date, a Random Forest and feature selection based LDA prediction model (RFLDA) is developed to identify disease-associated long non-coding RNA (lncRNAs). The first step is by integrating few input features, followed by the selection of useful features to train predictive models with based on the importance scores of random forest variables and lastly is the training process of random forest regression model to score potential lncRNA-disease associations. The performance of the model is better than few advanced LDA prediction models with 0.976 for AUC and 0.779 for area under the precision-recall curve (AUPR). The summarized reviews of Random Forest and its invariants are depicted in Table 3.

Table 3. Random Forest (RF) application in medical

Author (Year)	**Algorithm used**							
	RF	**Boosted RF**	**K-Slip-N-Gram-RF**	**RF + IOT**	**RF+NB+ANN+ Logistic Regression (LR)**	**RF Ensemble+Feature Selection**	**Enhanced RF+Improved Linear Model**	**Multivariate Regression Model+Classification +Rgeression Tree (CART)+NB Bagged Tree+AdaBoost+RF**
Chieh-Chen Wu, Wen-Chun Yeh, Wen-Ding Hsu, Md. Mohaimenul Islam, Phung Anh (Alex) Nguyen, Tahmina Nasrin Poly, Yao-Chin Wang, Hsuan-Chia Yang, Yu-Chuan (Jack) Li **(2019)[2**					√			

6]								
Pavleen Kaur, Ravinder Kumar and Munish Kumar **(2019)[27]**				√				
Lei Xu, Changrui Liao, Gin-Den Chen, Chi-Chang Chang **(2019)[28]**			√					
Celestine Iwendi, Ali Kashif Bashir, Atharva Peshkar, R. Sujatha, Jyotir Moy Chatterjee, Swetha Pasupuleti, Rishita Mishra, Sofia Pillai, and Ohyun Jo **(2020)[29]**	√							
Xinyu Fang, Wendong Liu, Jing Ai, Mike He, Ying Wu, Yingying Shi, Wenqi Shen and Changjun Bao		√						

(2020)[30]								
P. Nancy, B. Swaminathan, K. Navina, B. Nandhine, P. Lokesh **(2020)[31]**	√							
Dhyan Chandra Yadav, Saurabh Pal **(2020)[32]**	√							
Chunyan Guo, Jiabing Zhang, Yang Liu, Yaying Xie, Zhiqiang Han, ianshe Yu **(2020)[33]**						√		
Li Yang, Haibin Wu, Xiaoqing Jin, Pinpin Zheng, Shiyun Hu, Xiaoling Xu, Wei Yu & Jing Yan **(2020)[34]**							√	
Dengju Yao, Xiaojuan Zhan, Xiaorong Zhan, Chee Keong Kwoh,								√

Peng Li and Jinke Wang **(2020)[35]**								

3. RESEARCH METHODOLOGY

3.1 Data Selection

Data were obtained from a number of articles and journals searched using a combination of keywords such as "disease prediction + fuzzy logic", "disease prediction + artificial neural network" and "disease prediction + random forest", from 2015 to the current year via Google Scholar and PubMed. Any relevant keywords are also considered to further expand the search framework and the data obtained.

3.2 Data Pre-processing

To ensure the reliability of the selected data, data removal is done by discarding low-quality data and data that do not have clear objectives and results at the end of the study.

3.3 Data Analysis

Through the data that has been collected, the facts and patterns of the study are detected and analyzed. The results of the study were interpreted according to the objectives of the investigation and accurately documented.

4. RESULTS AND DISCUSSIONS

As shown by the related article above, machine learning is very widely used in medical area. All 30 papers that have been reviewed from 2015 to 2021, are to assess the extent to which machine learning is useful in predicting and identifying various diseases. These technological advances have provided many advantages in the field of medicine and health. There are many types of machine learning that have been explored by the medical field. Among them are Artificial Neural Networks, Naive Bayes, Fuzzy Logic, Support Vector Machine, K-Nearest Neighbor, Random Forest and many more. However, this paper will only highlight the use of Artificial Neural Networks, Fuzzy Logic and Random Forest in disease diagnosis prediction.

In terms of accuracy, Artificial Neural Networks showed a consistent accuracy where most of the articles showed the accuracy of 90% and above, some even reached almost 100% accuracy. For Fuzzy Logic and Random Forest, the accuracy varied from 75% till 99%. Even so, some

are able to achieve high accuracy as they combine different approaches along with machine learning, such as feature selection and genetic algorithm while for few articles, even with the use of one machine learning, it can achieve the maximum level of accuracy. Therefore, there is no emphasis that can show high accuracy of results depending on the capability of one learning machine only or need to use hybrid methods. This study has helped us to get an idea of the extent of machine learning involvement in the field of health and its level of effectiveness. It also can help to identify which machine learning is most effective in the diagnosis of disease.

5. CONCLUSION

There are many advantages in the use of this machine learning in the field of health. Machine learning is compatible with some phases, making it better than others. It can provide effective benefits with a standardized process. By using a number of datasets, from fields such as radiology, cardiology, and pathology, machine learning can extract the data to see and identify the relationships between a set of data, which lead to a person's physical state. There are many machine learning options that can be used to perfect this procedure, differing in theory and problem-solving methods.

Based on the research done, we can conclude that Artificial Neural Network and Random Forest show the most reliable prediction accuracy since the result are 85% and above for all paper included. However, since some researchess use a combination method and machine learning, the exact ability of Artificial Neural Network and Random Forest in prediction cannot be critically determined. Evaluating from how the research that use a single machine learning perform, it is safe to say that the ability of a single machine learning is reliable enough to make the prediction as the result range from 80% and above but to make it better, using the combination method is much more encouraged to maximize the accuracy.

ACKNOWLEDGEMENTS

We wish to thank all faculty members for supporting our work in reviewing for spelling errors and synchronization consistencies and also for the meaningful comments and suggestions.

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MÜTEVAZI LİDERLİK TARZININ BİBLİYOMETRİK YÖNTEMLE ANALİZİ

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ÖZET
Teknolojik dönüşüme bağlı olarak örgütlerde meydana gelen değişiklikler, çalışan beklentilerinin farklılaşması gibi sebeplerle geleneksel liderlik tarzları dönüşüme uğramıştır. Yaşanan bu dönüşümle birlikte 2012 yılında literatürde kazandırılan mütevazı liderlik kavramı ise liderin dikkatinin astlarına yönelik olduğu "aşağıdan yukarıya" bir liderlik tarzı olarak nitelendirilmektedir. Mütevazı liderler astlarının başarılarını takdir eden, hataların olabileceğini kabul eden ve astlarından geri bildirim alarak öğrenmeye açık bir yaklaşım sergileyen destekleyici liderlerdir. Sosyal mübadele teorisine dayanan mütevazı liderlik kavramının örgütlerde benimsenmesi ile astların örgüte ve lidere yönelik sergileyeceği prososyal yaklaşım ile örgüt içerisinde pozitif bir iklim oluşmaktadır. Örgütsel bağlamda önemli katkılar sağlayan mütevazı liderlik kavramının önemi fark edilerek literatürde de ilgi görmeye başlamıştır. Literatüre 2012 yılında giren bu liderlik tarzının günümüze kadar ki uluslararası alan yazındaki seyrinin çeşitli parametrelerle bibliyometrik analizinin yapılması çalışmanın amacını oluşturmaktadır. Bu amaç doğrultusunda Web of Science veri tabanı üzerinden "humble leadership", "humility*leader" ve "CEO humility" anahtar kelimeleri kullanılarak ve İngilizce dili ve makale yayın türü filtrelemesi yapılarak 182 yayına ulaşılmıştır. Elde edilen veriler VOSviewer 1.6.6 yazılım versiyonu kullanılarak mütevazı liderlik ile ilgili yazar, dergi ve referans atıf ağı, anahtar kelime ağ analizleri gerçekleştirilmiştir. Ağ haritaları incelendiğinde "leader humility" anahtar kelimesi ile en fazla kullanılan anahtar kelimelerin "team creativity", "psyclogical empowerment", "knowledge sharing", "work engagement", "social exchange theory", "job performance" olduğu tespit edilmiştir. Konu ile ilgili en sık referans gösterilen araştırma Owens tarafından 2013 yılında yapılan makale iken, çalışmalarda en fazla atıf yapılan yazar ise Owens olmuştur. Mütevazı liderlik ile ilgili en fazla makalenin yayınlandığı dergi ise "Journal of Applied Psychology" olarak saptanmıştır.

Anahtar Kelimeler: Liderlik, Tevazu, Mütevazı Liderlik, Bibliyometrik Analiz

A BIBLIOMETRIC ANALYSIS OF HUMBLE LEADERSHIP STYLE

ABSTRACT

Traditional leadership styles have been transformed because of differentiation of employee expectations and changes in organizations due to technological transformation. The humble leadership concept introduced in the literature in 2012 with this transformation is described as a "bottom-up" leadership style in which the leader's attention is directed to his subordinates. Humble leaders are supportive leaders who appreciate the success of their subordinates, accept that mistakes can happen, and take an open approach to learning by getting feedback from their subordinates. With the adoption of the humble leadership concept based on social exchange theory in organizations, a positive climate is created within the organization with the prosocial approach that subordinates will display towards the organization and the leader. The importance of the humble leadership concept, which provides important contributions in the organizational context, has started to attract attention in the literature. In this context the aim of the study is to make a bibliometric analysis of the course of this leadership style, which entered the literature in 2012, in the international literature, with various parameters. For this purpose, 182 publication was reached by filtering the English language and article publication type using the keywords “humble leadership”, “humility*leadership” and “CEO humility” over the Web of Science database. The obtained data were analyzed by using VOSviewer 1.6.6 software version, author, journal and reference citation network and keyword network analyzes related to humble leadership. When the network maps were examined, it was determined that the most used keywords with the keyword "leader humility" were "team creativity", "psychological empowerment", "knowledge sharing", "work engagement", "social exchange theory", "job performance". The most frequently cited research on the subject was the article made by Owens in 2013, while the most cited author in the studies was Owens. The journal in which the most articles on humble leadership was published was determined as the "Journal of Applied Psychology".

Keywords: Leadership, Humility, Humble Leadership, Bibliometric Analysis

1. GİRİŞ

Owens ve Hekman tarafından 2012 yılında literatüre kazandırılan mütevazi liderlik tarzı, liderin dikkatinin kendinden ziyade astlarına yönelik olduğu "aşağıdan yukarı" bir liderlik tarzı olarak nitelendirilmektedir (Kang vd., 2022). Mütevazi liderler, kendilerini ve astlarını nesnel bir şekilde değerlendirerek, astlarının güçlü yönlerini ve örgüt adına sundukları katkıları takdir ederek ve öğrenmeye açık bir yaklaşım ile astlarından geri bildirimler alarak (Owens vd. 2013; Yuan vd. 2018) örgüt içerisinde destekleyici bir liderlik tarzı sergiler. Tüm insanların eşit yaratıldığına inanarak astlarının eksikliklerini kabul eden bu liderler (Owens ve Heckman, 2012; Oc vd., 2015), meslektaşlarına ve astlarına saygı göstermeye özen gösterirler (Ou vd., 2015; Oc vd., 2015).

Mütevazi liderlerin astları üzerindeki olumlu etkileri sebebiyle (Swain, 2017) örgüt içerisinde pozitif bir iklim oluşturması ve astların işlerine yönelik prososyal yaklaşımlar sergilemesi olasıdır. Mütevazi liderliğin dayandığı sosyal değişim teorisi (Blau, 1964) , sosyal öğrenme teorisi (Bandura, 1977), kaynakların korunması teorisi (Hobfoll, 1989) ve sosyal bilgi işleme teorisi (Salancik & Pfeffer, 1978) de bunu destekler nitelikte olup, liderin olumlu yaklaşımının astların tutum ve davranışlarını şekillendirdiğini ifade etmektedir. Nitekim kavram literatürde inovatif iş davranışları (Zhou ve Wu, 2018; Yang vd., 2019; Ali vd., 2020; Wali vd., 2022), psikolojik güçlendirme (Chen vd., 2018; Ali vd., 2020; Qu vd., 2022; El-Gazar vd., 2022), öz yeterlilik (Ding ve Chu, 2020; Wali vd., 2022; Chu vd., 2022), dile getirme davranışı (Li vd., 2019; Zhou vd., 2021; Zhou ve Chen, 2022), duygusal bağlılık (Zhou vd., 2021; Chughtai ve Arifeen, 2022), işe adanmışlık (Yang vd., 2019; Al Hawamdeh) lider üye etkileşimi (Zhou ve Wu, 2018), örgütsel vatandaşlık davranışı (Ding vd., 2020), iş performansı (Cho vd., 2021; Yang vd., 2022; Wali vd., 2022;) gibi pek çok olumlu çıktılar ile birlikte ele alınmaktadır. Bu bağlamda özellikle son yıllarda sıklıkla kullanılmaya başlayan mütevazi liderlik kavramına bütüncül bir bakış açısı kazandırarak gelecek çalışmalara güçlü bir bibliyometrik aktarım yapmak çalışmanın amacını oluşturmaktadır.

2. YÖNTEM

Çalışma kapsamında uluslararası alan yazında mütevazi liderlik tarzı ile ilgili yayınlanan makaleler çeşitli parametreler kullanılarak bibliyometrik yöntemle incelenmiştir. Bilimsel yayınların analizi ve bilimsel alıntı indeksi için en sık kullanım alanı bulan veri tabanı olması sebebiyle (Yang vd., 2013) çalışma da veri taraması Web of Science veri tabanı üzerinden gerçekleştirilmiştir. Mütevazi liderlik kavramı 2012 yılında literatürde kavramsallaştırılmasına

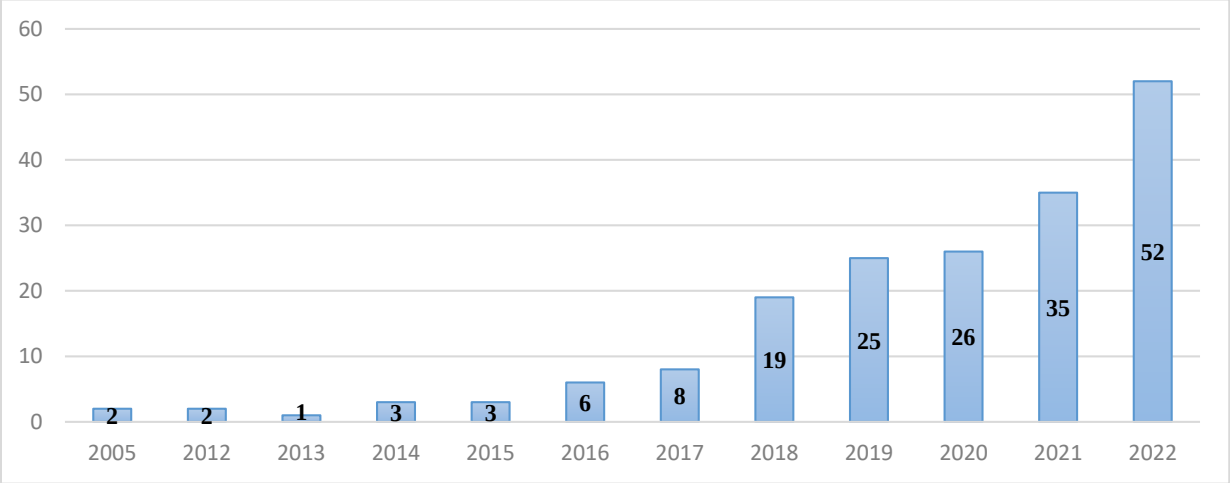
rağmen Web of Science veri tabanında tarama yapıldığında kavramın 2005 yılı itibariyle alan yazında yer edindiği tespit edilmesi sebebiyle çalışma kapsamında 2005-2022 yılları arasındaki veriler çalışmaya dahil edilmiştir. Web of Science veri tabanında "humble leadership", "humility*leader" ve "CEO humility" anahtar kelimeleri konu kriteri kullanılarak taranmıştır. Böylelikle makalelerin başlığı, özet ve anahtar kelimeleri taranarak veri kaybı sorunu bertaraf edilmiştir. Verilere ilişkin önemli katkılar sunması ve dolayısıyla bilimsel gelişmelerin kolaylıkla izlenebilmesi sebebiyle veri setinin içerisinden sadece makale türündeki yazınlar seçilmiştir. Çalışma kapsamında yayın dili İngilizce olan makaleler tercih edilmiştir. Yazın türü ve dil filtrelemesi sonucunda toplamda 182 veriye ulaşılmıştır. Elde edilen veriler ile VOSviewer 1.6.6 yazılım versiyonu kullanılarak ağ haritaları oluşturulmuş ve veri seti görselleştirilmiştir. Çalışma kapsamında öncelikle yıllara göre yayın sayıları grafik olarak aktarılmıştır. Ardından mütevazı liderlik ile ilgili yazar, dergi ve referans atıf ağı ile anahtar kelime ağ analizleri gerçekleştirilerek görselleştirilmiştir.

3. BULGULAR

Bölüm kapsamında mütevazi liderlik ile ilgili Web of Science veri tabanında yer alan İngilizce dilindeki makalelerin yıllara göre dağılımı, yazar, dergi, referans ortak atıf ağ analizleri ile anahtar kelime ağ analizine ait bulgular grafik ve şekiller aracılığı ile sunulmaktadır.

3.1. Makalelerin Yıllara Göre İncelenmesi

Mütevazi liderlik kavramı Web of Science veri tabanında tarandığında başlangıç yılının 2005 olduğu saptanmıştır. Bundan dolayı 2005 ile 2022 yılları arasında yer alan İngilizce dilinde yazılan makalelerin dağılımı Grafik 1'de aktarılmaktadır.

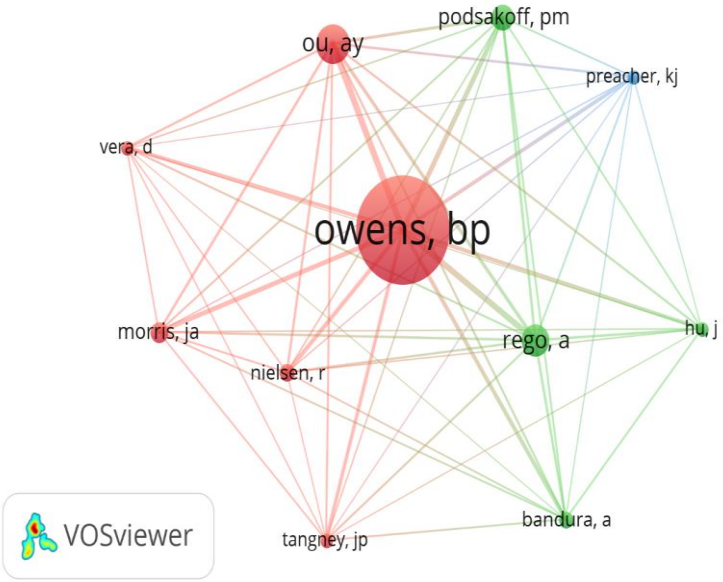


Grafik 1. Makalelerin Yıllara Göre Dağılımı

İlk olarak 2005 yılında liderlerin mütevaziliğinin etkilediği ve etkilendiği etmenlerin tespit edilmesine yönelik yapılan çalışmada kavrama ilişkin alt yapıların oluşturulduğu tespit edilmiştir. Mütevazilik ile liderlik arasındaki potansiyel bağı keşfetmeye yönelik 2005 yılında yapılan bu çalışmadan sonra "mütevazi liderlik" kavramının kullanıldığı makale 2012 yılına aittir. 2012 yılı itibariyle fark edilen kavram son yıllarda ivme kazanarak literatürde yer edinmiştir.

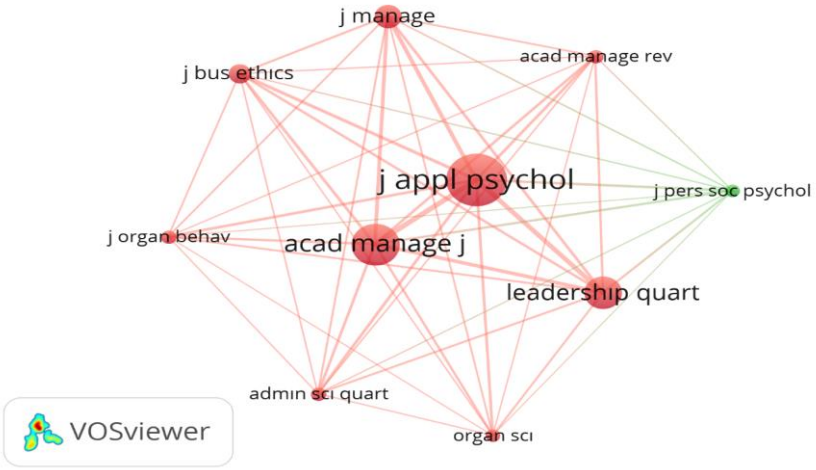
3.2. Ortak Atıf Ağ Analizleri

Doğrudan atıftan farklı olarak birbirine atıf vermeyen eserlerin içerisinde yer alan kaynakların incelenerek ilişkili kaynakların tespit edilmesi amacıyla yapılan ortak atıf ağ analizi ile mütevazi liderlik kavramının yazar, dergi, referans ve anahtar kelime ağ analizleri gerçekleştirilmiştir. Yazar ortak atıf ağının tespit edilmesine yönelik görsel Şekil 1'de aktarılmaktadır.



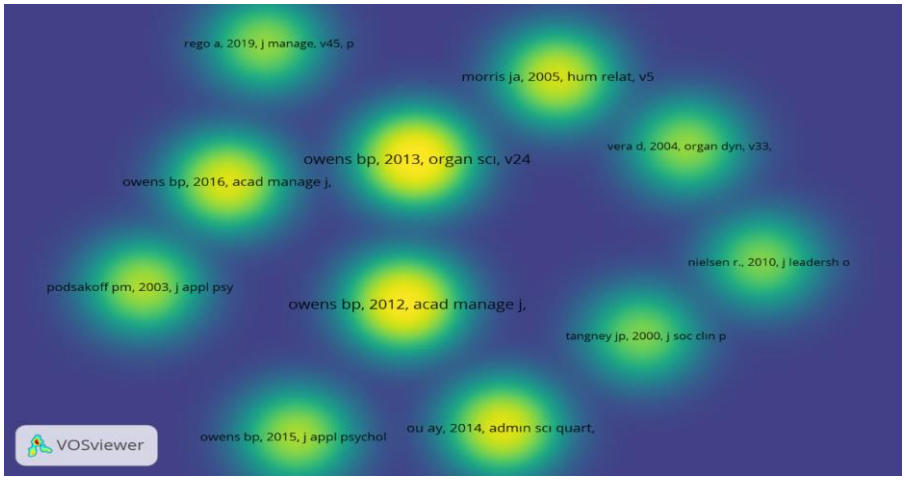
Şekil 1. Yazar Ortak Atıf Ağ Analizi

Şekil 1 incelendiğinde B.P. Owens'ın 582 atıf (3796 bağlantı gücü) ile en çok alıntı yapılan yazar olduğunu söylemek mümkündür. İkinci sırada en çok atıf yapılan yazar ise 196 atıf (1811 bağlantı gücü) ile aynı kümede yer alan A. Y. Ou olmuştur. Üçüncü sırada yer alan yazar ise yeşil kümede bulunan 157 atıfa sahip (1587 bağlantı gücü) A. Rego olmuştur. Yazar ortak atıf ağ analizi ile en popüler yazar tespit edildikten sonra ortak atıf ağ analizi dergiler bakımından gerçekleştirilerek Şekil 2'de sunulmuştur.



Şekil 2. Dergi Ortak Atıf Ağ Analizi

182 verinin incelenmesi ile gerçekleştirilen dergi ortak atıf ağ analizi sonucunda Dergi bağlamında ortak atıf ağ analizi incelendiğinde en çok atıf yapılan derginin 1287 atıf ve 37680 bağlantı gücü ile "Journal of Applied Psychology" dergisi olduğu saptanmıştır. "Academy of Management Journal" dergisi 1003 Atıf ve 30881 bağlantı gücü ile 2. sırada ve "Leadership Quartely" dergisi 764 Atıf ve 24357 bağlantı gücü ile 3. sırada yer edinmektedir. Şekil 3'de 182 verinin referansları incelenerek dergilerde yayımlanan makalelerin referans listesinde en çok yer verilen başka bir ifade ile en fazla alıntı yapılan makaleler tespit edilmiştir.

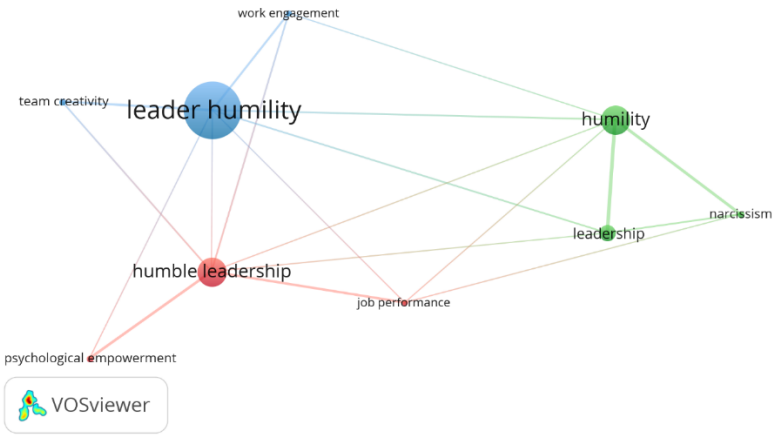


Şekil 3. Referans Ortak Atıf Ağı

Şekil 3 incelendiğinde 161 atıf sayısı ve 802 bağlantı gücü ile en fazla akıntı yapılan makale Owens, Johnson ve Mitchell'in 2013 yılında Organization Science dergisinde yayımladığı "Expressed Humility in Organizations: Implications for Performance, Teams, and Leadership" başlıklı araştırması olmuştur. İkinci sırada ise Owens ve Hekman'ın 2012 yılında Academy of

Management Journal dergisinde yayımladığı "Modeling How To Grow: An Inductive Examination Of Humble Leader Behaviors, Contingencies, And Outcomes" başlıklı makalesi 146 atıf ile yer almaktadır. Ou tarafından yazılan "Humble Chief Executive Officers' Connections to Top Management Team Integration and Middle Managers' Responses" başlıklı Administrative Science Quarterly dergisinde yayınlanan çalışma 110 atıf ve 636 bağlantı gücü ile üçüncü sırada yer almaktadır.

Yazar, dergi ve referans atıf ağ analizleri sonrasında 182 çalışmada yer alan toplamda 520 anahtar kelimelerin birlikte kullanım sıklıklarını ifade eden anahtar kelime ağ analizi gerçekleştirilerek Şekil 4'de sunulmaktadır.



Şekil 4. Anahtar Kelime Ağ Analizi

Şekil 4'de sunulan anahtar kelime ağ analizi incelendiğinde 520 anahtar kelime içerisinde en çok (70) kullanılan anahtar kelime "leader humility" olmuştur. "Humble leadership" ve "humility" anahtar kelimeleri ise 33 kere kullanım ile ikinci sırada yer almaktadır. 182 mütevazi liderlik çalışmasında 17 kere "leadership", 7 kere "psychological empowerment", "team creativity" ve "narcissism", 6 kere ise "work engagement" ve "job performance" anahtar kelimeleri kullanılmıştır.

4. SONUÇ

Değişen liderlik yaklaşımları ile birlikte örgütlerde prososyal çıktılar üreten pozitif liderlik tarzlarının öneminin anlaşılması çok sayıda yeni liderlik tarzını doğurmaktadır. Literatürde son on yılda kavramsallaştırılmasına rağmen önemli bir ivme ile devam eden mütevazi liderlik kavramı günümüzde hem uygulama alanlarında hem de akademik literatürde sıklıkla kullanım alanı bulmaktadır. Bu bağlamda kavramın hem nicel olarak değerlendirilmesi hem de geniş bir

perspektiften bakılarak gelecek çalışmalara kaynak aktarımı sağlanması bakımından bibliyometrik yöntemle analiz edilmesi önem arz etmektedir.

Yapılan bibliyometrik analiz sonucunda mütevazilik ve liderliğin ilişkili olabileceğini ortaya koymaya yönelik öncülleri ve sonuçlarının saptandığı 2005 yılındaki çalışma ile temelleri atılan bu kavramın "mütevazi liderlik" olarak ilk kullanımı 2012 yılına dayanmaktadır. 2012 yılı sonrasında ise kavramın özellikle son yıllarda yazarlar tarafından sıklıkla tercih edildiği saptanmıştır. Mütevazi liderlik kavramının 2012 yılında kullanım alanı bulmaya başladığı düşünüldüğünde kavram ile ilgili öncü çalışmaların Owens ve arkadaşları tarafından gerçekleştirilen "Expressed Humility in Organizations: Implications for Performance, Teams, and Leadership" ve "Modeling How To Grow: An Inductive Examination Of Humble Leader Behaviors, Contingencies, And Outcomes" başlıklı makale olduğunu söylemek mümkündür. Nitekim yazar ortak atıf ağ analizinde en fazla atıf yapıaln yazarın Owens olduğu saptanmıştır. Anahtar kelime ağ analizi sonucunda mütevazi liderlik çalışmalarında lider mütevaziliği, mütevazi liderlik ve mütevazilik anahtar kelimelerinin en sık kullanıldığı sonucuna varılmıştır. Buna ek olarak mütevazi liderlik kavramı ile işe adanmışlık, takım yaratıcılığı, psikolojik güçlendirme, iş performansı, narsizm kelimelerinin de kullanıldığı saptanmıştır. Bu doğrultuda konu ile ilgili araştırma yapacak yazarlara Owens'a ait çalışmaların incelenmesi ve mütevazi liderlik ile ilişkisinin saptanmasına yönelik işe adanmışlık, takım yaratıcılığı, psikolojik güçlendirme, iş performansı, narsizm değişkenlerinin kullanılması tavsiye edilmektedir.

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ÇOCUK BAKIM HEMŞİRELİĞİ: BİR DERLEME

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Özet
Hemşireler için bir çocuğun sağlığını idare etmek çok zor olabilir. 1990'ların sonundan başlayarak, çocuk ve aile uzmanları geniş ve benzersiz uygulama kapsamı göz önüne alındığında, pediatrik ve çocuk sağlığı hemşireliği uzmanlık bakımının ortak yönlerini işlevselleştirme ihtiyacını tespit ettiler. Pediatrik ve çocuk sağlığı bakımının temel çerçevesinin geliştirilmesi, bu uzmanlık alanının bilimine ve profesyonel gelişimine katkıda bulunmak için ihtiyaç duyulan uygulama, eğitim, araştırma ve politika oluşturmak gerekliliktir. Bu derlemede, çocuk hemşireliği konusunda son yıllarda yayınlanmış makaleler incelenerek elde edilmiş bazı güncel bilgiler sunulmuştur.

Anahtar Kelimeler: Çocuk sağlığı, hemşire, hemşirelik

1. GİRİŞ

Her yıl 4 milyondan fazla bebek hayatlarının ilk dört haftasında ölmektedir. 8 milyondan fazla bebek birinci yaş gününden önce, yaklaşık 10 milyon çocuk ise beşinci yaş gününden önce ölmektedir. Ölümlerin çoğu evde sağlık hizmeti eksikliği nedeniyle meydana gelmektedir (Kassaw ve ark., 2021). Avrupa'da çocuk sağlığını geliştirmek için DSÖ Avrupa Bölge Ofisi, 53 Avrupa üye devletinin tamamı tarafından kabul edilen 2015-20 dönemi için çocuk ve ergen sağlığı için bir strateji geliştirmiştir. Stratejinin öncelikleri erken çocukluk gelişiminin desteklenmesi, şiddete maruz kalmanın azaltılması ve ergenlik dönemindeki akıl sağlığı sorunlarının üstesinden gelinmesine yönelik eylemleri içermektedir. Stratejinin uygulanması, 2016 yılında tüm üye ülkelerdeki sağlık bakanlıklarına gönderilen 82 soruluk bir anketle izlenmiştir. Ülkelerin dörtte üçü ulusal bir çocuk ve ergen sağlığı stratejisini benimsemiş veya geliştirmeyi planlamıştır. Ancak, bölgesel stratejinin temel bileşenlerinin benimsenmesinde ve verilerin toplanmasında farklılıklar tespit edilmiştir. Örneğin, cinsel sağlık ve üreme sağlığı hizmetlerine erişim bölge genelinde eşit değildir ve çocukluk çağı obezitesi ve ruh sağlığı önemli endişe alanlarıdır. Bu tür anket verileri, devletlerin ve genel kamuoyunun başarıları gözden geçirmesine ve çocukların ve ergenlerin sağlık, gelişim ve refah için tam potansiyellerini gerçekleştirmelerinin önündeki engelleri ele almasına yardımcı olma potansiyeline sahiptir (Aleman-Diaz ve ark., 2018).

Bebeklik dönemindeki sosyoekonomik çevre, yetişkin sağlık davranışının güçlü bir belirleyicisidir ve sonuç olarak ilerideki sağlık sonuçlarını değiştirir (Pedron ve ark., 2021). Yoksulluk ve zorluklar karşısında bile, çocukların aileleri, toplulukları ve okulları içinde sağlıklı ilişkiler geliştirmelerine yardımcı olmak, yetişkin sağlığının iyileştirilmesine katkıda bulunabilir (Crandall ve ark., 2021). Düşük ebeveyn gelir düzeyine bağlı olarak büyüyen çocuklar, gelir dağılımının tepesinde yer alan ebeveynlerce yetiştirilen çocuklara kıyasla, yetişkinlikte ölçülen somatik ve psikolojik rahatsızlıklarda iki ila üç kat artış göstermektedir (Evensen ve ark., 2021).

Çocuk işçiliği, çocukların fiziksel, sosyal ve psikolojik olarak gelişmesini engelleyen temel insan haklarının ihlalidir. Hindistan gibi gelişmekte olan ülkelerde çocuklar çeşitli işletmelerde ücretli işçi olarak çalıştılar. Sosyoekonomik dezavantajlar nedeniyle, çocukların tuğla işi işinde önemli miktarda manuel, yorucu işler üstlendiği tespit edilmiştir. Muazzam bir fiziksel efor nedeniyle, çocuk tuğla işçileri kas-iskelet ağrısı ve yaralanmalardan muzdaripti ve bu da genel yaşam kalitelerini düşürmekteydi. Yüksekten düşme en yaygın yaralanma nedeniydi. Genç tuğla işçileri arasındaki iş kazaları, biyomekanik ve iş stresi dahil olmak üzere bir dizi nedenden

kaynaklanmaktadır (Das, 2021).

21. yüzyılda özel ve teknik olarak gelişmiş tıbbi araçların artan mevcudiyeti, karmaşık sağlık sorunları olan çocuk ve ergenlerin yaşam beklentilerine yönelik iyileştirmeleri önemli ölçüde artırmıştır. Toplum kapsamında, ergenler ve çocuklar, ciddi ve karmaşık kronik sağlık durumlarında daha yaygın olabilen ruhsal bozukluklar yaşarlar. Pediatri servislerinin, çocuk hastanelerinde çocuklara ve ergenlere bakan tıbbi, somatik ekipler içinde çocuk psikiyatrisinin daha fazla entegrasyonunu teşvik eden bir bakım modeline geçmesi gerekmektedir (Fazel ve ark., 2021).

Çocukların sağlık eşitsizliklerini azaltmak dünya çapında bir sağlık önceliğidir ve küçük çocuklukta optimum bilgi, beceri ve nitelik gelişimi yaşam boyu sağlık risklerini azaltabilir. Çocuklara "hayattaki en iyi başlangıcı" sağlamaya yönelik güçlü bir politika söylemine rağmen, okula başladıklarında sosyoekonomik eşitsizlikler devam etmektedir. Çocuk ve ergen sağlığındaki eşitsizlikler yetişkinlikteki sağlık eşitsizliklerini etkilemektedir (Black ve ark., 2021). Yoksulluk, aile içi şiddet, ebeveyn uyuşturucu ve alkol kullanımı ve ebeveyn akıl hastalığı, tüm yaşam süresi boyunca kötü sonuçlarla ilişkilidir. Örnek olarak, Birleşik Krallık'ta yoksulluk ve sıkıntı yaşayan çocuk nüfusunun 1/2'si ergenlik dönemindeki sağlık sorunlarıyla ilişkilendirilmiştir. Kalıcı yoksulluk veya ebeveyn akıl hastalığı, Birleşik Krallık çocuk nüfusunun %40'ını etkilemekte ve zayıf çocuk ruh sağlığı ile güçlü bir şekilde ilişkili bulunmkatadır (Adjei ve ark., 2021). Dayanıklılık, çocuklar ve ergenler arasında giderek yaygınlaşan ruh sağlığı bozukluklarına karşı koruyucu bir faktördür. Ergen sağlığı eğitimine odaklanan akran eğitiminin, özellikle erkeklerde, gençlerin dikkatini, duygusal uyumunu, kişilerarası yardımını ve genel dayanıklılığı iyileştirdiği gösterilmiştir (Tang ve ark., 2022).

Anneden çocuğa bulaşma, 15 yaşın altındaki çocuklarda HIV'in ana bulaşma şeklidir (Kassa, 2018).

2. OKUL

Gelişmekte olan ülkelerde okul çağındaki çocukların sağlığını iyileştirmek için okul sağlığı eğitiminde niteliksel bir iyileştirme yapılması gereklidir. Gelişmekte olan ülkelerde sağlık eğitimini geliştirmek için önerilen önlemler şunlardır: i) eğitimle ilgili yasalar ve politikalarda belirtilen hedeflere ulaşmada sağlık eğitiminin rolünün netleştirilmesi; ii) uygun öğrenme içeriği ve zaman tahsisi sağlamak; iii) kapsamlı bir okul sağlığı çerçevesi oluşturmak; iv) çocukların sağlık sorunlarını sürekli izleyen bir sistem kurmak; v) okulda sağlık eğitiminden sorumlu kişinin belirlenmesi ve eğitim sisteminin kurulması; vi) çocukların katılımıyla öğrenmeyi kolaylaştırmak için bir öğretmen kılavuzu ve öğretim materyalleri sağlamak ve (vii)

vasiler, topluluk üyeleri ve yerel sağlık çalışanları ile işbirliği yapmak (Tomokawa ve ark., 2021).

Covid-19, küresel olarak çocukların eğitimini, sağlığını ve sosyal yaşamını yoğun bir şekilde etkilemiştir. Akran zorbalığı, pandemi sırasında çocuk gelişimine zarar vermiştir. Geleneksel olan fiziksel, sözlü ve psikolojik zorbalığa ek olarak siber zorbalık, dijital yöntemlerle uygulanan yeni bir olgudur (Armitage, 2021). 2020'de Covid-19 pandemisi nedeniyle birçok ülke okulları kapatmıştır. Okulların kapanması çocuklar ve ergenler için önemli endişeleri artırdı. Okulların kapanması, hastaneye kabul sayılarının ve pediatrik acil servislere yapılan ziyaretlerin azalmasıyla ilişkilendirildi. Ancak birçok ergen ve çocuk, okul sağlık hizmetleri, engelli çocuklara yönelik özel hizmet türleri ve beslenme programlarıyla bağlantısını kaybetmiştir. Fakir aileler ve engelli çocuklar için, kaynak eksikliği ve uzaktan eğitim desteği nedeniyle eğitim eşitsizliklerini genişletme riskinin daha yüksek olduğu da bildirilmiştir. Okulun kapanması ayrıca gençlerde artan yalnızlık ve kaygıya ve çocuklarda stres, disiplinsizlik, hayal kırıklığı, üzüntü ve hiperaktiviteye katkıda bulundu. Uzun süren okul kapanması ve günlük fiziksel aktivite azalması, vücut kitle indeksi ve çocukluk obezite prevalansını arttırmıştır. Öğrenme ve ruh sağlığı bozuklukları açısından daha yüksek risk altındaki çocukları ve ergenleri belirlemek ve okulların kapanması sırasında onları desteklemek bir ihtiyaçtır (Chaabane ve ark., 2021).

Çocuklar alerjik tepkilere karşı daha savunmasızdır. Okulda veya kreşte çok fazla zaman geçirdikleri için alerjik reaksiyon geliştirme riskleri oldukça yüksektir. Okullarda ve kreşlerde anafilaktik reaksiyonların yönetimi şu anda yetersizdir. Sonuç olarak, hemşireler için standartlaştırılmış bir hemşirelik kılavuzu ve bu bağlamlarda eğitim gereklidir (Avedissian ve ark., 2018). Anafilaksi tahmin edilemez olduğundan, hızlı bir başlangıç yaptığından ve ölümcül olabileceğinden, okul personelinin semptomlarını hemen tanıması ve bunlara yanıt vermesi için eğitilmesi gerekir. Özellikle hissettiklerini ifade etmekte güçlük çeken okul çağındaki çocuklarda anafilaksi semptomlarını ayırt etmek zor olabilir. Okul hemşiresi, çocukların anafilaktik semptomları tanımlama ve sergileme konusundaki metodların eğitimini okul çalışanlarına vermesi kritik bir öneme sahiptir. Güvenli bir ortam sağlamak ve yaşamı tehdit eden herhangi bir alerjik reaksiyona hızlı yanıt verilmesini sağlamak için okul hemşiresi, alerjisi olduğu bilinen çocuklar için özel acil bakım/eylem planları ve ayrıca tüm öğrenciler için kapsamlı bir bakım planı hazırlamalı ve koordine etmelidir. Bir anafilaktik acil durumda hemen verilebilmesi için epinefrinin stoklanmış ve kolayca erişilebilir olmalıdır (Schoessler & White, 2013). Anafilaksiyi tetikleyen ve hayati risk oluşturan alerjilerden mustarip okul çağındaki

çocukların sayısı artmaktadır. Okul hemşireleri, bakımları altındaki çocuklar için potansiyel olarak yaşamı tehdit eden sağlık sorunlarının nasıl tedavi edileceği konusunda okul çalışanlarına sağlık eğitimi verirken kendilerine yardımcı olacak kaynaklara ihtiyaç duyar, ancak bu kaynaklar sınırlıdır (Cavanaugh & Strickland, 2011).

Kadınların ve çocukların fiziksel sağlığı vurgulanırken, özellikle düşük ve orta gelirli ülkelerde anne ve çocuk sağlığı programları tarafından sağlıklarının zihinsel yönleri sıklıkla göz ardı edilmektedir (Atif ve ark., 2015). Erken, stresli ebeveyn-çocuk etkileşimleri, çocukların değişen nörobiyolojik düzenleyici sistemlerine faydalı olabilir (Lunkenheimer ve ark., 2019). Sohbetler, günlük aile hayatında önemli bir iletişim şeklidir. Bakıcı-çocuk iletişiminin belirli kalıpları, çocukların sosyo-bilişsel gelişimi ve yakın aile ortamının ötesinde çocuk-ilişki kalitesi ile ilişkilendirilmiştir (Nguyen ve ark., 2021). Sosyal-duygusal yeterlilikler yaşamın erken dönemlerinde gelişir. Örneğin, erken duygu düzenleme, öncelikle anne-çocuk etkileşimi bağlamında öğrenilir ve bu, anne etkilerinin çocukların sosyal-duygusal gelişimini şekillendirmesine izin verebilir (Behrendt ve ark., 2019).

3. BESLENME

Anemi, 5 yaşından küçük 293 milyon (%47) çocuğu etkilemektedir. Aneminin beslenme, bulaşıcı hastalıklar ve diğer faktörler arasındaki karmaşık etkileşimi içeren çok faktörlü nedenleri vardır ve bu karmaşıklık aneminin belirleyicilerini ele almak için bir zorluk teşkil eder. Araştırma ve politikadaki bilgi boşluklarının azaltılması ve etkili nüfus düzeyinde stratejilerin uygulanmasının iyileştirilmesi, düşük kaynaklı ortamlarda anemi yükünün hafifletilmesine yardımcı olacaktır (Balarajan ve ark., 2011). Diyet müdahaleleri çocuklarda demir eksikliğini iyileştirmede etkilidir (Sun ve ark., 2018). Demir açısından zengin gıdaların düşük tüketimi ve emilim bozukluğu, beş yaş altı aneminin en yaygın nedenleridir (Black ve ark., 2013).

Çocuklarda fazla kilo ve obezitenin artması önemli bir halk sağlığı sorunu olarak ortaya çıkmıştır. Bu eğilim, çocukluk çağı obezitesini önlemek için çocuklar ve aileleri için sağlıklı ağırlıkları desteklemek için erişilebilir ve yeni yaklaşımlara duyulan ihtiyacı göstermektedir (Bottorff ve ark., 2021). Fiziksel aktivite gelecekte kardiyovasküler hastalık riskini azaltır; yine de, çocukların ve ergenlerin yalnızca küçük bir yüzdesi gerekli miktarda günlük aktiviteye sahiptir. Küçük miktarlarda yüksek yoğunluklu egzersiz, kardiyovasküler hastalık riskinin birincil önlenmesi olarak çocuklarda ve ergenlerde sağlık yararları için yüksek bir etkinliğe sahiptir. Yüksek yoğunluklu egzersiz, çocuklar ve ergenler için çeşitli kardiyometabolik sonuçları iyileştirmenin güvenli ve etkili bir yoludur (Bond ve ark., 2017). Diyet ve fiziksel

egzersizin takibi ve dengelenmesiyle elde edilen ideal normal vücut ağırlığı, zengin ekonomilerdeki çocukların sağlığıyla sıkı sıkıya bağlantılıdır. Sonuç olarak, gençlere, ailelerinin dil ve alışkanlıkları, çocuk medyasında yer alan mesajlar ve resmi eğitim yoluyla genç yaşta obez olmayı nasıl önleyecekleri öğretilmektedir (Wright ve Halse, 2014). Obez çocuklar, metabolik sendromlar ve diyabet gibi obezite ile ilişkili hastalıkları geliştirme riskinin yanı sıra, yaşamlarının ilerleyen dönemlerinde artan mortalite ve olumsuz sağlık sonuçları riskine sahiptir (Garcia-Mantrana & Collado, 2016). Hemşireler, birçok sağlık hizmeti ortamında çocukların büyüme ve gelişimini değerlendirmekten doğrudan sorumludur (Speedie, 2016). Engelli çocuklara bakan ebeveynler, fiziksel ve duygusal sağlıklarının kötü olduğunu bildirmektedirler. Bu çocuklar strese girmekteler ve sağlıkla ilgili davranışlara ve 'standart' önleyici programlara (örneğin kilo verme programları) katılmayı zor bulmaktadırlar (Borek ve ark., 2018).

Diş çürükleri çocuklarda en sık görülen kronik hastalıktır. Çürük risk değerlendirme araçları, diş hekimlerinin, doktorların ve diş dışı sağlık hizmeti sağlayıcıları tarafından bireyin riskini değerlendirmesini sağlar. Birinci basamakta hemşirelerin müdahalesi, ağız sağlığı alışkanlıklarının oluşturulmasına ve diş hastalıklarının önlenmesine katkıda bulunabilir (Natapov ve ark., 2018). Tedavi edilmeyen şiddetli diş çürüğü çocuğun büyümesi, kilosu, yaşam kalitesi ve bilişsel gelişimi üzerinde çocuğun ötesinde aileye, topluma ve sağlık sistemine kadar uzanan etkilere sahiptir. Diyet davranışları ve yeme alışkanlıkları gibi erken sağlıkla ilgili davranışsal faktörlerin, ağız hastalıklarının, özellikle diş çürüklerinin başlaması ve ilerlemesi üzerinde önemli bir etkisi mevcuttur. Birincil bakıcı olarak anne, koruyucu sağlık bakım davranışlarının benimsenmesinde hayati bir rol oynar ve ebeveynlerin beslenme alışkanlıkları çocukların beslenme alışkanlıkları üzerinde önemli bir etkiye sahiptir (Arrow ve ark., 2013).

Annelik, hamilelik, doğum, annelik ve çocuk yetiştirmeyi içeren karmaşık bir konudur (Earner-Byrne, 2017). Çocuklar ve hamileler 25-hidroksi D vitamini eksikliğine karşı savunmasızdır. D vitamini ve kalsiyum, iskelet büyümesi ve kemik sağlığı için önemli besinlerdir (Fiscaletti ve ark., 2017). Düşük ve orta gelirli ülkelerde yaşayan çoğu kadın ve çocuk olmak üzere iki milyar insan önemli mineral ve vitaminlerden yoksundur. Gebelikte artan enerji ve beslenme talepleri sonucunda eksiklik artar. Bu, anne ve çocukta olumsuz etkilere neden olur, ancak mikro besin takviyeleri ile hafifletilebilir (Oh ve ark., 2020).

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ORTAOKUL 5. VE 6. SINIF ÖĞRENCİLERİNDE BESLENME ALIŞKANLIKLARININ OBEZİTE ÜZERİNE ETKİSİ

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ÖZET

Çocukluk çağı boyunca şekillenen ve yetişkinlik döneminde kalıcı hale gelen yeme alışkanlıklarının yeniden şekillendirilmesi oldukça zordur. Gelişim çağındaki adölesanların düzensiz beslenmesi büyüme ve gelişimini tehdit ederken psikososyal gelişimini de olumsuz etkileyebilir. Adölesanların beslenme alışkanlıklarını ile beslenme hakkındaki bilgi düzeyleri anlamak, obezite ile mücadele için gereklidir. Araştırma, ortaokul 5. ve 6. sınıf öğrencilerinde beslenme alışkanlıklarının obezite üzerine etkisinin araştırılması amacıyla tanımlayıcı tipte gerçekleştirildi. Araştırmanın evrenini İstanbul ilindeki bir devlet okulunda 2019-2020 eğitim öğretim yılında 5. ve 6. sınıfa kayıtlı olan 120 öğrenci oluşturdu. Örneklemi ise evrenden tam sayım yöntemi ile seçilen ve ebeveynleri tarafından araştırmaya katılmaya gönüllü olan 110 öğrenci oluşturdu. Veriler, araştırmacılar tarafından literatür doğrultusunda hazırlanan anket formu ve beden kitle indeksinin (BKİ) hesaplanabilmesi amacıyla güncel kayıtlardan alınan antropometrik ölçümler aracılığı ile elde edildi. Elde edilen verilerin değerlendirmesinde yüzdelik ve ki-kare testi kullanıldı. Araştırma kapsamındaki öğrencilerin yaş aralığı 10-12 olmakla birlikte %50'si 11 yaşındadır. Çoğunluğunun erkek olduğu (%51,8), persentil eğrilerine göre normal kilolu (%84,5), anne eğitim durumunun genellikle ilkokul (%51,8),

annelerin çoğunun çalışmadığı (%79,1), baba eğitim durumunun genellikle ilköğretim (%34,5) ve lise (%32,7), ailedeki çocuk sayısının 1-3 (%84,5) olduğu saptandı. Öğrencilerin günde 1-3 öğün (%83,6) yemek yeme alışkanlığı olduğu, kahvaltıda en çok tüketilen yiyeceklerin yumurta (%84,5) ve ekmek (%83,6), en çok tüketilen içeceğin çay/bitki çayları (%67,3) olduğu belirlendi. Öğrencilerin akşam yemeği yeme alışkanlıklarının olduğu ve ev yemeği (%97,3) yedikleri, öğün aralarında taze meyve (%65,6) tükettikleri, çoğunun (%72,7) mahallede/parkta arkadaşlarıyla futbol, ip atlama gibi aktivitelerde bulunduğu saptandı. Bu sonuçlar doğrultusunda, öğrencilerin persentil eğrilerine göre normal kilolu olmasının olumlu beslenme alışkanlıklarından kaynaklandığı düşünülmüştür.

Anahtar Kelimeler: Beslenme alışkanlıkları, Obezite, Beden Kitle İndeksi, Adölesan.

THE EFFECT OF NUTRITIONAL HABITS ON OBESITY IN SECONDARY SCHOOL 5th AND 6th GRADE STUDENTS

ABSTRACT

It isn't easy to reshape the eating habits shaped during childhood and become permanent in adulthood. While irregular nutrition of adolescents in developmental age threatens their growth and development, it may also negatively affect their psychosocial development. Understanding the nutritional habits of adolescents and their level of nutrition knowledge is necessary to combat obesity. The research was carried out in descriptive type to investigate the effect of eating habits on obesity in secondary school 5th and 6th-grade students. The research universe consisted of 120 students in the 5th and 6th grades in a public school in Istanbul in the 2019-2020 academic year. The sample consisted of 110 students selected from the population by the complete count method who volunteered to participate in the research with their parents. The data were obtained using a questionnaire prepared by the researchers in line with the literature and anthropometric measurements taken from current records to calculate the body mass index (BMI). Percentage and chi-square tests were used in the evaluation of the obtained data. The age range of the students within the scope of the research is 10-12, but 50% are 11 years old. Most of them are male (51.8%), normal weight according to percentile curves (84.5%), the mother's education level is usually primary school (51.8%), most of the mothers are not working (79.1%), the father's education level is generally primary education (34.5%) and high school (32.7%), had 1-3 (84.5%) children in the family. The students have the habit of eating 1-3 meals a day (83.6%), the most consumed foods for breakfast are eggs (84.5%) and bread (83.6%), and the most consumed beverage is tea/herbal tea (67.3%). It was determined that the students had dinner habits and ate home-cooked food (97.3%), consumed fresh fruit (65.6%) between meals, and most of them (72.7%) were engaged in activities such as football and jumping rope outside. In line with these results, it was thought that the normal weight of the students according to the percentile curves was due to their positive eating habits.

Keywords: Nutritional habits, Obesity, Body Mass Index, Adolescent.

1.GİRİŞ

Çocukluk çağı obezitesi son yıllarda en önemli küresel sağlık sorunlarından biri haline gelmiştir (Köse ve Yıldız, 2020). Dünya Sağlık Örgütü (2018)'nün raporuna göre 2016 yılında 5-19 yaş aralığındaki 340 milyon çocuk ve adölesan fazla kilolu ve obezdir. Türkiye'de ise 10-14 yaş arası çocukların %19,6'sının fazla kilolu, %10,5'inin obez olduğu bildirilmektedir (Ministry of Health of Turkey, 2019). Küreselleşme ile birlikte sağlıksız beslenme davranışlarının ve sedanter yaşam tarzının yaygınlaşması obezite insidansını arttırmaktadır (Altay, Kılıçarslan Törüner ve Akgün- Çıtak, 2020). Obeziteye bağlı olarak diyabet, hipertansiyon, kardiyovasküler hastalıklar gibi fiziksel hastalıkların yanı sıra düşük benlik saygısı, depresyon gibi psikolojik sorunların da gelişebileceği düşünüldüğünde (Lee and Yoon 2018; Di Cesare et al., 2019) meydana gelecek zararın daha büyük boyutlarda olacağı görülmektedir

Dengeli ve sağlıklı beslenme, çocukların büyüme ve gelişimi için oldukça önemlidir. Yüksek enerjili, besin değeri açısından fakir, yağ, şeker ve tuz bakımından zengin gıdaların tüketimi ile fiziksel aktivite düzeyinin azalması vücuttaki yağ oranını arttırmaktadır (Zalewska ve Maciorkowska, 2017). Çocukluk ve adölesan çağı, sağlıklı gıda tüketimi ile ilgili davranışların oluşması açısından önemli bir dönemdir (Grosso ve ark. 2013). Bu dönemde kazanılacak beslenme alışkanlıkları yaşam boyu sürmektedir (Sağlık Bakanlığı, 2017). Sağlıklı ve dengeli beslenme ile ilgili bilgi eksikliği, düzensiz beslenme alışkanlıklarının ortaya çıkmasına neden olmaktadır. Aile, okul ve arkadaş çevresi adölesanların beslenme alışkanlıklarını etkilemektedir (Grosso ve ark. 2013). Amerika Birleşik Devletleri'nde yapılan bir araştırmada, öğrencilerin okuldayken daha çok şekerli içecek, pizza ve patates kızartması gibi sağlıklı olmayan besinleri tükettiği görülmüştür (Briefel, Wilson ve Gleason, 2009; Fox ve ark. 2009). Adölesan dönemde görülen obezitenin yetişkin dönemde görülen obezite riskini arttırdığı için sağlıklı beslenme düzenin oluşturulması önemlidir (Kartal ve ark. 2019).

Literatür incelendiğinde adölesanların riskli beslenme davranışlarına sahip olduğu, kahvaltı atlama, öğlen veya akşam yemeği yerine atıştırmalık besin tüketimi gibi sağlıksız beslenme alışkanlıkları gösterdikleri görülmektedir (Erdoğan ve Akın, 2017; Türk, Gürsoy ve Ergin, 2007; Rodrigues ve ark. 2017; Michels ve ark. 2018; Musaiger ve ark. 2016). Bu alışkanlıklar yetersiz ve düşük kalitede besin alımına neden olup aşırı kilolu ve obez adölesan insidansını arttırmaktadır (Rodrigues ve ark. 2017). Epidemiyolojik çalışmalar, adölesanlarda kahvaltı atlama ile aşırı kilo/obezite arasında pozitif bir ilişki olduğunu göstermektedir (Dubois ve ark. 2009; Croezen ve ark. 2009).

Bu bilgiler ışığında, ortaokul 5. ve 6. sınıf öğrencilerinde beslenme alışkanlıklarının obezite üzerine etkisinin araştırılması ve ileri çalışmalar için alt yapı oluşturması amacıyla tanımlayıcı tipte bir araştırma gerçekleştirilmiştir.

2. GEREÇ YÖNTEM

Çalışma Eylül 2019- Haziran 2020 tarihleri arasında İstanbul ilinde bulunan bir devlet ortaokulunda yürütüldü. Çalışmanın evrenini, bu ortaokulda 2019-2020 eğitim öğretim yılında 5. ve 6. sınıfa kayıtlı 120 öğrenci oluşturdu. Örneklemi ise evrenden tam sayım yöntemi ile seçilen, ebeveynleri ve kendileri tarafından çalışmaya katılmaya gönüllü olan 110 öğrenci oluşturdu.

Çalışmanın verileri, araştırmacılar tarafından literatür doğrultusunda düzenlenen (Çelik, 2012; Koçak Kaplan, 2014; Yahia et al., 2016) "Öğrenci Bilgi ve Beslenme Alışkanlıkları Formu" ve beden kitle indeksinin (BKİ) hesaplanabilmesi amacıyla güncel kayıtlardan alınan antropometrik ölçümler ile toplandı. Öğrenci Bilgi ve Beslenme Alışkanlıkları Formu, iki bölümden ve toplam 37 sorudan oluşmaktadır. İlk bölümde, öğrencilerin ve ailelelerinin sosyo-demografik özelliklerini belirlemek amacıyla; çocuğun yaşı, cinsiyeti, vücut ağırlığı, boy uzunluğu, annenin ve babanın eğitim durumu, iş ve ekonomik durum, ailedeki çocuk sayısı ile ilgili sorular bulunmaktadır. İkinci bölümde ise öğrencilerin beslenme alışkanlıkları hakkında veri toplamak için; çocuğun öğün sayısı, kahvaltı - öğle yemeği - ara öğün- akşam yemeği yeme durumu ve tüketilen besinler, atlanılan öğünler var ise sebepleri, okul kantininden alışveriş durumu ve aldığı besinler, televizyon ya da bilgisayar başında yeme alışkanlığı ve tükettiği besinler, uyku arasında yeme durumu, aktivite, besin tüketim sıklığını belirleyen besin tablosunu da içeren sorulardı.

Veri toplama aşamasında sırasıyla aşağıdaki adımlar izlendi:

- Öğrencilerin rehber öğretmenleri aracılığı ile ebeveynlerine bilgilendirilmiş onam formu gönderildi.
- Ebeveyni çalışmaya katılmayı kabul eden çocuklara, Öğrenci Bilgi ve Beslenme Alışkanlıkları Formu öğretmenleri eşliğinde yüz yüze görüşme yöntemi ile uygulandı.
- Öğrencilerin boy ve kilo ölçüm kayıtları düzenli olarak öğretmenleri tarafından tutulduğu için araştırmacılar tarafından tekrar ölçüm yapılmadı. Öğretmenlerindeki güncel kayıtlardan veriler alındı.

- Boy ve kilo değerlerinden, kilonun boyun karesine bölünmesiyle öğrencilerin BKİ' si hesaplandı.
- Obezitenin var olma durumu BKİ'nin yaşa ve cinsiyete uygun persantil değerine çevrilmesi ile belirlendi. Yaşa ve cinsiyete göre BKİ – persantil değerinin 2-20 yaş arasında %5'den küçük olması zayıflığı, %5-84 arasında olması normal kiloyu, %85-94 persantil arasında olması fazla kiloyu, %95 ve üzerinde olması obeziteyi göstermektedir (Barlow, 2007). Çalışmada elde edilen bulgular değerlendirilirken, istatistiksel analizler için IBM SPSS Statistics 25 paket programı kullanıldı. Elde edilen verilerin değerlendirmesinde yüzdelik ve ki-kare testi kullanıldı. Anlamlılık $p<0,05$ düzeyinde değerlendirildi. Veri toplamaya başlamadan önce, etik kurul başvurusu İstanbul Arel Üniversitesi Etik Kurulu'na yapıldı, 20.05.2020 tarih ve 2020/03 sayılı etik kurul kararı ile onaylandı. Etik Kurul onayından sonra ilgili kurumdan kurum izni alındı. Çocuklar ile görüşme yapılmadan önce, rehber öğretmenler aracılığı ile ailelerden bilgilendirilmiş onam alındı. Çalışma, 2019-2020 eğitim öğretim yılında bir devlet ortaokulunda 5. Ve 6. Sınıf öğrencileri arasından seçilen 110 öğrencinin verdiği cevaplar ile sınırlıdır.

3. BULGULAR

Öğrencilerin Tanıtıcı Özelliklerine İlişkin Bulgular

Araştırmaya katılan öğrencilerin tanıtıcı özellikleri Tablo 1'de sunulmuştur. Araştırmaya katılan 110 öğrencinin %48,2'si kız, %51,8'i erkek öğrenciden oluşmaktadır. Öğrencilerin yaş aralığı 10-12 olmakla birlikte %50'si 11 yaşındadır. Anne eğitim durumunun %51,8'lik bir oran ile ilkokul olduğu ve annelerin çoğunun (%79,1) çalışmadığı bulunurken baba eğitim durumunun genellikle ilköğretim (%34,5) ve lise (%32,7) olduğu ayrıca %79,1'inin çalıştığı görülmektedir. Ailelerde genellikle (%84,5) 1-3 çocuk bulunmaktadır.

Tablo 1. Öğrencilerin Tanıtıcı Özellikleri (n=110)

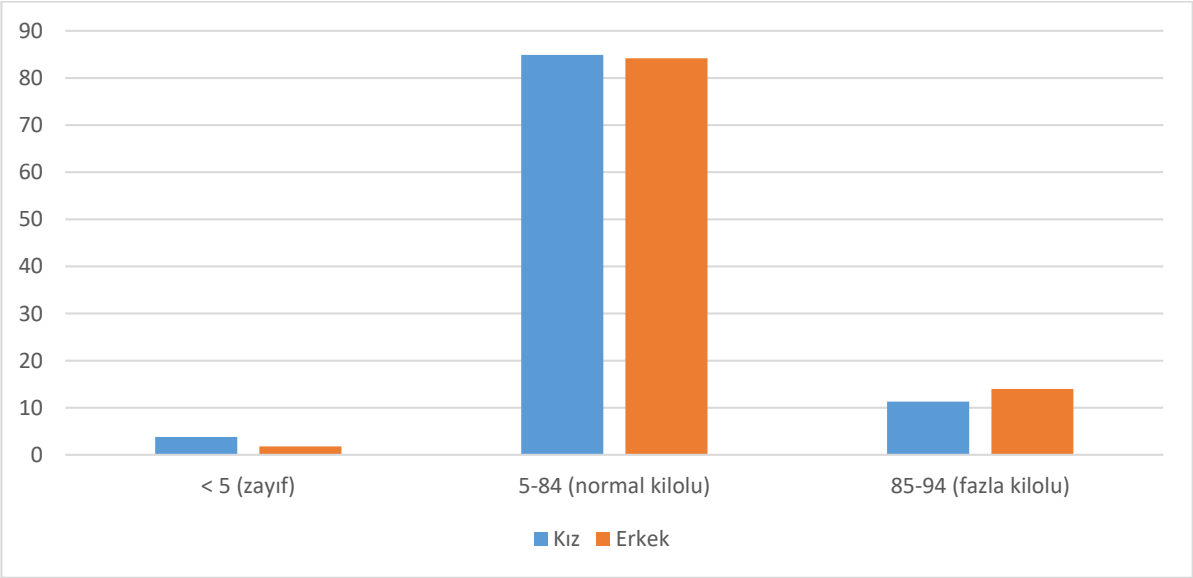
	Özellikler	**n**	**%**
Cinsiyet	Kız	53	48.2
	Erkek	57	51.8
Sınıf	5	80	72.7
	6	30	27.3
Yaş	10	42	38.2
	11	55	50.0
	12	13	11.8
Annenin Eğitim Durumu	Okur-Yazar Değil	11	10.0
	İlköğretim Mezunu	57	51.8
	Lise Mezunu	31	28.2
	Lisans ve Üstü	11	10.0
Annenin Çalışma Durumu	Çalışıyor	23	20.9
	Çalışmıyor	87	79.1
Babanın Eğitim Durumu	Okur-Yazar Değil	9	8.2
	İlköğretim Mezunu	38	34.5
	Lise Mezunu	36	32.7
	Lisans ve Üstü	27	24.5
Babanın Çalışma Durumu	Çalışıyor	87	79.1
	Çalışmıyor	23	20.9
Ailedeki Çocuk Sayısı	1-3	93	84.5
	4 ve üstü	17	15.5

Çocukların büyük çoğunluğunun (%84,5) persantil eğrilerine göre normal kilolu olduğu, obez olarak kabul edilebilecek hiç çocuk olmadığı bulunurken zayıf (%2,7) ve fazla kilolu (%12,7) çocukların da olduğu saptanmıştır (Tablo 2).

Tablo 2. Persantil Değerleri

	Özellikler	**n**	**%**
Persantil	5 ve altı (zayıf)	14	2.7
	16-84 (normal kilolu)	85	84.5
	85-94 (fazla kilolu)	11	12.7
	95 ve üstü (Obez)	0	0

Öğrencilerin cinsiyetlerine göre persantil değerleri incelendiğinde her iki cinsiyette de zayıf, normal kilolu ve fazla kilolu çocukların olduğu belirlenmiştir (Şekil 1). Persantil değerleri arasında cinsiyetlere göre istatistiksel olarak anlamlı fark saptanmamıştır ($p< 0,05$).



Şekil 1. Cinsiyete Göre Persantil Değerleri

Beslenme Alışkanlıklarına İlişkin Bulgular

Tablo 3' de görüldüğü gibi öğrencilerin %83,6'sı günde 1-3 öğün tüketmekte ve %87,3'ü her gün kahvaltı yapmaktadır. Kahvaltıda en çok tüketilen besinler yumurta (%84,5), ekmek (%83,6), bal/reçel/tahin/pekmez (%68,2) ve peynir (%66,4) iken, en az çikolatalı karışımların (%14,5) tüketildiği bulunmuştur. Öğrencilerin %67,3'ü kahvaltıda çay/ bitki çayları tükettiğini bildirmiştir. Öğle yemeğinde öğrencilerin %79,1'i ev yemeği, %10,9' u fast food tükettiğini, %5,5' i ise öğle yemeği yeme alışkanlığı olmadığını belirtmiştir. Akşam yemeğinde ise öğrencilerin %97,3' ünün ev yemeği, %0,9' unun fast food tükettiği, %1,8' inin ise akşam yemeği yeme alışkanlığının olmadığı görülmektedir. Öğün aralarında sırasıyla en çok; taze meyve (%65,5), ev yapımı kek/pasta (%61,8), çay (%55,5), süt (%51,8), tost (%51,8), simit/ poğaça (%45,5), şeker/ çikolata (%35,5), cips (%34,5), taze sıkılmış meyve suyu (%33,6), hazır meyve suyu (%28,2), kuru meyve (%24,5), gazlı içecekler (%24,5), sandviç (%22,7), hazır kek/ pasta (%20) tüketilmektedir. Kantinden en çok su (%52,7) ve sandviç/ simit/ tost (%52,7) alındığı ancak gofret/ çikolata/ şekerleme (%39,1), cips/ bisküvü/ kraker (%33,6), dondurma (%16,4) ve gazlı içeceklerin de (%13,6) alındığı bulunmuştur. Ayrıca öğrencilerin televizyon veya bilgisayar karşısında da meyve (%61,8), kuruyemiş (%46,4), çay (%45,5), meyve suyu (%36,4), pasta/ kek (%34,5), bisküvü (%30), cips (%29,1) ve gazlı içecekler (%20) tükettiği görülmektedir. Öğrencilerin çoğu (%75,5) gece uykudan uyanıp bir şey yiyip içmediği ve öğün saatlerinin düzenli olduğu (%73,6) cevabını vermiştir. Ayrıca çoğunun (%72,7) mahallede/parkta arkadaşlarıyla futbol, ip atlama gibi aktivitelerde bulunduğu saptanmıştır (Tablo 3).

Tablo 3. Öğrencilerin Beslenme Alışkanlıklarına İlişkin Bilgiler

	Özellikler	**n**	**%**
Bir günde öğün yemek yeme sayısı	1-3 öğün	92	83.6
	4 ve üstü	18	16.4
Kahvaltı yapma durumu	Her gün	96	87.3
	Bazen ya da hiç	14	12.7
Kahvaltıda tüketilen yiyecekler*	Yumurta	93	84.5
	Ekmek	92	83.6
	Bal-Reçel-Tahin-Pekmez	75	68.2
	Peynir	73	66.4
	Siyah-Yeşil Zeytin	66	60.0
	Tost	63	57.3
	Sucuk, Sosis, Salam	57	51.8
	Poğaça-Simit	47	42.7
	Taze Meyve	37	33.6
	Çorba	24	21.8
	Margarin-Tereyağı	19	17.3
	Sandviç	18	16.4
	Bisküvi-Hazır Kek	17	15.5
	Çikolatalı Karışımlar	16	14.5
Kahvaltıda tüketilen içecekler*	Çay-Bitki Çayları	74	67.3
	Süt	61	55.5
	Taze Sıkılmış Meyve Suyu	46	41.8
	Hazır Meyve Suyu	28	25.5
Öğle yemeği yeme alışkanlığınız var ise tüketilenler	Öğlen yemeği yeme alışkanlığım yok	6	5.5
	Ev yemeği	87	79.1
	Fast-food	12	10.9
Akşam yemeği yeme alışkanlığınız var ise tüketilenler	Akşam yemeği yeme alışkanlığım yok	2	1.8
	Ev yemeği	107	97.3
	Fast-food	1	.9
Öğün aralarında yiyecek ve içecek tüketimi*	Taze Meyve	72	65.5
	Ev Yapımı Kek-Pasta	68	61.8
	Çay	61	55.5
	Süt	57	51.8
	Tost	57	51.8
	Simit-Poğaça	50	45.5
	Şeker-Çikolata	39	35.5
	Cips	38	34.5
	Taze Sıkılmış Meyve Suyu	37	33.6
	Hazır Meyve Suyu	31	28.2
	Kuru Meyve	27	24.5
	Kola,Gazoz vb.Gazlı İçecekler	27	24.5
	Sandviç	25	22.7
	Hazır Kek-Pasta	22	20.0
Kantinden satın alınan yiyecek ve içecekler*	Su	58	52.7
	Sandviç-Simit-Tost	58	52.7
	Süt-Ayran-Yoğurt	44	40.0
	Gofret-Çikolata-Şekerleme	43	39.1
	Meyve Suyu	41	37.3

	Cips-Bisküvi-Kraker Vb.	37	33.6
	Çay	31	28.2
	Dondurma	18	16.4
	Kola-Gazoz vb.Gazlı İçecekler	15	13.6
TV ya da bilgisayar başında tüketilen yiyecek ve içecekler*	Meyve	68	61.8
	Kuruyemiş	51	46.4
	Çay	50	45.5
	Meyve Suyu	40	36.4
	Pasta-Kek Vb.	38	34.5
	Bisküvi	33	30.0
	Cips	32	29.1
	Kola,Gazoz gibi Gazlı İçecekler	22	20.0
Gece uykudan uyanıp bir şeyler yiyip içme	Evet	11	10.0
	Bazen	16	14.5
	Hayır	83	75.5
Öğün saatlerinin düzenli olma durumu	Evet	81	73.6
	Hayır	29	26.4
Spor aktiviteleri	Mahallede/Parkta Arkadaşlarımla Aktiviteler (Futbol, İp Atlama, Yakalamaca gibi)	80	72.7
	Spor, Dans vb. Kursu	30	27.3

** Birden fazla seçenek işaretlenmiştir.*

4. TARTIŞMA

Çocukluk ve adolesan dönemindeki besin seçimleri ve beslenme alışkanlıklarının yetişkinlik döneminde de benzer şekilde devam ettiği belirtilmektedir (Kabaran & Mercanlıgil, 2013). Bu sebeple olumlu beslenme alışkanlıklarının çocukluk döneminde kazandırılması oldukça önemlidir. Özellikle büyüme ve gelişmenin hızlı olduğu okul çağı çocuklarında hızlı büyümeyi sağlayabilmek için gerekli enerji, protein, vitamin, mineral ve diğer besin ögelerinin, yeterli ve dengeli bir beslenme planı oluşturularak sağlanması gerekmektedir (Neyzi ve Ertuğrul, 2002). Yeterli ve dengeli beslenmeyen çocuklar kısa ve uzun vadede birçok sağlık sorunu ve kronik hastalıklar açısından da risk altında kalmaktadır (Çelik, 2012).

Çocukluk çağında obezite prevalansı ülkeden ülkeye ve yıla göre farklılık göstermekle birlikte obezite oranları hala yüksek seviyededir (Savaşhan et al., 2015). Ülkemizde okul çağındaki çocuklarda obezite prevalansını araştıran geniş tabanlı çalışma bulunmasa da bölgesel yapılan çalışmalarda obezite prevalansı %9-27 arasında saptanmıştır (İnal & Canbulat, 2013). Çalışmadaki öğrencilerin büyük çoğunluğu (%84,5) persantil eğrilerine göre normal kiloludur ve obez olarak kabul edilebilecek hiç çocuk yoktur. Bunun yanında zayıf (%2,7) ve fazla kilolu

(%12,7) çocukların da olduğu saptanmıştır (Tablo 2). Öğrencilerin cinsiyetlerine göre persantil değerleri incelendiğinde her iki cinsiyette de zayıf, normal kilolu ve fazla kilolu çocukların olduğu ancak aradaki farkın anlamlı olmadığı saptanmıştır (Şekil 1). Yapılan başka bir çalışmada 6-11 yaş arasındaki çocukların %11,1'i kilolu ve %7,5'i obez olarak saptandı (Savaşhan et al., 2015). Bir diğer çalışmada ise öğrencilerin %4,3'ü çok zayıf, %6,4'ü normal, %20,6'sı fazla kilolu, %15,2'si obez olarak belirlenmiştir (Çelik, 2012). Çalışmada obezite sıklığının Türkiye'de yapılan diğer çalışmalara oranla düşük olduğu tespit edilmiştir. Bulunan sonuçların sadece çalışma kapsamındaki okula genellenebileceği düşünülmektedir.

Öğrencilerin çoğunluğunun günde 1-3 öğün beslendiği görülmektedir. Öğün atlamak süt ve süt ürünleri, sebze, meyve tüketimi gibi sağlıklı besin seçimlerinin azalmasına ve vitamin, mineral alımında eksikliğe neden olmaktadır (Kabaran & Mercanlıgil, 2013). Yapılan çalışmalar düzenli kahvaltı yapmanın, çocuklarda ve adölesanlarda daha sağlıklı beslenme, daha iyi besin alımı ve fazla kilolu olma ihtimalinin daha düşük olması ile ilişkili olduğunu göstermiştir. (Pedersen, Meilstrup, Holstein ve Rasmussen, 2012; Dubuisson et al., 2012; Tin, Ho, Mak, Wan ve Lam, 2011; Lehto, Ray, Lahti-Koski ve Roos, 2011). Çalışmada öğrencilerin genellikle düzenli kahvaltı yaptığı ancak yine de öğlen ve akşam yemeklerine göre en çok atlanan öğün olduğu belirlenmiştir (Tablo 3). Literatür incelendiğinde de en çok sabah kahvaltısının atlandığına yönelik bulgular elde edilmiştir (Çelik, 2012; Gümüş et al., 2011; Kabaran & Mercanlıgil, 2013; Koçak Kaplan, 2014).

Düzenli kahvaltı yapmak kadar kahvaltıda tüketilen besinler de önemlidir. Dengeli bir kahvaltı günlük enerji miktarının ¼'ünü karşılamalıdır. Çocukların kahvaltısında süt, peynir meyve veya sebze, zeytin, yumurta, reçel ve ekmek gibi besinler bulunmalıdır (Anon, 2007). Çalışmaya katılan öğrencilerin çoğunluğunun sabah kahvaltısında; yumurta, ekmek, bal/reçel/tahin pekmez, peynir, zeytin tükettiği saptanmıştır. Kahvaltıda en çok tüketilen içeceğin çay olduğu, ardından çayı sütün takip ettiği görülmektedir. Yapılan başka çalışmalarda da benzer şekilde kahvaltıda en çok yumurta, ekmek, peynir, zeytin, reçel/bal tükettikleri ve kahvaltıda tüketilen içecekler arasında en çok çayın tüketildiği saptanmıştır (Çelik, 2012; Koçak Kaplan, 2014).

Öğrencilerin büyük çoğunluğunun öğle ve akşam yemeği yeme alışkanlığının olduğu ve ev yemekleri yediği saptanmıştır. Çelik (2012)'in çalışmasında da öğrencilerin öğle ve akşam yemeklerinde ev yemeği tercih ettiği saptanmış olup bu açıdan çalışmalar arasında paralellik bulunmaktadır.

Öğün aralarında rastgele besin alınması çocukların iştahının kesilmesine ve ana öğünü atlamalarına neden olabilmektedir. Ara öğünlerde meyve, süt gibi besinlerin teşvik edilmesi,

çocukların hemsağlıklı büyüme ve gelişmesine hem de obeziteden korunmasına yardımcı olmaktadır (Çelik, 2012). Çalışmada öğrencilerin çoğunun öğün aralarında besin tükettikleri belirlenmiştir. Öğün aralarında sıklıkla tüketilen taze meyveyi ev yapımı kek/pasta, çay, süt ve tost takip etmektedir. Yapılan diğer çalışmalarda da öğrencilerin öğün aralarında besin tükettikleri saptanmış ancak farklı olarak çoğunlukla besin değeri düşük yiyecek ve içecekleri tükettikleri belirlenmiştir (Çelik, 2012; Aydoğan, 2011).

Çalışmaya katılan öğrencilerin öğün saatlerinin çoğunlukla düzenli (%73,6) olduğu saptanmıştır. Benzer şekilde Çelik (2012)'in çalışmasında da öğrencilerin çocuğunun öğün saatlerinin düzenli (%76,3) olduğu belirtilmektedir.

5. SONUÇ VE ÖNERİLER

Çocukluk çağı boyunca şekillenen ve yetişkinlik döneminde kalıcı hale gelen yeme alışkanlıklarının yeniden şekillendirilmesi oldukça zordur. Gelişim çağındaki adölesanların düzensiz beslenmesi büyüme ve gelişimini tehdit ederken psikososyal gelişimini de olumsuz etkileyebilir. Adölesanların beslenme alışkanlıklarını ile beslenme hakkındaki bilgi düzeyleri anlamak, obezite ile mücadele için gereklidir. Bu sonuçlar doğrultusunda, öğrencilerin persentil eğrilerine göre normal kilolu olmasının olumlu beslenme alışkanlıklarından kaynaklandığı düşünülmüştür. Standardize ölçüm araçları ile beslenme alışkanlıkları, fiziksel aktivite ve bilgi düzeyinin ölçüldüğü, olasılıklı örnekleme yöntemlerinden birinin kullanıldığı ileri çalışmaların yapılması önerilmektedir.

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PEDİATRİK PALYATİF BAKIMDA KULLANILAN TERAPİLER: MÜZİK VE HAYVAN DESTEKLİ TERAPİ

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ÖZET

Palyatif bakım, kronik, tedavi olanağı olmayan, ölümcül hastalıklarda ağrıyı hafifletip, semptomları kontrol altına alarak yaşam kalitesini arttırmayı amaçlayan holistik bir yaklaşımdır. Dünyada 20 milyondan fazla çocuk pediatrik palyatif bakım almaktadır. Pediatrik palyatif bakım, çocuğun ve ailenin yaşam kalitesini arttırmaya, ıstırabı en aza indirmeye ve kişisel gelişim için fırsatlar sağlamaya odaklıdır. Kronik hastalığa ve ölümcül hastalığa sahip bazı çocuklar dayanma gücünü aşan ağrılar yaşarlar. Öte yandan hastalığa ilişkin yaşanılan dispne, anskiyete, yorgunluk, depresyon, uykusuzluk, endişe, üzüntü gibi sıkıntılar, çocuk ve ailesinin yaşam kalitesini bozarak hastalıkla baş etmelerini zorlaştırmaktadır. Son yıllarda, Pediatrik Palyatif Bakım'da analjezi etkisini oluşturmak adına nonfarmakolojik yöntemler önem kazanmaya başlamıştır. Pediatrik Palyatif Bakım ünitelerinde fiziksel, emosyonel desteğin sağlanması ve çocuğun yaşam kalitesinin arttırılması amacıyla müzik ve hayvan destekli terapi kullanılmaktadır. Bu derleme makalesi pediatrik palyatif bakımda kullanılan müzik ve hayvan destekli terapiler hakkında bilgi verilmektedir. Müzik terapi bireylerin yaşam kalitesini, fizyolojik, psikolojik ve spiritüel durumunu iyileştiren; tüm yaş gruplarına uygulanan bir müdahaledir. Hayvan Destekli Terapi, kronik hastalığa sahip olan bireylerde terapötik sonuca ulaşmak, rehabilitasyon ve tedaviyi kolaylaştırmak amacıyla, eğitimli hayvan ve terapist ile uygulanan bir tedavi programıdır. Palyatif bakım alan çocuklarda müzik ve hayvan destekli terapinin çocuklarda ağrı ve anksiyeteyi azalttığı, vital bulguları üzerinde pozitif etkisi olduğu, çocuklarda hastaneye uyumu ve iletişimi arttırdığı; ebeveynlerde anksiyeteyi azalttığı ve memnuniyeti arttırdığı görülmektedir. Ülkemizde de hayvan destekli terapi ve müzik terapi gibi tamamlayıcı alternatif terapilerin uygulanmasına ilişkin hemşirelerin de sertifikalı programlara katılmaları, yeterlilik kazanmaları ve kanıt temelli çalışmalardan yararlanarak aile ve çocuklara rehberlik etmesi önemlidir.

Anahtar Kelimeler: Pediatrik palyatif bakım, hemşirelik, müzik terapi, hayvan destekli terapi

THERAPİES USED İN PEDİATRİC PALLİATİVE CARE: MUSİC AND ANİMAL ASSİSTED THERAPY

ABSTRACT

Palliative care is a holistic approach that aims to improve the quality of life by relieving pain and controlling symptoms in chronic, incurable and fatal diseases. More than 20 million children worldwide receive pediatric palliative care. Pediatric palliative care focuses on improving the quality of life of the child and family, minimizing suffering and providing opportunities for personal growth. Some children with chronic and terminal illness experience pain beyond their endurance. On the other hand, problems such as dyspnea, anxiety, fatigue, depression, insomnia, anxiety and sadness experienced related to the disease impair the quality of life of the child and his family, making it difficult for them to cope with the disease. In recent years, non-pharmacological methods have started to gain importance in order to create the analgesia effect in pediatric palliative care. Music and animal-assisted therapy are used in Pediatric Palliative Care units to provide physical and emotional support and to increase the quality of life of the child. This review article provides information about music and animal-assisted therapies used in pediatric palliative care. Music therapy improves the quality of life, physiological, psychological and spiritual conditions of individuals; It is an intervention applied to all age groups. Animal Assisted Therapy is a treatment program applied with a trained animal and therapist in order to achieve therapeutic results, facilitate rehabilitation and treatment in individuals with chronic diseases. In children receiving palliative care, music and animal-assisted therapy reduced pain and anxiety in children, had a positive effect on vital signs, and increased hospital compliance and communication in children; It appears to reduce anxiety and increase satisfaction in parents. In our country, it is important for nurses to participate in certified programs regarding the application of complementary alternative therapies such as animal-assisted therapy and music therapy, to gain competence and to guide families and children by making use of evidence-based studies.

Key Words: Pediatric palliative care, nurse, music therapy, animal assisted therapy

1. GİRİŞ

Palyatif bakım, kronik, tedavi olanağı olmayan, ölümcül hastalıklarda ağrıyı hafifletip, semptomları kontrol altına alarak yaşam kalitesini arttırmayı amaçlayan holistik bir yaklaşımdır[1].

Geri dönüşümsüz organ yetmezliği gibi yaşamı tehdit eden, kistik fibrozis, Duchenne kas distrofisi gibi durumlarda yaşamın uzatılması amacıyla uzun süreli yoğun bakım tedavisi gerektiren, küratif tedavi seçeneği olmayan ve beyin/omurilik hasarı, şiddetli serebral palsi ile birlikte çeşitli komplikasyonların görüldüğü hastalıklarda Pediatrik Palyatif Bakım'a (PPB) ihtiyaç duyulmaktadır[2].

Dünyada 20 milyondan fazla çocuk pediatrik palyatif bakım almaktadır ve 8 milyondan fazla çocuk yaşamlarını sınırlayan hastalıklara karşı çocuklar, gelişimlerini destekleyen etkili palyatif bakıma ihtiyaç duymaktadır[3,4]. Etik ve yasal kaygılar, çok farklı hastalıklara sahip olan az sayıda hasta, yetişkinlerde görülmeyen nadir hastalıklar, ebeveyn katılımı, aile dinamikleri, ölümün anne-baba ve kardeşler üzerine etkisi PPB'da dikkat edilmesi gereken durumlardır[5].

Pediatrik palyatif bakımda aile ve çocuğun fiziksel, spiritüel/manevi ve psikososyal yönleri bütüncül olarak ele alınmaktadır. Dünya Sağlık Örgütü'ne göre[6]:

- Palyatif bakım duruma özgü olan hastalık tanısı konulduğu anda başlar ve hasta tedavi almasa da devam eder.
- Palyatif bakım çocuğun bedenini, ruhunu ve aklını kapsayan, aynı zamanda bu süreçte aileyi de destekleyen aktif bir bakımdır.
- Sağlık personeli çocuğun fiziksel, psikolojik ve sosyal sıkıntılarını değerlendirmeli ve hafifletmelidir.
- Etkili bir palyatif bakım kaynaklar sınırlı olsa da toplumsal kaynakları kullanan, bakımda aileyi içeren, multidisipliner yaklaşım gerektiren bir bakımı içerir.
- Palyatif bakım, üçüncü basamak sağlık kurumlarında, toplum sağlığı merkezlerinde hatta çocukların evlerinde de sağlanabilir.

Palyatif bakımın amacı ölümü ertelemek olmayıp yaşam ve ölümü normal süreç olarak göstermektir[7,8]. Palyatif bakım, çocuğun ve ailenin yaşam kalitesini arttırmaya, ıstırabı en aza indirmeye ve kişisel gelişim için fırsatlar sağlamaya odaklıdır. Bakımda bütüncül bir yaklaşım benimsenmeli, her ailenin kültürel ve dini değerlerine duyarlı bir şekilde fiziksel ve psikososyal

bakım sağlanarak çocuk ve ailenin yaşam kalitesinin en üst düzeyde sürdürmelerine yardımcı olunmalıdır[3]. Palyatif bakımda, ayrıca çocuğun gelişim dönemine uygun, etkili iletişim kurulmalıdır. Tedavinin etkileri, yan etkileri çocuğa ve aileye anlatılmalı, bakım süresince çocuğun ağrı ve anksiyetesi en aza indirilmelidir. Çocuğun yaşamının sınırlanmaması adına büyüme ve gelişme en üst düzeyde tutulmalı, şefkatli bakım sağlanmalıdır. Etkili bir terapötik iletişim palyatif bakımın bütünlüğünü sağlayarak, tekrarlı hastaneye yatışları ve bakım maliyetini azaltmaktadır[9,10].

Kronik hastalığa ve ölümcül hastalığa sahip bazı çocuklar dayanma gücünü aşan ağrılar yaşarlar. Özellikle invaziv işlemlerin sık yapılması çocukta yaşanılan ve hissedilen ağrıyı arttırmaktadır. Öte yandan hastalığa ilişkin yaşanılan dispne, anskiyete, yorgunluk, depresyon, uykusuzluk, endişe, üzüntü gibi sıkıntılar, çocuk ve ailesinin yaşam kalitesini bozarak hastalıkla baş etmelerini zorlaştırmaktadır[11]. Anksiyolitik ve analjezik ilaçlar çocuklarda ağrı ve anksiyetenin kontrol edilmesine yardımcı olurken anemi, bulantı, konstipasyon gibi önemli yan etkilere de yol açabilir. Palyatif bakımda çocuğun ağrı yönetimi sağlanırken yaşam kalitesinin de korunmasına özen gösterilmelidir.

Son yıllarda, PPB'da analjezi etkisini oluşturmak adına nonfarmakolojik yöntemler önem kazanmaya başlamıştır[12]. Müzik terapi, yoga, hipnoz, hayvan destekli terapi, nefes egzersizleri gibi tamamlayıcı ve alternatif tedaviler, hastalık sürecinde tedavinin etkinliğinin arttırılması, semptomların hafifletilmesi, çocuk ve ailesine fiziksel ve emosyonel desteğin sağlanması ve çocuğun yaşam kalitesinin arttırılması amacıyla kullanılmaktadır[13].

Bu derleme, müzik ve hayvan destekli terapinin palyatif bakım alan çocukların tedaviye uyumu ile ağrı ve anksiyete yönetimine etkisini ortaya koymak amacıyla yazılmıştır.

2. MÜZİK TERAPİ

Müzik yüzyıllar boyunca farklı medeniyetler tarafından hastaları tedavi etmek, duyguları yoğunlaştırmak amacıyla kullanılmıştır[14]. Müziğin fizyolojik parametreler üzerine etkisi 20. yüzyılın ortalarında araştırılmaya, çeşitli üniversitelerde program olarak yer almaya başlamış, son yıllarda ise çeşitli klinik alanlarda müziğin terapötik amaçlı kullanımı artmıştır[15]. Amerikan Müzik Terapisi Birliği (American Music Therapy Association) (16) 2011 yılında müzik terapiyi; "bireylerin fiziksel, sosyal, duygusal, entelektüel, spiritüel iyilik hallerini geliştirmek ve yaşam kalitelerini yükseltmek amacıyla tıbbi ve gündelik ortamlarda müziğin ve ögelerinin bir müdahalesi" olarak tanımlamıştır.

Müzik terapi tüm yaş gruplarına uygulanabilen bir girişimdir. Müzik terapi pediatri servisleri,

yoğun bakım üniteleri, palyatif bakım üniteleri, onkoloji, koroner bakım, kadın doğum, psikiyatri, radyasyon, kemoterapi tedavisi, ağrı ve anksiyete yaratacak semptom tedavilerinde, bağışıklık sisteminin desteklenmesinde, yaşam kalitesini arttırmada kullanılmaktadır[15]. Müzik terapi, aile merkezli bakım sağlamak, olumlu başa etme yöntemlerini geliştirmek ve yaşam kalitesini arttırmak amacıyla sunulan bir yöntemdir. Hastalara uygulanan müzik terapisi nonfarmakolojik ağrı yönetimini ve başa çıkma mekanizmalarını geliştirmektedir[17]. Yapılan çalışmalarda müzik terapinin yetişkinlerde ağrı, yorgunluk, endişe, tedavi süresi, ruh hali, maneviyat ve yaşam kalitesi üzerinde olumlu etkiye sahip olduğu[18,19,20], pediatrik hastalarda ise; daha az sedasyona gereksinim duyulduğu, anksiyete düzeylerini azalttığı ayrıca tedavi maliyetini düşürdüğü belirtilmektedir. Çocukların fiziksel yeteneklerini artırmak amacıyla rehabilitasyona eş tedavi olarak kullanıldığında dayanıklılığı ve ağrıya karşı toleransı arttırdığı belirtilmiştir[17].

Makalemizde amaca yönelik olarak Pubmed, ScienceDirect, Google Akademik indeksleri incelenmiştir. Tarama yapılırken "müzik terapi", "music therapy", "pediatric palliative care" anahtar sözcüklerinin çeşitli kombinasyonları kullanılmıştır. Nguyen ve ark. onkoloji kliniğinde yatan, lomber ponksiyon (LP) uygulanacak 7-12 yaş arası 40 çocukta müzik terapinin çocuklarda ağrı ve anksiyete düzeyleri üzerine etkisini araştırmıştır. 20 çocuğa LP işleminden 10 dk önce müzik dinletilmeye başlanmış; 20 çocuğa ise müzik dinletilmemiş. Müzik terapi alan çocuklarda LP işlemi sırasında ve sonrasında yapılan ölçümlerde ağrı puanları, kalp atım ve solunum sayılarının daha düşük bulunduğu belirtilmiştir. Anksiyete puanlarının ise işlem öncesi ve sonrasında daha düşük olduğu belirtilmiştir[21].

Ebeveynler çocuklarını en iyi tanıyan kişilerdir. Çocuklara yönelik iyi bakım sağlamak için aileler ile iyi iletişim kurulmalı, tanı ve tedavi hakkında bilgi verilmelidir. Müzik terapi, sözel ya da sözel olmayan iletişimi güçlendirmektedir[17].

Hilliard müzik terapinin çocuklar ile ebeveynleri arasındaki iletişimi geliştirdiğini belirtmiştir[22]. Lindenfelser ve ark. terminal dönemdeki 5 ay-12 yaş arasındaki çocuğa sahip 7 ebeveyn ile bir nitel çalışma gerçekleştirmiştir. Çocuklar müzik terapistleri eşliğinde şarkı söylemiş, sevdikleri müzikleri dinlemiş ya da şarkı sözü yazmıştır. Çalışma sonunda, müzik terapinin hastalığın aile ve çocuk üzerinde yarattığı sıkıntıyı giderdiği, aile ve çocuk arasındaki iletişimi geliştirdiği, terapinin çok yönlü bir deneyim olduğu belirtilmiştir[23].

Children's Hospice and Palliative Care Coalition (CHPCC) tarafından geliştirilen politika doğrultusunda, aile merkezli verilen palyatif bakım ile ebeveynlerin memnuniyetinde artış olduğu, olumlu başa etme stratejileri geliştirdikleri ve yaşam kalitelerinde artış olduğu

bildirilmiştir[24]. Lindenfelser ve ark. 14 çocuk ve ailesine 45 ile 60 dakika arasında değişen 5 seanslık müzik terapisi uygulamışlar, terapistler çocukların ilgi, yetenek ve yorgunluk düzeyine göre şarkı söyleme, şarkı sözü yazma, enstrüman çalma, müzik eşliğinde dans etme gibi çeşitli terapi yöntemlerini kullanmıştır. Aileler, müzik terapi ile çocuklarının daha mutlu olduğunu, tedaviye daha iyi uyum sağladıklarını, bu terapinin aile ve çocukların birlikte aktivite yapmasına imkan verdiğini, aile merkezli bakım için oldukça uygun olduğunu belirtmiştir. Ayrıca bireysel olarak uygulanan müzik terapi seanslarının, ebeveynlerin yaşam kalitesini arttırdığı belirtilmiştir[25]. Knapp ve ark. pediatrik palyatif bakımda tedavi edilen ve müzik terapisi uygulanan çocuk ve ebeveynlerin terapiden memnun kaldıkları bildirilmiştir[26].

3. HAYVAN DESTEKLİ TERAPİ

Hayvan Destekli Terapi (HDT), kronik hastalığa sahip olan bireylerde terapötik sonuca ulaşmak, rehabilitasyon ve tedaviyi kolaylaştırmak amacıyla, eğitimli hayvan ve terapist ile uygulanan bir tedavi programıdır[27]. Pediatrik ve erişkin yoğun bakım üniteleri, psikiyatri ve onkoloji servisi, hospis bakım hizmetleri gibi çeşitli tedavi ortamlarında bireyleri fizyolojik, psikolojik ve duygusal yönden tedavi etmeyi amaçlayan, günümüzde kullanımı giderek artan, bilimsel etkinliği kanıtlanmış maliyet-etkin bir terapi programıdır[12,28, 29,30].

Hayvan destekli terapinin temel prensibi, insan ve hayvan etkileşimi sonucu fiziksel, biyolojik, kimyasal değişimlerle ortaya çıkan psikosomatik etkilere dayanmaktadır[30]. Literatür incelendiğinde evcil hayvana sahip bireylerde, sosyal etkileşimin arttığı, duygu durumlarının iyileştiği gözlenmiş, kortizol düzeyinin azaldığı, oksitosin ve serotonin gibi hormonların arttığı belirlenmiştir[31,32]. Hayvan destekli terapide at, köpek ve yunus en sık tercih edilen hayvanlardır[33].

Günümüzde birçok ülkede hemşire tarafından uygulanan, nonfarmakolojk tedavi olan hayvan destekli terapi, 2004 yılından itibaren Hemşirelik Girişimleri Sınıflandırılması'nda (NIC) yer almaktadır[33,34].

Makalemizde Pubmed, ScienceDirect, Google Akademik indeksleri incelenmiş olup tarama yapılırken "hayvan destekli terapi", "animal-assisted therapy", "pediatric palliative care" anahtar sözcüklerinin çeşitli kombinasyonları kullanılmıştır. Pediatri hemşireleri hastaneye yatan çocuğun anksiyetesini azaltmak için çeşitli girişimlerde bulunmaktadır. Hayvan destekli terapi ile çocuklarda kaygı, yalnızlık duyguları azaltılıp, kliniğe alışması sağlanabilmektedir[35]. Literatür incelendiğinde, tedavi sırasında köpek terapisi uygulanan çocukların kendilerini evde gibi hissettikleri; ebeveyn memnuniyetinde de artış olduğu belirtilmektedir[36,37]. Nagengast ve

ark. köpeklerle etkileşimin fiziksel muayene sırasında anksiyete üzerinde etkisini araştırmıştır. Köpekten korkan ya da alerjisi olan çocuklara ise hayvan destekli terapi uygulanmamış ve iki grup karşılaştırılmıştır. Üç ila altı yaş arasındaki 23 çocuk ile yapılan bu çalışma çocuklarla tıbbi bir ortamda yapılan ilk hayvan destekli terapidir. Çalışma Nebraska Üniversitesi Hemşirelik Bölümü'nde bulunan Behavioral Laboratory ortamında gerçekleştirilmiştir. Hayvan destekli terapi uygulanan çocukların sistolik kan basıncı ve kalp atımında anlamlı azalma olduğu saptanmış; köpek ile etkileşimde bulunan çocukların davranışsal distress puanı ile köpek ile etkileşimde bulunmayan çocukların davranışsal distress puanı arasında anlamlı fark bulunduğu belirlenmiştir[38].

Kaminski ve ark. hematoloji/onkoloji, kistik fibrozis, travma, transplantasyon, diyabet, ameliyat nedeniyle hastanede yatan 30 çocuk hayvan terapisi grubuna; 40 çocuk video oyunları, kart gibi oyunlar oynanan gruba dahil edilmiştir. Uygulamalardan önce çocuklara Reynolds Child Depression Scale uygulanmış ve ağrı skorları sorgulanmış, kalp hızı, tansiyon, kortizol ölçümü yapılmıştır. Terapi sırasında çocukların köpeği sevdiği, sarıldığı, nazik davrandığı, sağlık personeli ile bağın daha da güçlendiği bildirilmiştir. Terapi sonrasında kalp atım hızlarının daha iyi olduğu, ebeveynlerin çocuğun ruh haliyle ilgili daha olumlu geri bildirimler verdiği bildirilmiştir. Hayvan terapi grubunda uygulama sonrası kortizol düzeyinde düşüş olduğu belirlenmiş ancak bu fark istatistiksel olarak anlamlı bulunmamıştır[39].

İnsan-hayvan etkileşiminin ağrı yönetiminde etkili olduğuna dair birçok çalışma bulunmaktadır. Braun ve ark. hastanede yatan 3-17 yaş arasındaki, köpek korkusu ya da alerjisi olmayan (n:18) ve olan (n:39) çocuklara ağrı ölçeği uygulayarak hayvan destekli terapinin ağrı üzerine etkisini incelemiştir. 15-20 dk boyunca terapist eşliğinde uygulanan hayvan destekli terapi sonrası çocukların ağrı skorlarında azalma olduğu bildirilmiştir. Müdahale ve kontrol grubu arasında kan basıncı ve nabız değerlerinde farklılık bulunmamıştır[40].

Sobo ve ark. hayvan destekli terapinin postoperatif ağrı üzerine etkisini incelemek amacıyla 5-18 yaş arasındaki 25 çocukla gerçekleştirdikleri araştırmada, köpekler ile çocukların odası ziyaret edilmiştir. Uygulama sonrasında çocuklardaki ağrı skorunun anlamlı derecede azaldığı, çocuklar ile köpekler arasında olumlu bağların oluştuğu bildirmiştir[41].

McCullough ve ark. onkoloji servisinde yatan 3-17 yaş arası 106 çocuk ile hayvan destekli terapi uygulaması yaptıkları çalışmada; çocukların aksiyeteleri ve yaşam kalitesi değerlendirilmiştir. Dört ay boyunca haftada bir kez, 10 ila 20 dakika boyunca mümkün olduğunca aynı köpek ile terapi yapılmıştır. Terapide köpek ile konuşma, köpek resmi gösterme, köpek ile yürüme, köpek fırçalama gibi çocukların isteğine göre 22 ayrı aktivite

uygulanmıştır. Müdahale grubunda çocuklarda ve ebeveynlerde anksiyete düzeyinde düşme olduğu (p = .008) ve kontrol grubuna göre bu farkın anlamlı olduğu görülmüştür. Gruplar arasında vital bulgular (kalp hızı ile kan basıncı) açısından anlamlı fark bulunmamıştır[37].

4. SONUÇ

Palyatif bakım alan çocuklarda müzik ve hayvan destekli terapinin çocuklarda ağrı ve anksiyeteyi azalttığı, vital bulguları üzerinde pozitif etkisi olduğu, çocuklarda hastaneye uyumu ve iletişimi arttırdığı; ebeveynlerde anksiyeteyi azalttığı ve memnuniyeti arttırdığı görülmektedir. Ülkemizdeki hastanelerde müzik ve hayvan destekli terapi programları uygulanmamaktadır. Ebeveynlerin terapiler hakkında bilgilendirilmesi için öncelikle pediatri hemşirelerinin bu terapiler hakkında bilgi düzeylerinin yeterli olması gerekmektedir. Bu doğrultuda hemşirelik lisans eğitim müfredatlarında müzik ve hayvan destekli terapi ile ilgili derslere yer verilmesi, hemşirelerin de hayvan destekli terapi ve müzik terapi gibi tamamlayıcı alternatif terapilerin uygulanmasına ilişkin sertifikalı programlara katılmaları, klinik bazlı çalışmaların yapılması önerilmektedir. Bu terapi programlarının tedavi ve bakım uygulamalarının etkinliğini ve yaşam kalitesinin arttırılmasına yönelik büyük katkı sağlayacağı düşünülmektedir.

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PANORAMİK RADYOGRAFLARDA TONSİLOLİT PREVELANSININ DEĞERLENDİRİLMESİ

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ÖZET

Amaç: Bu çalışmanın amacı panoramik radyografilerde rastlantısal olarak karşılaşılan ve çoğu kez gözden kaçabilen yumuşak doku kalsifikasyonlarınndan olan tonsilolit görülme sıklığını belirlemektir.

Giriş: Panoramik radyografiler, diş hekimliğinde maksillar ve mandibular arkın kolaylıkla izlenebildiği klinik muayeneyi destekleyici bir görüntüleme tekniğidir. Maksillofasiyal bölgede yumuşak doku kalsifikasyonları nadir olarak görülmektedir ve genellikle panoramik radyografiler gibi rutin muayenelerde asemptomatik olup, tesadüfen tespit edilmektedir.

Gereç ve Yöntem: Necmettin Erbakan Üniversitesi Diş Hekimliği Fakültesi Ağız, Diş ve Çene Radyolojisi Bölümü'ne Eylül 2021-Nisan 2022 tarihleri arasında başvuran rastgele seçilmiş 180 hastanın panoramik radyografileri çalışmaya dahil edilmiştir. Bu grafilerde tonsilolit görülme sıklığı taranmıştır. Elde edilen bulgular yaş, cinsiyet ve tonsilolit varlığına göre sınıflandırılmıştır.Verilerin analizinde Pearson ki-kare testi ve Bonferoni düzeltmesi kullanılmıştır. Tanımlayıcı istatistikler frekans (n) ve yüzde (%) olarak sunulmuştur. Anlamlılık düzeyi 0,05 olarak kabul edilmiştir.

Bulgular: 180 hastanın panoramik radyografları incelendiğinde tonsilolit görülmesinde cinsiyet ve yaş ile ilişkili anlamlı bir fark kaydedilmemiştir ($p>0,05$). Çalışmamızda 61-70 yaş aralığında tonsilolit diğer yaş gruplarına göre daha yaygın izlenmiştir.

Sonuç: Yumuşak doku kalsifikasyonlarında tonsilolith literatürle uyumlu olarak benzer oranlarda görülmüştür. Tonsilolit ile birlikte siyaloloit, karotid arter kalsifikasyonu, styloid ligament ossifikasyonu ve tritiseöz kıkırdak kalsifikasyonu gibi yumuşak doku kalsifikasyonlarının da panoramik radyograflardan tespit edilebilirliği göz önüne alınmalıdır. Panoramik radyograflar diş hekimliği klinik pratiğinde rutin kullanımı, ucuz olması ve düşük radyasyon dozu gibi özellikleri sayesinde yumuşak doku kalsifikasyon/ossifikasyonlarının ilk değerlendirmesinde fayda sağlamaktadır.

Anahtar Kelimeler: Kalsifikasyon, Panoramik Radyografi

EVALUATİON OF TONSİLOLİTH PREVALENCE ON PANORAMİC RADİOGRAPHS

ABSTRACT

The aim of this study is to determine the incidence of tonsillitis, which is one of the soft tissue calcifications that are encountered incidentally and often overlooked in panoramic radiographs.

Introduction: Panoramic radiographs are an imaging technique that supports clinical examination in dentistry, where the maxillary and mandibular arch can be easily observed. Soft tissue calcifications in the maxillofacial region are rare and are usually asymptomatic on routine examinations such as panoramic radiographs and detected incidentally.

Materials and Methods: Panoramic radiographs of 180 randomly selected patients who applied to Necmettin Erbakan University Faculty of Dentistry, Department of Oral and Maxillofacial Radiology between September 2021 and April 2022 were included in the study. The incidence of tonsillitis was screened in these radiographs. The findings were classified according to age, gender and the presence of tonsillitis. Pearson chi-square test and Bonferoni correction were used in the analysis of the data. Descriptive statistics are presented as frequency (n) and percentage (%). The significance level was accepted as 0.05.

Results: There was no significant difference related to gender and age in the occurrence of tonsillitis in 180 patients ($p<0.05$). In our study, tonsillitis was observed more commonly in the 61-70 age group compared to other age groups.

Conclusion: In soft tissue calcifications, tonsilolith were seen at similar rates in line with the literature. Along with tonsillitis, the detectability of soft tissue calcifications such as sialloid, carotid artery calcification, styloid ligament ossification, and triticeous cartilage calcification should be considered by panoramic radiographs. Panoramic radiographs are useful in the initial evaluation of soft tissue calcifications/ossifications, thanks to their routine use in dentistry clinical practice, their low cost and low radiation dose.

Keywords: Calcification, Panoramic Radiography

GİRİŞ

Baş ve boyun bölgesindeki yumuşak doku yapılarının kalsifikasyonu fizyolojik veya patolojik mineralizasyon sonucu ortaya çıkmaktadır. Patolojik mineralizasyonun eklem kıkırdağı, ligamentler, glandüler ve vasküler dokularda meydana gelmesi daha olasıdır ve genellikle kronik inflamasyon veya skar ile ilişkilidir. (Scarfe & Farman, 2010) Normal şartlar altında kemik dokuda biriken kalsiyum tuzları, bazen yumuşak dokuda da birikebilir. Esas olarak kalsiyum tuzlarının çökelmesi kalsiyum fosfat şeklinde gerçekleşir. Yumuşak dokuda organize olmadan biriken mineraller 'heterotopik kalsifikasyon' olarak adlandırılırken organize bir şekilde biriktiği durumlar ise 'heterotopik ossifikasyon' olarak bilinir. Genellikle belirti ve semptoma sebep olmazlar. Anatomik lokalizayon, sayı, dağılım, şekil ve boyut özellikleri teşhis edilmelerinde önemli rol oynar. Yumuşak dokuda olduğunun ayırt edilmesi kemik üzerine süperpoze olduklarında lezyonun kemik içindemi yoksa yumuşak dokudamı olduğunu tespit etmek oldukça zordur. (White & Pharoah, 2014)

Maksillofasiyal bölgedeki yumuşak doku kalsifikasyonları nadirdir ve genellikle rutin muayenede kullanılan panoramik radyografilerde tespit edilmektedir. Çoğunlukla herhangi bir belirti ve semptom göstermemektedir ve prevelansının %2-19 arasında değiştiği bildirilmiştir. (Barrett, Waters, & Griffiths, 1984; Scarfe & Farman, 2010; Valiyaparambil, Rengasamy, & Mallya, 2009)

Tespit edildiğinde öncelikli amaç yumuşak dokudaki bu oluşumların, kalsifikasyonu tanımak ve tedavi gerekip gerekmediğini belirlemektir. Doğru tanı için kalsifikasyonun lokalizasyon, sayı, şekil, dağılım gibi kriterlerinin göz önüne alınması gerekir. İlaveten yumuşak doku anatomisinin iyi bilinmesi de önemlidir. (Carter, 2014; Monsour, Romaniuk, & Hutchings, 1991; Valiyaparambil et al., 2009)

Bu kalsifikasyonların ayırıcı tanısı, radyograflarda, hyoid kemik, triticeous kıkırdak, styloid proçes, epiglottis ve tiroid kıkırdağın üst boynuzları gibi anatomik yapılarla yapılmalıdır. (Garay, Netto, Olate, & medicine, 2014) Yumuşak doku kalsifikasyonları kemiğe komşu olduğunda, kalsifikasyonun kemik içerisinde mi yoksa yumuşak dokuda mı olduğunu belirlemek zordur. Böyle durumlarda, hastanın anamnez ve klinik muayenesini detaylandırmak, farklı bir açıyla radyograf almak veya ileri görüntüleme tekniklerine başvurmak faydalı olabilir.(Carter, 2014; Monsour et al., 1991)

Tonsiller, sağ ve sol tarafta orofarinksin lateral duvarında bulunan lenfoid dokulardır. Tonsilolitler, tonsillerin kronik enflamasyonu sonucu oluşur.(Monsour et al., 1991) Tekrarlayan enflamasyonlar sonucu tonsiller kriptalar genişler ve organik debrisin (ölü bakteriler ve cerahat,

epitelyal hücreler ve yiyecekler) buralardaki retansiyonu kalsifikasyonun gelişmesine zemin hazırlar. (Thakur, Minhas, Thakur, Sharma, & Mohindroo, 2008)

Çocuklarda oldukça nadir gözlenen tonsilolitler çoğunlukla ileri yaş grubunda ortaya çıkar. En sık 40'lı yaşlarda gözlenen tonsilolitler, klinikte sıklıkla sert, yuvarlak, beyaz ya da sarı renkte objeler olarak görülür. En sık palatinal tonsillerden olmak üzere tonsiller kriptalardan çıkıntı oluştururlar. Küçük kalsifikasyonlar çoğunlukla hiçbir klinik bulgu ve semptoma neden olmazken daha geniş kalsifikasyonlarda ağrı, şişlik, ağızda kötü koku, disfaji ve yutkunma esnasında yabancı cisim hissi yaratabilirler.(Carter, 2014; Scarfe & Farman, 2010; Takahashi et al., 2014; Thakur et al., 2008)

Bu çalışmanın amacı, diagnostik nedenlerle alınmış panoramik radyografilerde rastlantısal olarak karşılaşılan ve çoğu kez gözden kaçabilen yumuşak doku kalsifikasyonlarından olan tonsilolit prevelansını incelemektir.

ARAŞTIRMA VE BULGULAR

Necmettin Erbakan Üniversitesi Diş Hekimliği Fakültesi Ağız, Diş ve Çene Radyolojisi Bölümü'ne Eylül 2021-Nisan 2022 tarihleri arasında başvuran rastgele seçilmiş 180 hastanın panoramik radyografileri çalışmaya dahil edilmiştir. Bu grafilerde tonsilolit görülme sıklığı taranmıştır. Elde edilen bulgular yaş, cinsiyet ve tonsilolit varlığına göre sınıflandırılmıştır. Verilerin analizinde Pearson ki-kare testi ve Bonferoni düzeltmesi kullanılmıştır. Tanımlayıcı istatistikler frekans (n) ve yüzde (%) olarak sunulmuştur. Anlamlılık düzeyi 0,05 olarak kabul edilmiştir.

İstatistiksel Analiz

Veriler SPSS (versiyon 21, IBM, Armonk, NY) paket programında analiz edilmiştir. Verilerin analizinde Pearson ki-kare testi ve Bonferoni düzeltmesi kullanılmıştır. Tanımlayıcı istatistikler frekans (n) ve yüzde (%) olarak sunulmuştur. Anlamlılık düzeyi 0,05 olarak kabul edilmiştir.

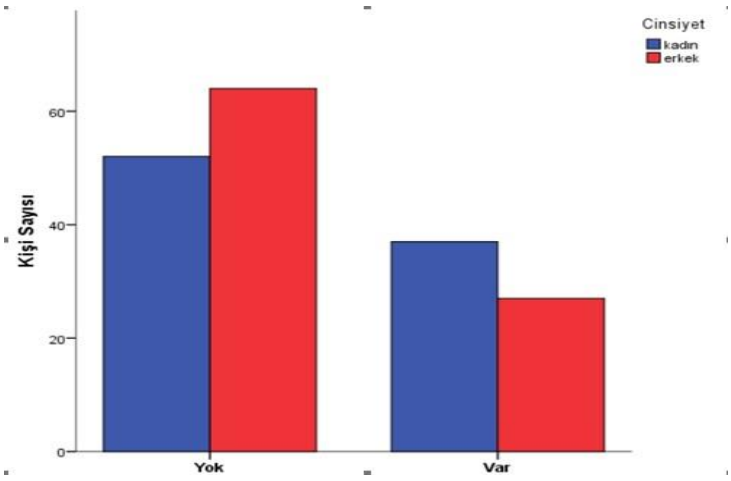
Bulgular

Tablo 1. Tonsilolit varlığının cinsiyete göre değerlendirilmesi

		Tonsilolit Varlığı [n(%)]		
		Yok	**Var**	**Toplam**
Cinsiyet	**Kadın**	52 (58,4)	37 (41,6)	89 (49,4)
	Erkek	64 (70,3)	27 (29,7)	91 (50,6)
	Toplam	116 (64,4)	64 (35,6)	180 (100)

*Pearson ki-kare testi

Kadın ve erkekler arasında tonsilolit varlığı açısından anlamlı bir farklılık bulunmamıştır. (Tablo 1) (p=0,095).



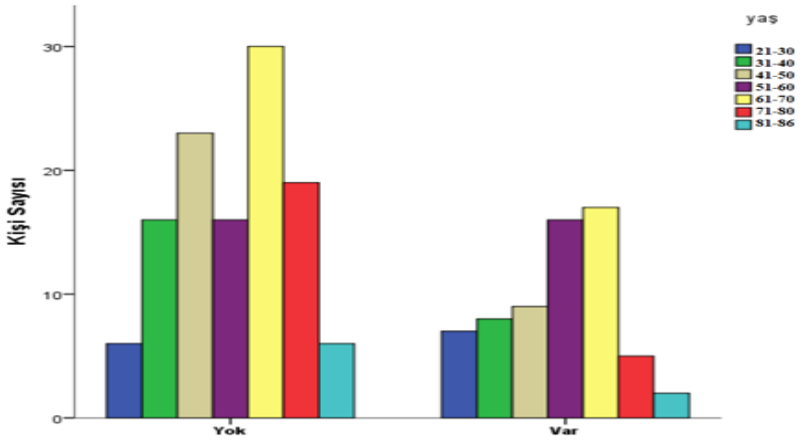
Resim 1. Cinsiyete göre tonsilolit varlığının dağılımı

Tablo 2. Tonsilolit varlığının yaş aralıklarına göre değerlendirilmesi

		Tonsilolit Varlığı[n(%)]		
		Yok	**Var**	**Toplam**
Yaş Aralığı	**21-30**	6 (46,2)	7 (53,8)	13 (100)
	31-40	16 (66,7)	8 (33,3)	24 (100)
	41-50	23 (71,9)	9 (28,1)	32 (100)
	51-60	16 (50)	16 (50)	32 (100)
	61-70	30 (63,8)	17 (36,2)	47 (100)
	71-80	19 (79,2)	5 (20,8)	24 (100)
	81-86	6 (75)	2 (25)	8 (100)
	Toplam	116 (64,4)	64 (35,6)	180 (100)

*Pearson ki-kare testi

Yaş grupları arasında tonsilolit varlığı açısından anlamlı bir farklılık bulunmamıştır. (Tablo 2) (p=0,217).



Resim 2. Yaş aralıklarına göre tonsilolit varlığının dağılımı

SONUÇ

Sıklıkla radyografik muayene sırasında tesadüfen saptanan yumuşak doku kalsifikasyonları/ossifikasyonları durumunda hekimler kalsifikasyonları tanıyabilmeli ve sağlıklı doku anatomisi ile kıyaslamayı yapabilmelidir.Öte yandan rutin kullanımda panoramik radyografi diş hekimliği uygulamalarında, ucuz olması ve düşük radyasyon dozu gibi özellikleri sayesinde yumuşak doku kalsifikasyon/ossifikasyonlarının ilk değerlendirmesinde fayda sağlamaktadır.

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TAM DİŞSİZ HASTALARDA PANORAMİK RADYOGRAFİLERDE GÖRÜLEN REZİDÜL KÖK İNSİDANSININ ARAŞTIRILMASI

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ÖZET

Amaç: Bu çalışmanın amacı tam dişsiz hastalardan alınan panoramik radyografileri retrospektif olarak tarayıp kemik ve mukoza içinde kalmış rezidüel kök insidansını araştırmaktır.

Materyal ve Metod: 74-92 yaş arasında tam dişsiz 250 hastanın (119 kadın, 131 erkek) panoramik radyografileri analiz edildi. Bu çalışmaya dâhil edilen hastaların yaş ve cinsiyet bilgileri kaydedildi. Panoramik radyografilerde mukoza ve kemik yerleşimli rezidüel kök varlığı değerlendirildi. İstatistiksel analiz için SPSS 22 (Statistical Package for Social Science 22) kullanıldı. Farklılıklar $p<0.05$'te anlamlı kabul edildi.

Bulgular: Toplam 250 hastanın yaş ortalaması 81,49±3,91'di. Hastaların 119'u (%47,6) kadın, 131'i (%52,4) erkekti. Hastaların 60'ında (%24) kemikte rezidüel kök görülürken, 13'ünde (%5,2) mukozada rezidüel kök tespit edildi. Kemikteki rezidüel kök tespit edilen hastaların 31'i (%26) kadın, 29'u (% 22,1) erkek iken; mukozada rezidüel kök tespit edilen hastaların 6'sı (%5) kadın, 7'si (% 5,3) erkekti. Hastalar 74-80 ve 81-92 yaş olarak iki gruba ayrıldı. Kemikteki rezidüel kök tespit edilen hastaların 30'u (% 27,8) 74-80 yaş grubunda, 30'u (% 21,1) 81-92 yaş grubundaydı. Mukozada görülen rezidüel köklerin ise 3'ü (% 2,8) 74-80 yaş grubunda, 10'u (%7) 81-92 yaş grubunda gözlendi. Rezidüel kök varlığı cinsiyete ve yaş dağılımına göre anlamlı bir farklılık göstermemekteydi ($p>0,05$).

Sonuç: Protetik tedaviyi etkileyebilecek olan mukoza ya da kemik yerleşimli rezidüel kökleri olan hastaları tespit etmek için çenelerin rutin panoramik radyografik muayenesi gereklidir.

Anahtar kelimeler: rezidüel kök, panoramik radyografi, tam dişsizlik

INVESTIGATION OF THE INCIDENCE OF RESIDUAL ROOT OBSERVED ON PANORAMIC RADIOGRAPHY IN TOTALLY EENTLESS PATIENTS

ABSTRACT

Objective: The aim of this study was to retrospectively scan panoramic radiographs taken from edentulous patients and investigate the incidence of residual roots in the bone and mucosa.

Material and Method: Panoramic radiographs of 250 edentulous patients (119 women, 131 men) aged 74-92 years were analyzed. Age and gender information of the patients included in this study were recorded. Presence of residual roots located in the mucosa and bone was evaluated on panoramic radiographs. SPSS 22 (Statistical Package for Social Science 22) was used for statistical analysis. Differences were considered significant at $p<0.05$.

Results: The mean age of 250 patients in total was 81.49±3.91 years. Of the patients, 119 (47.6%) were female and 131 (52.4%) were male. Residual root was observed in the bone in 60 (24%) of the patients, while residual root was detected in the mucosa in 13 (5.2%) patients. While 31 (26%) of the patients with residual root in the bone were female, 29 (22.1%) were male; 6 (5%) of the patients with residual roots in the mucosa were female and 7 (5.3%) were male. The patients were divided into two groups as 74-80 and 81-92 years old. Thirty (27.8%) of the patients with residual roots in the bone were in the 74-80 age group, and 30 (21.1%) were in the 81-92 age group. On the other hand, 3 (2.8%) of the residual roots seen in the mucosa were observed in the 74-80 age group, and 10 (7%) were observed in the 81-92 age group. Presence of residual root did not differ significantly according to gender and age distribution ($p>0.05$).

Conclusion: Routine panoramic radiographic examination of the jaws is necessary to detect patients with mucosal or bone-located residual roots that may affect prosthetic treatment.

Key words: residual root, panoramic radiography, complete edentulism

1. GİRİŞ

Dünya nüfusu yaşlandıkça ve diş kayıpları arttıkça, implant ve protez ihtiyacı artmakta ve bu da yeni zorluklar oluşturmaktadır (Wallace & Gellin, 2010). Diş hekimleri bazen implant yerleştirilecek bölgede kök artıkları ve gömülü dişleri olan hastalara rastlarlar . Rezidüel kökler diş çekimi, travma gibi sebeplerle çene içerisinde kalmış kök artıklarıdır. Alveolar kemik içerisinde veya mukozada bulunabilir. Diş çekimi sırasında bir komplikasyonla oluşabileceği gibi sinir hasarının önlemek veya aleveoler kemiği korumak ve protez stabilizasyonunu sağlamak için hekim tarafındanda bırakılabilir. Ameliyatta istemeden kırılan ve alveol kemiğinde kalan köklerin durumu üzerine yapılan araştırmalar, köklerin genellikle ağız ortamına açılana kadar sağlıklı kaldıklarını göstermektedir (Helsham, 1959; Simpson, 1959).

Tam dişsiz hastaların radyografik olarak değerlendirilmesi gerektiği fikri ilk kez Logan tarafından ortaya atılmıştır (Ahmad et al., 2019). 35 dişsiz çenenin değerlendirildiği bir çalışmada, hastaların %28.6'sında klinik öneme sahip ve tedaviyi etkileyebilecek rezidüel kök fragmanları ve gömülü dişleri olduğu saptanmıştır (Jindal, Sheikh, Kulkarni, & Singla, 2011). Bunun gibi daha bir çok çalışmalarda tam dişsiz hastalarda en sık görülen radyografik bulgular genellikle rezidüel kökler ve gömülü dişler olduğu bildirilmiştir (Masood, Robinson, Beavers, & Haney, 2007).

Tam dişsiz hastalarda rezidüel kökleri ve diğer patolojileri saptamanın en kolay yolu panoramik radyografilerdir. Panoramik radyografinin en önemli avantajı, kısa sürede ve düşük doz radyasyonla elde edilen tek bir radyografik görüntü sayesinde hem çenelerin hem de komşu anatomik yapıların genel bir değerlendirmesinin yapılabilmesidir (Awad & Al-Dharrab, 2011; Choi, 2011; Kratz, Walton, MacEntee, Nguyen, & MacDonald, 2017; MacDonald & Yu, 2020). Bu sebeple Amerikan Diş Hekimleri Birliği ağız içi muayeneyi takiben panoramik radyografi değerlendirmesini önermektedir (Bohay, Stephens, Kogon, & Endodontology, 1998).

Bu çalışmanın amacı tam dişsiz hastalardan alınan panoramik radyografileri retrospektif olarak tarayıp kemik ve mukoza içinde kalmış rezidüel kök insidansını araştırmaktır.

MATERYAL VE METOD:

Çalışma dizaynı ve Radyolojik İnceleme

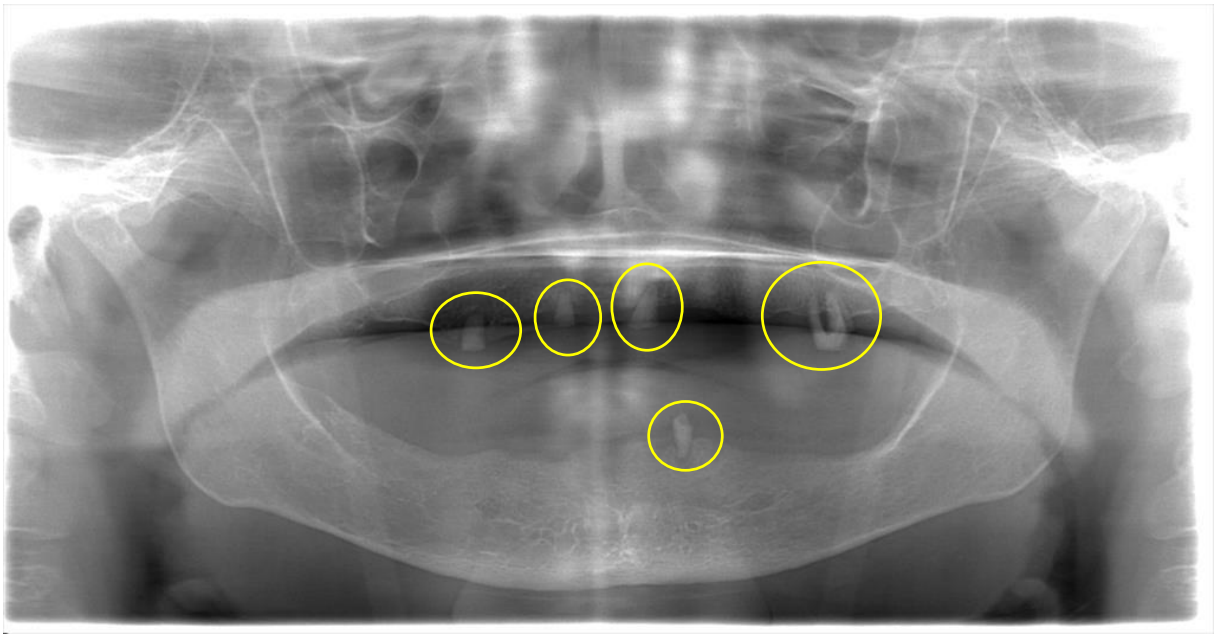
Necmettin Erbakan Üniversitesi Diş Hekimliği Fükültesi Ağız, Diş ve Çene Radyolojisi bölümüde rutin muayene olmuş ve dijital panoramik radyografisi alınmış 72-94 yaş aralığında tam dişsiz 250 hasta (119 kadın, 131 erkek) retrospektif olarak tarandı.

Tam dişsizliği olan oalan hastalar çalışmaya dahil edildi. Panoramik radyografide tespit edilen

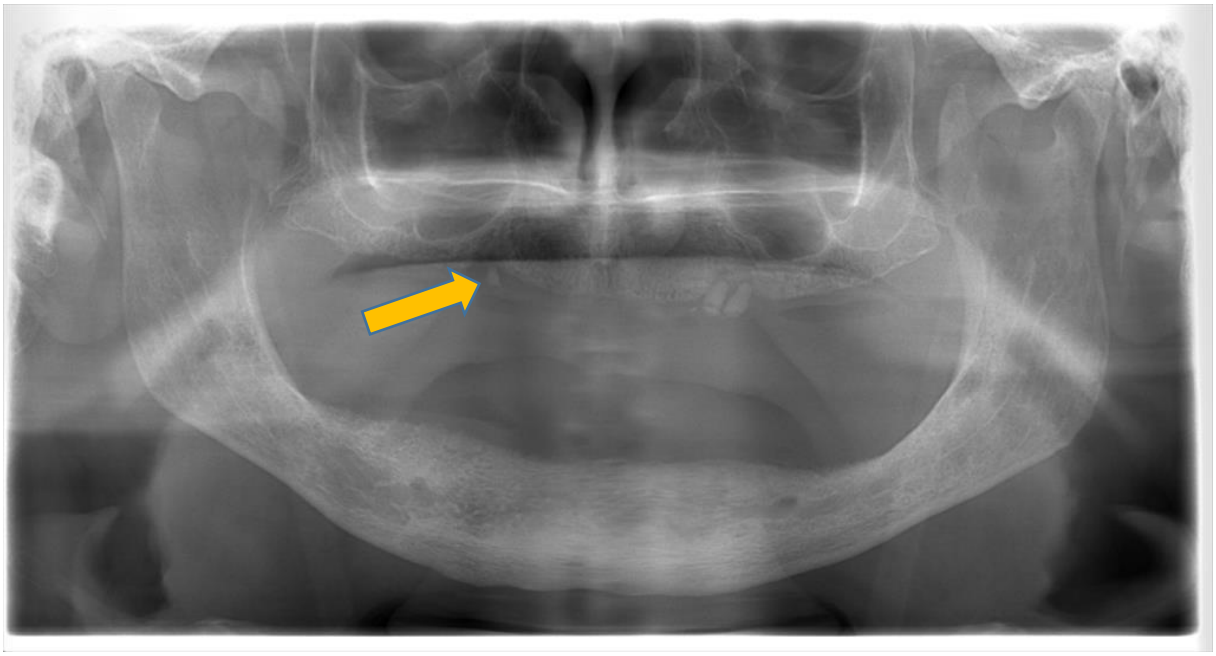
rezidüel kökler kemik retansiyonlu ve mukoza retansiyonlu olarak ikiye ayrılarak kaydedildi. Tanı kalitesi düşük, eksik kayıtlar, major cerrahi operasyon (maksillektomi, hemimandibulektomi vb.) geçiren hastalar çalışma dışı bırakıldı.

Panoramik radyograflar (Morita Veraviewepocs 3D R100-P, J Morita MFG Corp., Kyoto, Japonya) 70 kVp, 10mA ve 10 s'de üreticinin belirttiği referanslara göre alındı. Tüm değerlendirmeler, aynı gözlemci tarafından düz ekran bir monitörde yapıldı.

Radyografiler cinsiyete ve yaşa göre 74-80 yaş ve 81-92 yaş olmak üzere iki gruba ayrıldı. Tespit edilen rezidüel kökler alveolar kemik içerinde ise kemik retansiyonlu (Resim 1), alveolar kemik üstünde yumuşak dokuda ise mukoza retansiyonlu olarak ayrıldı (Resim 2). Dental panoramik radyografilerde rezidüel köklerin tespiti, karanlık bir odada 3 yıllık deneyimli oral ve maksillofasiyal radyolog (MA) tarafından yapıldı.



Resim 1: Kemik içi rezidüel kök



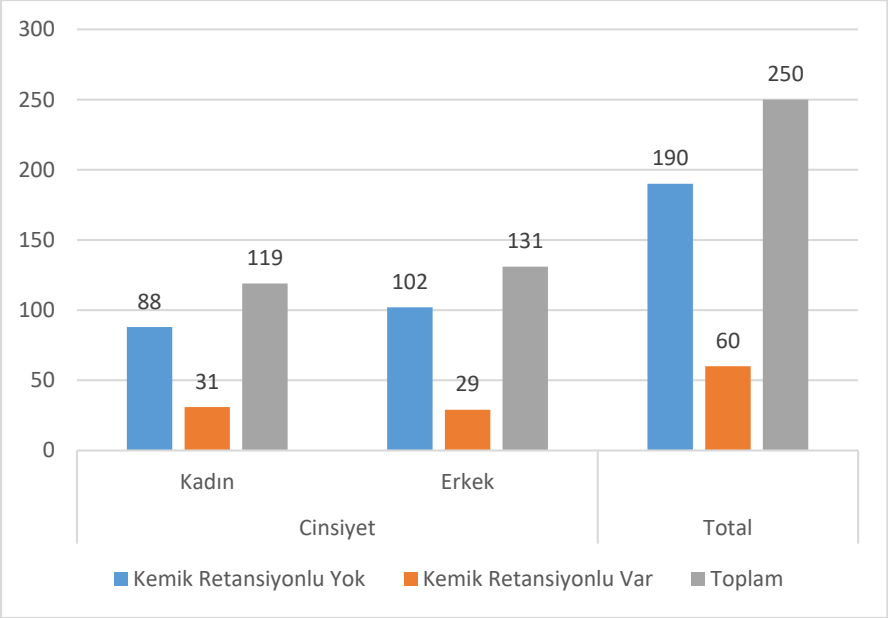
Resim 2: Mukozal rezidüel kök

İstatistiksel analiz

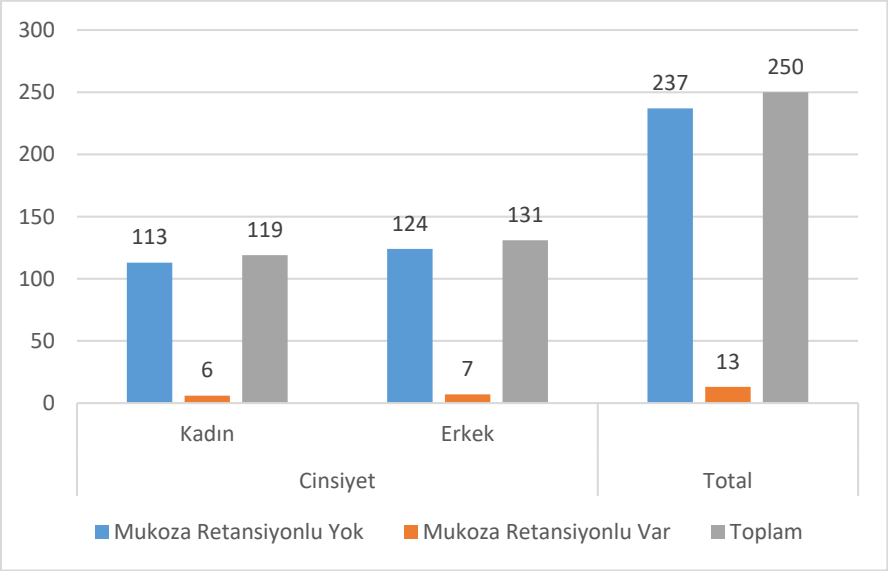
Verilerin analizi için IBM® SPSS® for Windows sürüm 22.0 (SPSS, Chicago, IL, ABD)kullanıldı. Elde edilen sonuçlar $p<0,05$ seviyesinde anlamlı kabul edildi. Kategorik değişkenler sayı (n) ve yüzde (%) değerleri ile ifade edildi ve veriler ki-kare testi kullanılarak karşılaştırıldı.

BULGULAR

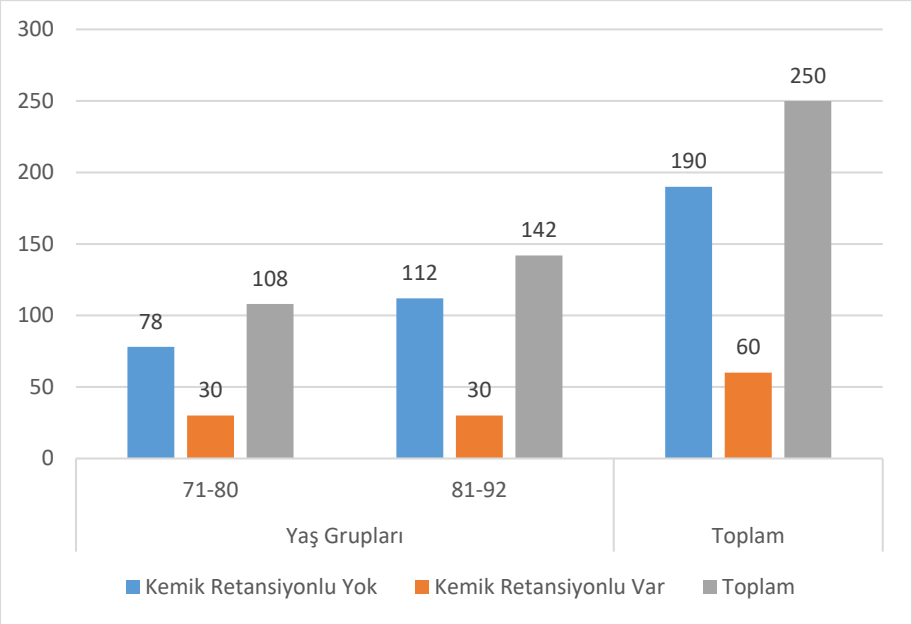
Bu çalışmaya toplam 250 hasta dâhil edildi. Dâhil edilen hastaların yaş ortalaması 81,49 ± 3,91'di. Hastaların 119'u (%47,6) kadın, 131'i (%52,4) erkekti. Hastaların 60'ında (%24) kemik retansiyonlu rezidüel kök görülürken, 13'ü (%5,2) mukoza retansiyonlu idi. Kemik retansiyonlu rezidüel kök tespit edilen hastaların 31'i (%26) kadın, 29'u (% 22,1) erkek iken (Şekil 1); mukoza retansiyonlu rezidüel kök tespit edilen hastaların 6'sı (%5) kadın, 7'si (% 5,3) erkekti (Şekil 2). Kemik retansiyonlu rezidüel kök tespit edilen hastaların 30'u (% 27,8) 74-80 yaş grubunda, 30'u (% 21,1) 81-92 yaş grubundaydı (Şekil 3). Mukozada görülen rezidüel köklerin ise 3'ü (% 2,8) 74-80 yaş grubunda, 10'u (%7) 81-92 yaş grubunda gözlendi (Şekil 4). Rezidüel kök varlığı cinsiyete ve yaş dağılımına göre anlamlı bir farklılık göstermemekteydi ($p>0,05$).



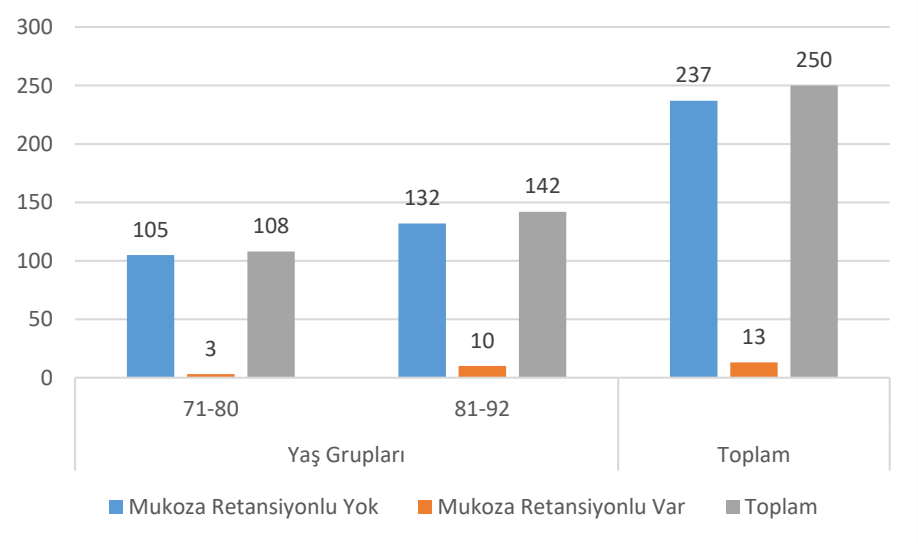
Şekil 1 Cinsiyete göre kemik retansiyonlu rezidüel kök varlığının dağılımı



Şekil 2 Cinsiyete göre mukoza retansiyonlu rezidüel kök varlığının dağılımı



Şekil 3 Yaş gruplarına göre kemik retansiyonlu rezidüel kök varlığının dağılımı



Şekil 4 Yaş gruplarına göre mukoza retansiyonlu rezidüel kök varlığının dağılımı

TARTIŞMA

Panoramik radyografi, dental radyolojide hastaların durumunu değerlendirmek için rutin kullanılan, maliyet az, düşük dozlu bir tekniktir (Choi, 2011). Bu teknik, maksiller ve mandibular arkların ve bunlarla ilişkili anatomik yapıların tek bir görüntü üzerinde incelenmesine olanak sağlar (Awad & Al-Dharrab, 2011; White & Pharoah, 2004). Panoramik radyografinin avantajları zamandan tasarruf, geniş anatomik kapsama alanı ve yüksek hasta kabul edilebilirliğidir (Masood et al., 2007; White & Pharoah, 2004). Rezidüel kökler, yabancı

cisimler, gömülü dişler, neoplazmalar gibi durumlar, hastada semptom vermeden veya klinik muayenede belirlenemeden genellikle gözden kaçar (Ezoddini Ardakani & Navab Azam, 2007). Panoramik radyografiler ise genellikle dişsiz çenelerin rutin muayenelerinde rezidüel kökler, neoplazmlar, radyolüsent lezyonlar, gömülü dişler ve yabancı cisimler gibi asemptomatik durumları saptamak için kullanılır (Jindal et al., 2011; Sumer, Sumer, Güler, & Biçer, 2007).

Dişsiz hastalarda rezidüel kökler en sık görülen önemli radyografik bulgulardır (Ansari, 1997; Jindal et al., 2011; Masood et al., 2007). Sumer ve ark., yaptıkları çalışmada %15,4 oranında; Jindal ve ark., yaptıkları çalışmada % 16,4 oranında; Ezoddini ve ark., yaptıkları çalışmada %32,4 oranında; Haştar ve ark., yaptıkları çalışmada %25,5 oranında; Kose ve ark., yaptıkları çalışamada %8 oranında rezidüel kök saptamışlardır (Ezoddini Ardakani & Navab Azam, 2007; Haştar, Yılmaz, & Orhan, 2010; Jindal et al., 2011; Kose, Demirtas, Karabas, & Ozcan, 2015; Sumer et al., 2007). Literatüre bakıldığında mukoza ve kemik retansiyonlu rezidüel kök oranları genel olarak %9,5-16,4 olarak bildirilmiştir (Jindal et al., 2011; Kose et al., 2015; Sumer et al., 2007). Bizim çalışmamızda hastaların %24'ünde kemik retansiyonlu rezidüel kök görülürken, %5,2'sinde mukoza retansiyonlu rezidüel kök görülmüştür. Çalışmamızda rezidüel kök görülme sıklığının fazla olma sebebi yaş ortalaması ile ilgili olduğu düşünülmüştür. Diğer çalışmalarda yaş ortalaması 58.04-69.9 arasında değişirken bizim çalışmamızda yaş ortalaması 81,49 ± 3,91'di (Cinel Sahin & Ozdede, 2020; Haştar et al., 2010; Jindal et al., 2011) Yaş ilerledikçe kemik retansiyonlu köklere cerrahi işlem yapılması komplikasyonları arttıran bir risk faktörüdür.

Cinel Şahin ve ark., 189 panoramik radyografiyle yaptıkları bir çalışmaya göre 26 (%13,7) kemik retansiyonlu rezidüel kök; 15 (%7,9) mukoza retansiyonlu rezidüel kök bildirmişlerdir. Aynı çalışmada kemik retansiyonlu rezidüel köklerin 11'i (%12.3) kadınlarda, 15'i (%15) erkeklerde görülmüştür. Mukoza retansiyonlu rezidüel köklerin 9'u (%10.1) kadınlarda, 6'sı (%6) erkeklerde olduğu saptanmıştır (Cinel Sahin & Ozdede, 2020). Bizim çalışmamızda hastaların 60'ında (%24) kemik retansiyonlu rezidüel kök görülürken, 13'ünde (%5,2) mukoza retansiyonlu rezidüek kök saptandı. Kemik retansiyonlu rezidüel kök tespit edilen hastaların 31'i (%26) kadın, 29'u (% 22,1) erkek iken; mukoza retansiyonlu rezidüel köklü hastaların 6'sı (%5) kadın, 7'si (% 5,3) erkekti. Aynı şekilde cinsiyet üzerindenden bakıldığında kemik retansiyonlu köklerin oranı bizim çalışmamızda fazla çıkmış, bunun sebebeninde yaş ortalamasından ve örneklem büyüklüğünden kaynaklandığı düşünülmüştür.

Yapılan çalışmalarda rezidüel köklerin çoğu maksilla posterior bölgede yerleşim gösterdiği

görülmüştür. Bunun sebebinin köklerin morfolojisi ve köklerin operasyon yapmanın zor olduğu yerlerde olması olabilir. Ayrıca, bu köklerin çıkarılması, köklerin maksiller sinüse yer değiştirmesi ve sinir hasarı (alveolar, lingual ve mental sinirler) gibi çeşitli komplikasyonlara sebep olabilir (Jones, Seals, & Schelb, 1985; Sumer et al., 2007). Özellikle yaşlı hastalar cerrahi işlemlerde bu komplikasyonlar açısından yüksek risk taşırlar.

SONUÇ

Dişsiz hastalarda çoğu zaman asemptomatik bulunan rezidüel köklerin tespit etmek önemlidir. Çünkü bazen bu kökler yapılacak olan tedavi planlamasının seyrini etkileyebilmektedir. Bunların önüne geçmek ve ileride oluşabilecek problemleri önlemek için rutin panoramik radyografi alınmalıdır.

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AMBULANS KABİNİ HAVASININ ISITILMASININ SAYISAL VE DENEYSEL OLARAK İNCELENMESİ

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ÖZET
Ambulanslar günümüzde büyük bir öneme sahiptirler. Kısa sürede hastaya ilk müdahalenin yapılması ve en yakın sağlık kuruluşuna iletilmesi açısından önem arzetmektedir. Bu sebeple hastanın bulunduğu kabinin konfor şartları hastaya uygun olmalıdır. Soğuk iklimin olduğu bölgelerde aracın hava ısıtma sistemi bazen yeterli olmamaktadır. Bu yüzden araca ek olarak ısıtıcı ilavesi yapılmaktadır. Böylelikle kabin içerisindeki soğuk hava daha kısa sürede ısıtılarak istenilen termal koşullar sağlanabilmektedir. Bu çalışmada bir ambulans kabininin ısıtılma süreci zamana bağlı olarak deneysel ve sayısal olarak incelenmiştir. Deneysel incelemede ortam şartları uygun hale getirilerek yirmi dakika boyunca ısıtıldığında sedye üzerinde elde edilen hava sıcaklığı kaydedilmiştir. Sayısal olarak geçici rejimde hesaplamalı akışkanlar dinamiği analizi yöntemiyle yirmi dakikalık ısıtma süreci için çözüm yapılmıştır. Sedye üzerinde istenilen hava sıcaklığına ne kadar sürede ulaşıldığı belirlenerek yorumlanmıştır. Elde edilen deneysel ve sayısal veriler karşılaştırılarak kabin içerisindeki sıcaklık dağılımı ve hava hızının termal konfor şartlarına olan etkileri değerlendirilmiştir.

Anahtar Kelimeler: Ambulans, Deneysel, HAD, Isıtma, Sıcaklık

NUMERICAL AND EXPERIMENTAL INVESTIGATION OF AMBULANCE CABIN AIR HEATING

ABSTRACT
Ambulances have a significant impact on our daily life. It is crucial to make the first intervention to the patient in a short time and convey it to the nearest health institution. For this reason, the comfort conditions of the cabin where the patient is located should be suitable for the patient. In regions with cold climates, the vehicle's air heating system is sometimes insufficient. For this reason, a heater is added in addition to the vehicle. Thus, the cold air in the cabin can be heated in a shorter time, and the desired thermal conditions can be achieved. In this study, the heating process of an ambulance cabin was investigated experimentally and numerically depending on time. In the experimental examination, the air temperature obtained on the stretcher section was recorded when the environmental conditions were made suitable, and the ambulance cabin was heated for twenty minutes. Numerically, a solution was made for the twenty-minute heating period with the computational fluid dynamics analysis method in the transient regime. It was determined how long it took to reach the desired air temperature on the stretcher, and then it was interpreted. By comparing the experimental and numerical data obtained, the effects of the temperature distribution in the cabin and the air velocity on the thermal comfort conditions were evaluated.

Keywords: Ambulance, Experimental, CFD, Heating, Temperature

1. GİRİŞ

Termal konfor çalışmaları, günümüzde teknolojinin gelişmesiyle birlikte giderek artış göstermektedir. Bu sebeple yapılan çalışmalarda deneysel yöntemlerle birlikte sayısal çözümlemelerin kullanılması, bu alanda yapılan çalışmaların doğruluk ve hassasiyetini arttırmış olup termal konfor çalışmalarında sistemin optimizasyonu için katkı sağlamıştır (Kılıç ve Sevilgen, 2009). Özellikle araç kabin havasının termal koşullarını etkiyen güneş etkileri, iklim koşulları, menfezden gelen şartlandırılmış hava, insan vücut ısısı, termal kaçaklar vb. gibi sınır şartlarının birlikte hesaplanmasının oldukça güç olduğu durumlarda bilgisayar destekli hesaplamalar, çalışmaları daha kolay hale getirmektedir (Kılıç ve Korukçu, 2012).

Deneysel çalışmaların, sayısal çalışmaları doğrulanmasında önemli bir rolü vardır. Bu sebeple deneysel çalışmalarda ölçüm hassasiyeti ve hata kriteri önemlidir (Kılıç ve Akyol, 2012). Ölçüm yapılan ortam koşulları, sensörlerin bağlantı ve konumu, ölçüm değerlerindeki basamak hassasiyeti, insan faktörü vb. gibi etmenlerin birlikte değerlendirilmesi ve yorumlanması gerekmektedir.

Günümüzde termal konfor alanında yapılan sayısal çalışmalarda, karmaşık sınır şartlarının birlikte modellenmesi ve çözümü için ticari yazılımlar kullanılmaktadır. Bu çalışmaların içeriğinde hesaplamalı akışkanlar dinamiği (HAD) temelleri yer almaktadır (Korukçu ve Kılıç, 2011). Farklı matematiksel çözüm metotlarını ve akışkan dinamiği modellerini birlikte bulunduran ticari yazılımlarda, çözüm modelinin oluşturulması önemlidir (Sevilgen ve Kılıç, 2012). Çözümün yapılacağı akışkan hacminin mesh modellemesindeki hassasiyet, seçimi yapılan türbülans modeli, sınır şarlarının doğru belirlenmesi, çözüm için belirlenen matematiksel metot, zamana bağlı geçici rejimde çözüm için (transient) belirlenen zaman adımı vb. gibi etmenlerin birlikte çözülebileceği uygunluğun sağlanması gerekmektedir (Sevilgen ve Kılıç, 2010).

Korukçu, vd. (2013), araç kabin havasının ısıtıma sürecini, aynı ortam koşullarında menfez hava hızlarının farklı olduğu durumları HAD yöntemiyle analiz ederek deneysel yöntemlerle karşılaştırmışlardır. Sevilgen ve Kılıç (2010), araç kabini içerisindeki ısıtılma sürecini geçici rejimde HAD analizi yöntemiyle inceleyerek ısıl konfor etkilerinin ne gibi sonuçlar oluşturduğunu yorumlamışlardır. Mhetre, vd. (2019), araç kabininin güneş etkisinden dolayı maruz kaldığı ışınım etkilerini zamana bağlı sayısal olarak incelemiş ve etkilerini yorumlamışlardır. Roy, vd. (2001), aracın tüm hacmine mesh atmak yerine, araç kabin hacminin belirli bölgelere ayrılıp mesh atılmasıyla analiz işlemini gerçekleştirmişlerdir. Elde edilen sonuçları, tüm hacime mesh atılıp analiz edilen sonuçlarla karşılaştırarak

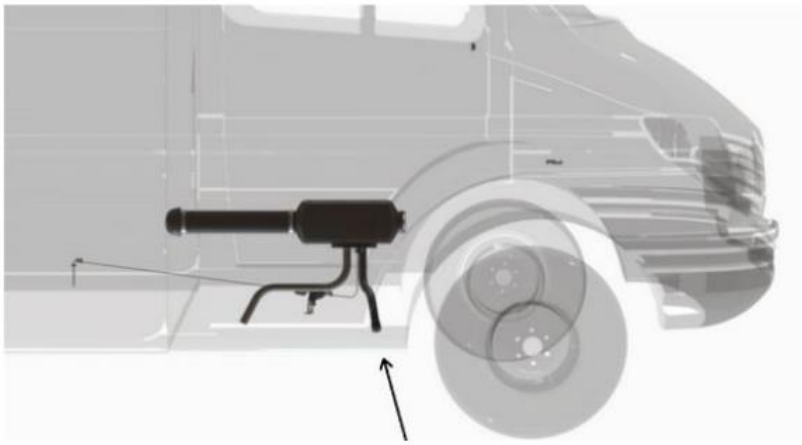
yorumlamışlardır.

Hastaya hızlı hizmet vermesi ve termal koşulların hastaya uygun olması yönünden ambulans kabini termal koşulları oldukça önemlidir. Bu sebeple kabin içi havasının termal konfor etkilerine yönelik yapılan çalışmalarda, sıcaklık dağılımının ve ısınma süresinin incelenmesi gerekmektedir. Yapılan çalışmada kabin içerisinde iki adet insan, bir adet sedye, iki adet koltuk, oksijen tüpü, iki adet dolap ve bir adet taşıma sedyesi bulunmaktadır. Kabin içerisine gönderilen sıcak hava, dizel yakıtlı bir ısıtıcı sağlamaktadır. Bu çalışmada ambulans kabin havasının ısıtılma süreci deneysel ve sayısal olarak incelenip sonuçlar karşılaştırılmıştır.

2. ARAŞTIRMA VE BULGULAR

Yapılan deneysel çalışmada ambulans, 20 dakika boyunca sabit 278 K ortam sıcaklığında tutulmuştur. Başlangıçta kabin içi hava sıcaklığı 278 K, ısıtıcı menfez sıcaklığı 370 K ve 5 m/s hava hızındadır. Kabin içerisinde iki adet insan bulunmaktadır.

Deneysel çalışmada kullanılan ısıtıcı modeli YILKAR marka YH 5 ısıtıcı modelidir. Isıtıcı, Şekil 1'de görüldüğü gibi araç içerisine montajlanmaktadır. Sıcaklık ölçümleri Graphtec GL84 marka 20 kanallı bir data logger cihazı ile kaydedilmektedir. Sıcaklık ölçümleri termokupl ile gerçekleştirilmektedir.



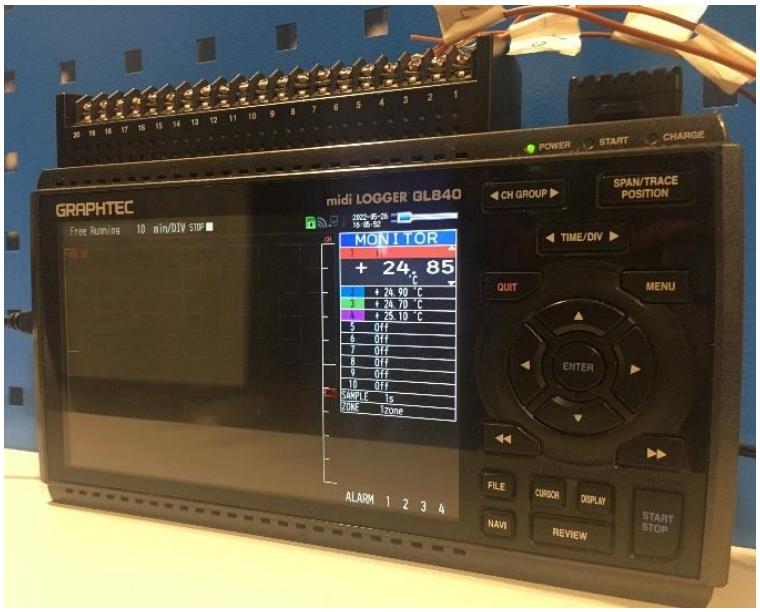
Şekil 1. Isıtıcının araç içerine montajı

Kullanılan termokupl kablolarının sıcaklık ölçme aralığı -50 °C ile +350 °C aralığındadır. Bu değer aralığı, kabin içi hava sıcaklığı ölçümü için yeterlidir. Kullanılan termo kupl görseli Şekil 2' de gösterilmiştir.



Şekil 2. Ölçüm için kullanılan termokupl

Data logger cihazının kaydettiği sıcaklık değeri, 0,02 °C hassasiyet ile gerçekleşmektedir. Ölçümleri kaydettiği hassasiyet kriteri, ölçümlerin değerlendirilme boyutu açısından uygundur. Kullanılan data logger görseli Şekil 3'de gösterilmiştir.



Şekil 3. Kullanılan data logger cihazı

Deneysel çalışma için ortam şartları uygun hale getirilmiş ve 20 dakika boyunca kabin içi hava sıcaklığının ölçümü gerçekleştirilmiştir. Ölçümde termokupl, sedye üzeri hava sıcaklığını ölçecek şekilde sedye üzerine yerleştirilmiştir. Sensörün yerleştirildiği bölge Şekil 4'te gösterilmiştir.



Şekil 4. Sensörün konumlandırıldığı sedye üzeri bölümü

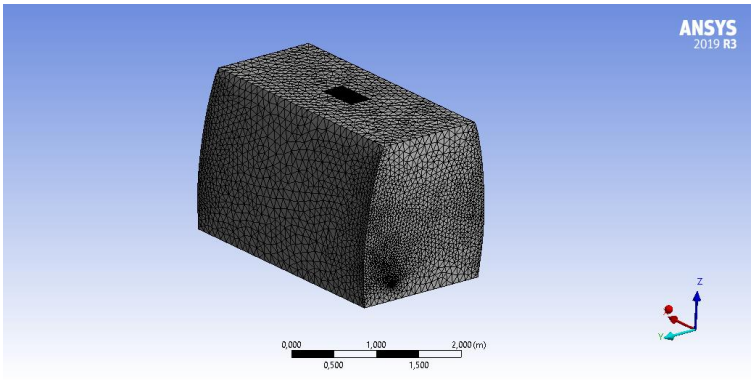
Ölçüm yapılırken dış ortam sıcaklığının sabit kalması ve sensörün sabit konumda hareket etmemesi gözlemlenerek deneysel çalışmadan doğru değerler alınması önemsenmiştir. Yapılan ölçüm sonucunda elde değerler zamana göre Tablo 1'de gösterilmiştir.

Tablo 1. Zamana göre deneysel ölçüm sonuçları

Zaman (Saniye)	**Sıcaklık (Kelvin)**
0	277,5
180	287
360	296
540	298,5
720	300
900	301
1080	302

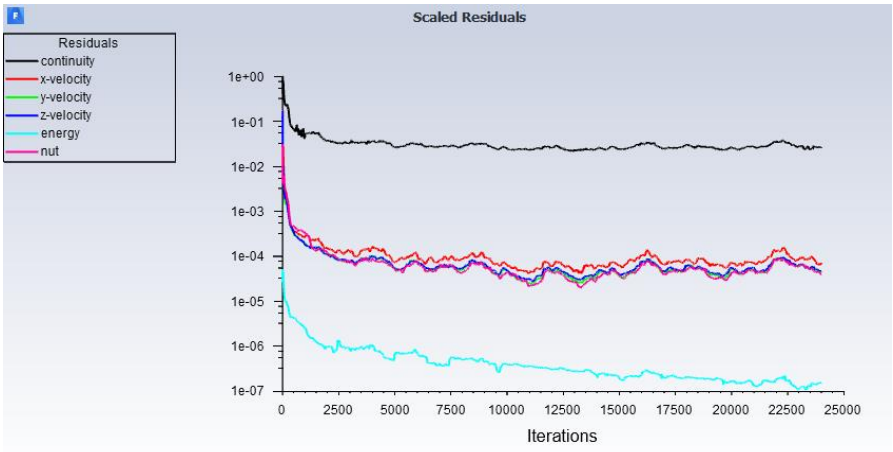
Sayısal çözüm için ANSYS Fluent ticari yazılımı kullanılmıştır. Geometrik model oluşturulurken referans alınan araç modeli deneysel çalışmanın yapıldığı ambulans kabin ölçüleri ile aynıdır. Mesh işleminde tetrahedron mesh yapısı kullanılmıştır. Belirlenen element sayısı 524 516'dır. İnsan vücuduna tanımlanacak sınır şartı iyileştirmesi için 7 katmanlı inflation katmanı uygulanmıştır. Mesh işleminin doğruluğu için skewness ve orthogonal mesh

kalitesi incelenmiştir. Mesh görüntüsü Şekil 5'te verilmiştir.



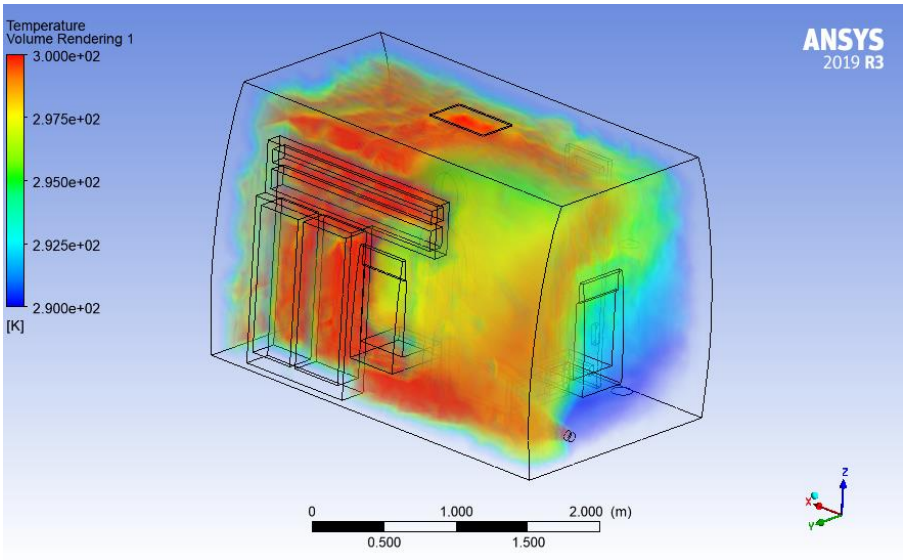
Şekil 5. Mesh Görüntüsü

Türbülans modeli olarak Spalart – Allmaras modeli seçilmiştir. Kabin içi hava sıcaklığı başlangıçta 278 K, ısıtıcı menfez sıcaklığı 370 K, menfezden gelen hava hızı 5 m/s'dir. İnsan vücudu sıcaklığı 309 K olarak belirlenmiştir. Kabin, deneysel çalışma boyunca 278 K sıcaklığındaki ortamda bulunduğu için kabin duvar sınırları sıcaklığı 278 K olarak tanımlanmıştır. 20 dakikalık ısıtma süresi analizi için zaman adımı 0,1 time step size olarak, number of time step ise 12 000 olarak belirlenmiştir. Her bir çözüm adımı için 2 iterasyon değerinde çözüm parametresi tanımlanmıştır. Çözüm bittiğinde elde edilen yakınsama grafiği Şekil 6'da gösterilmiştir.

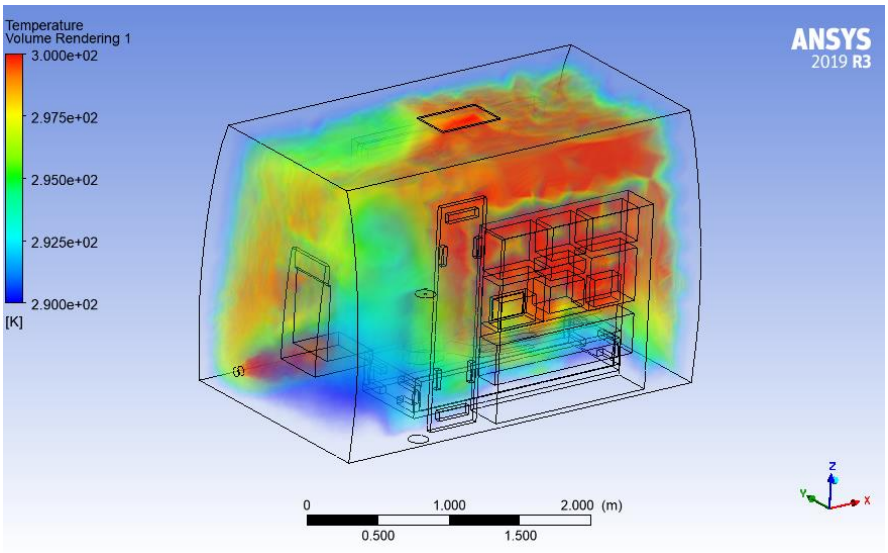


Şekil 6. Yakınsama grafiği

Yapılan analiz sonucunda 20. Dakikada elde edilen edilen sıcaklık dağılımı, sol böülüm için Şekil 7'de, sağ bölüm için Şekil 8'de gösterilmiştir. Isınma süreci sonunda kabin içerisinde homojen bir sıcaklık gözlemlenmemektedir. Isıtıcının sol tarafa yakın olması sebebiyle kabinin sol bölümü, sağ bölüme göre daha sıcaktır.



Şekil 7. Sıcaklık dağılımı kabin sol bölümü (20. dakika)



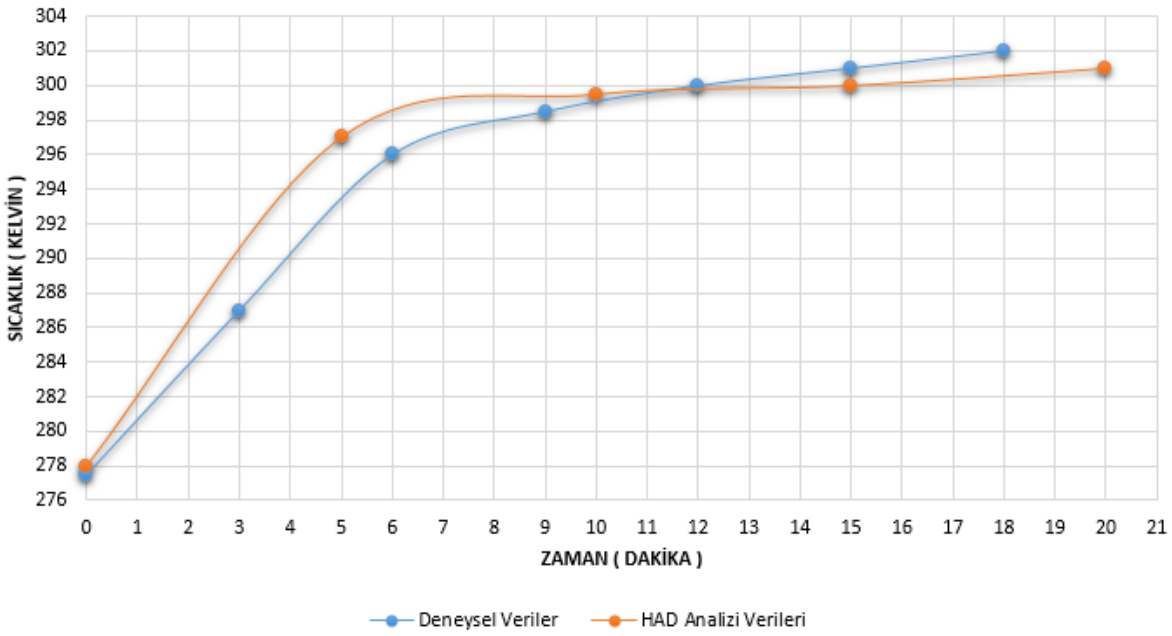
Şekil 8. Sıcaklık dağılımı kabin sağ bölümü (20. dakika)

Sedye üzerinden elde edilen hava sıcaklık değerleri Tablo 2'de verilmiştir. Değerlerin alındığı bölüm, sıcaklık sensörünün deneysel veride konumlandırıldığı sedye üzeri bölüm ile aynıdır.

Tablo 2. Analiz sonucu elde edilen sıcaklık değerleri

Zaman (Saniye)	**Sıcaklık (Kelvin)**
0	278
300	297
600	299,5
900	300
1200	301

Yapılan deneysel ve sayısal çalışma sonucunda sedye üzerinden alınan hava sıcaklık değerleri Şekil 9'daki grafikte karşılaştırılmıştır.



SONUÇ

Yapılan çalışmada, ambulans kabin havasının ısınma süreci deneysel ölçümler ve sayısal analizlerden elde edilen sonuçlar karşılaştırılarak incelenmiştir. Deneysel ölçümler gerçek araç üzerinde gerçekleştirilmiştir.

Sayısal çözümlemede üç boyutlu hesaplamalı akışkanlar dinamiği (HAD) analizi uygulanmıştır. HAD analizleri sonuçları ile deneysel ölçüm değerleri arasında farklılıklar gözlemlenmiştir. Farklılıkların sebepleri, analizlerde yapılan bazı kabuller, kabin geometrisi ve insan modelinin birebir modellenememesi, kabin içerisindeki termal kaçaklar, mesh modeli hassasiyeti, ölçüm cihazlarının hassasiyetleri vb. gibi etmenler olduğu değerlendirilmiştir. Genel olarak sayısal analiz ve ölçümler arasındaki farkın kabul edilebilir derecede olduğu ve

sayısal modellemede kullanılan yöntemin doğrulandığı değerlendirilmiştir.

Deneysel ölçümlerle doğrulanan, HAD analizi çalışmalarının, termal konfor optimizasyonunun daha kısa sürede ve daha ucuz sağlanmasına olanak sağladığı sonucu açık bir şekilde gözlemlenmiştir.

Ambulans kabini içerisinde karmaşık yapıdan dolayı sıcaklık dağılımının homojen olmadığı görülmüştür. Kabinin sağ bölümüne konumlandırılabilecek sıcak hava menfezleri ile sıcaklık dağılımı daha homojen hale getirebileceği değerlendirilmiştir.

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TREND AND CHALLENGES OF INFORMATİON AND COMMUNİCATİON TECHNOLOGY İN EDUCATİON (ICTE) IN A CHANGİNG WORLD

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ABSTRACT
Information communication technologies application in education is one of the most concerns of education authorities around a changing world. The whole intent of ICT use in education is to improve the system to benefit the recipients by ensuring that they acquire more saleable work skills. Such work skills that could enable them become more functional and useful to themselves and the society in general. With this in focus, this paper reviewed the basic ways in which the application of ICT on education could be made possible. In doing this, the paper centered on synchronous ICT media in education. That is, ICT media requiring all participant in a teaching and learning process to be present at the same time even though in different locations. To further extend the knowledge of the audience, this research, also captured the significance of ICT application, ICT generated changes in the education system as well as some pertinent issues for consideration on ICT use in education. The study concluded that ICT use in education is challenging the world over, countries pursue ICT use in the education as a priority agenda in the education system. As a way of recommendation, the paper stressed that ICT use in education may be enabled by many factors amongst which are: the availability of a well-designed website and an equipped classroom with functional computers, video projectors as well as the availability of experienced resource instructors, among others.

Keywords: Information, Communication, Technology, Education and Media

INTRODUCTION

ICT application in education is one of the most concerns of educational authorities around the changing world. In Nigeria today there has been promising effort of government in partnership with ICT inclined private sectors in the training of both students and teachers in the use of ICT gadgets. In fact, all tertiary institutions in the country are struggling to be ICT compliant, i.e. to adopt the system for classroom instruction, students learning and for administrative convenience. There are three basic ways in which the application of ICT in education could be described and understood. Information and Communication Technology (ICT) in education is the mode of education that uses information and communications technology to support, enhance, and optimise the delivery of information. Worldwide research has shown that ICT can lead to an improved student learning and better teaching methods. A report made by the National Institute of Multimedia Education in Japan, proved that an increase in the use of ICT in education with integrating technology to the curriculum has a significant and positive impact on students' achievements. The results specifically showed that the students who are continuously exposed to technology through education has better 'knowledge', presentation skills, innovative capabilities, and are ready to take more efforts into learning as compared to their counterparts. Sayed, (2001).

CONCEPTUAL FRAMEWORK

Information and communications technology (ICT)

Information and communications technology (ICT) is an extensional term for information technology (IT) that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals) and computers, as well as necessary enterprise software, middleware, storage and audiovisual, that enable users to access, store, transmit, understand and manipulate information. ICT is also used to refer to the convergence of audiovisual and telephone networks with computer networks through a single cabling or link system. There are large economic incentives to merge the telephone network with the computer network system using a single unified system of cabling, signal distribution, and management. ICT is an umbrella term that includes any communication device, encompassing radio, television, cell phones, computer system and network hardware, satellite systems and so on, as well as the various services and appliances with them such as video conferencing and distance learning. ICT also includes analog technology, such as paper communication, and any mode that transmits communication. *Ozdamli, et al (2015).*

Education

Education is a purposeful activity directed at achieving certain aims, such as transmitting knowledge or fostering skills and character traits. These aims may include the development of understanding, rationality, kindness, and honesty. Various researchers emphasize the role of critical thinking in order to distinguish education from indoctrination. Some theorists require that education results in an improvement of the student while others prefer a value-neutral definition of the term. In a slightly different sense, education may also refer, not to the process, but to the product of this process: the mental states and dispositions possessed by educated people. Education originated as the transmission of cultural heritage from one generation to the next. Singh, M. (2015).Today, educational goals increasingly encompass new ideas such as the liberation of learners, skills needed for modern society, empathy, and complex vocational skills. Types of education are commonly divided into formal, non-formal, and informal education. Formal education takes place in education and training institutions, is usually structured by curricular aims and objectives, and learning is typically guided by a teacher. Livingstone (2005)

ICT Education

This is the most common understanding of the field of ICT in education. Essentially, it refers to the creation of human resources to meet the information technology needs of the knowledge economy, Torkman and Baloh, (2008). Nigeria as a developing nation is trying to create educated and efficient manpower (not just computer operators) to address complex job opportunities in computer hardware and software, as well as in computer engineering Sayed, (2001). Nigeria ICT in education policy should therefore describe the steps by which computers will be placed in schools, how teachers and students will be provided with the basic computer programming skills to carter for the growing job market in computer base technologies.

ICT supported education

Distance education universities like National Open University of Nigeria (NOUN) use ICT to support the print content that they deliver to students. These may include broadcast audio and video such as radio and television programmes, audio and video tapes delivered to students as part of a learning kit, and in more recent times multimedia content such as lessons which are delivered off line ie. On CDs Kisilowska, (2002). This is also sometimes called multimedia education, where multiple media are used to support learning.

ICT enabled education is any educational programme that is purely delivered through ICTs or with ICT delivered content as the primary backbone of the teaching – learning process, such as online courses through the web is ICT enabled education. In simple words, this form of

education requires ICT access and also requires that the learners use ICTs as a primary or basic medium of instruction Fathi, and Azadmanesh, (2007). When deciding to use ICT, effort should be made to determine the purpose for which you will make your choice of the ICT; as well as the objective you expect to achieve with the gadget. For instance, you should endeavor to put across the following questions. Is it to teach computer skills, to support the learning process, or to instruct through the ICT itself? One basic challenge for the learners is that in our education system, learners are often classified into four groups. The first level consists of those who are able to afford the high cost of education. Thus, they are financially fit to obtain education from either good public or private institutions of learning. This group will be lucky to get the best of ICTs in education Ekong, Igwe and Ekong, (2008). The second group of learners consists of intelligent and competent students, who are unable to afford the high cost of education, but can obtain the little they can afford in les equipped public schools and later be competing with the first group. The third group of students (learners) consists of the academically poor learners who seek access to education from lower quality institutions of learning. The fourth and the last group of learners consist of the illiterates and the poor who cannot afford the cost of education at all and they are deprived. The whole intent of ICT used in education is to improve the system and ensure that the recipients acquire more saleable skills that will enable them become more functional are useful both to themselves and the society at large.

Synchronous ICT media in education

ICT in education could be viewed in terms of the technologies ie, in terms of the delivery system or in terms of their content. Based upon their delivery system (characteristics), ICT media technologies in education can be grouped into two categories, namely; synchronous and asynchronous media Reddi, (2009). Focus in this piece will be on synchronous media. This type of educational media requires all participants to be together at the same time even though in different locations. Synchronous media permit every learner to take part in the learning (class) all at the same time Sife and Lwoga, (2007). Thus, synchronous learning are usually supported by synchronous ICT facilities. Through the use of the synchronous media, for example; students watch a live streaming of a class. They take part in a chat and students and instructors participate in the class with the help of web conference tools such as whiteboard-collaborate, Adobe connect, WebEx, Skype, etc Collis and Jung, (2003). Synchronous online classes therefore, are those that require student and instructors to be online all at the same time. Lectures, discussions and presentations occur at a specific hour. All students must log-on at that specific hour in order to ensure their participation Bates, (2000). Many students like synchronous classes and class

media because they feel involved, in real time, with the class experience. Through the media, they can ask questions or make contents, and they can receive instant feedback. Thus, most students believe that synchronous learning powered by synchronous ICT media are real time communication which allows for more fruitful discussion, Kling, (2011). In this understanding, synchronous ICT media (or class elements) in education may be classified to include:

✓ **Microsoft Teams:** is a proprietary business communication platform developed by Microsoft, as part of the Microsoft 365 family of products. Teams primarily competes with the similar service Slack, offering workspace chat and videoconferencing, file storage, and application integration. Teams is replacing other Microsoft-operated business messaging and collaboration platforms, including Skype for Business and Microsoft Classroom. Throughout the COVID-19 pandemic, Teams, and other software such as Zoom and Google Meet, gained much interest as many meetings moved to a virtual environment. As of 2022, it has about 270 million monthly users. Microsoft Teams for Education allows teachers to distribute, provide feedback, and grade student assignments turned in via Teams using the Assignments tab through Office 365 for Education subscribers. Quizzes can also be assigned to students through an integration with Office Forms.

✓ **Google Meet:** formerly known as **Hangouts Meet** is a video-communication service developed by Google. It is one of two apps that constitute the replacement for Google Hangouts, the other being Google Chat. It replaced the consumer-facing Google Duo in late 2022, with the Duo mobile app being renamed Meet and the original Meet app set to be phased out. During the COVID-19 pandemic, the use of Meet grew by a factor of 30 between January and April 2020, with 100 million users a day accessing Meet, compared to 200 million daily uses for Zoom as of the last week of April 2020.

✓ **Zoom:** is a communications platform that allows users to connect with video, audio, phone, and chat. Using Zoom requires an internet connection and a supported device. Zoom has grown exponentially since December 2019 when the outbreak of Covid-19 prompted businesses and schools to switch to work-from-home or remote learning. In April 2020, Zoom announced that it had over 200 million daily active users, a 2000% increase from 10 million daily users during pre-pandemic days. Now, Zoom has entered the lexicon of netizens with some referring to 'Zoom' as a verb or labelling Gen Z youths as 'zoomers' (the equivalent of 'boomers').

✓ **Skype:** is a proprietary telecommunications application operated by Skype Technologies, a division of Microsoft, best known for VoIP-based videotelephony,

videoconferencing and voice calls. Although Skype is a commercial product, its non-paid version is used with increasing frequency among teachers, schools, and charities interested in global education projects. A popular use case is to facilitate language learning through conversations that alternate between each participant's native language. The video conferencing aspect of the software has been praised for its ability to connect students who speak different languages, facilitate virtual field trips, and engage directly with experts. Skype in the classroom is another free-of-charge tool that Skype has set up on its website, designed to encourage teachers to make their classrooms more interactive, and collaborate with other teachers around the world.

✓ **Virtual Worlds:** Educational "Islands" in virtual worlds like Second Life are wonderful places for students to meet "live" and to interact. They are idea for learning languages because it is possible to speak with each other through headsets and VoIP. It is a wonderful way to practice conversation while being immersed in a virtual place that has the look and feel of another country or culture. While virtual worlds can be very engaging and productive as learning environments, they can be frustrating for those who are new. There is quite a learning curve as you learn to navigate the worlds, and to clothe and operate your avatar. Students should also bear in mind that virtual worlds require significant bandwidth along with a computer that has a lot of usable memory and a great video card.

✓ **Chat (text only):** Synchronous chat rooms allow multiple users to log on and interact. This is a great way to ask questions and to share resources and insights, Librero, (2006). The only drawback is that when there are a lot of people logged in, and everyone's trying to chat at the same time, the conversation can break off into tangents. The fast typists are definitely rewarded. If you are participating in a chat session, be sure to save the session (archive it), and review it later. You can usually save it as a text or rtf file, Hon-chan and Mukherjee, (2003).

✓ **Voice (Telephone or voice-over IP):** Sometimes you will be asked to dial into a toll-free number, or to log into a website where you will speak through your built-in microphone or a headset. The purpose is to have a conference call with your instructor and fellow students. You may be reviewing a document or a presentation. In that case, it is extremely helpful to plan ahead of time and have all the documents you will need at your fingertips, Leach, Ahmed and Power, (2003).

✓ **Video conferencing:** Video conferences can, in theory, require all the participants to have their webcams running. The conference administrator can then post everyone's head shot in the screen. This is not usually the case though, because to have everyone's webcam turned

on and transmitting images requires a very fast connection and a lot of bandwidth. Usually, a video conference (or web conference) will involve two webcams operating – the instructor's and that of another key person. A video conference can involve a live feed from a classroom or elsewhere. Alternatively, the conference might transmit a presentation of slides and graphics, with a question and answer session at the end Warschaver (2009).

✓ **Web conferencing:** What differentiates a web conference from a video conference is the fact that you will probably not rely on video as your primary instructional content, Shortidge (2012). Instead, you are likely to access a wider variety of media elements. Web conferences tend to be more interactive, and you will probably be asked to respond to questions (survey, poll, questionnaire), which will give you a chance to interact. Web conferences usually incorporate chat and they often have a question and answer session at the end.

✓ **Internet radio/podcasts:** When there is not sufficient bandwidth to broadcast live video of an event, instructors might stream the audio over the internet. Good opportunities for audio streaming include concerts or political speeches. Ideally, the audio file would be archived for students to access and review later as well. The nice thing about internet radio/streaming audio is that students can send chat messages while the event is happening, Kling (2011).

The Effectiveness and uses of ICT in education: The discussion above shows that ICT is a very powerful tool in education delivery and activities. ICTs are potentially powerful tool for extending educational opportunities, both formal and non formal, to previously underserved constituencies scattered, and rural populations, groups, traditionally excluded from education due to cultural or long standing social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as others who for reasons of cost or because of time constraints are unable to enroll in school, Leach, Ahmed and Power (2003). ICT effectiveness in education is perceived from the following:

a. It could be accessed anytime, anywhere: One defining feature of ICT is their ability to transcend time and space. ICT makes possible asynchronous learning, or learning characterized by a time lag between the delivery of instruction and its reception by learners, Librero (2006). Online courses materials, for example, may be accessed 24 hours a day. ICT based educational delivery, example educational programming broadcast over a radio or television, also dispenses with the need for all learners and instructors to be in one physical location, Warschaver (2009). Additionally, certain types of ICTs such as teleconferencing technologies enable instruction to be received simultaneously by multiple, geographically dispersed learners, Collis and Jung

(2003).

b**. Access to remote learning Resources:** Teachers and students no longer have to rely solely on books and other materials in physical media housed in libraries for their educational needs. With the internet and world wide web, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at any time of the day and by an unlimited number of people Sife, Lwoga and Sanga (2007). This is particularly significant for many schools in developing countries, and even in developed countries, that have limited and outdated library resources. ICT also facilitates access to resource persons, mentors, experts, researchers, professionals, business leaders and peers all over the world, Hon-chan and Mukherjee (2003).

c. ICT help to prepare individuals for the work place: One of the most commonly cited reasons for using ICTs in the classroom has been to better prepare the current generations of students for a workplace where ICTs particularly computers, the internet and related technologies are becoming more and more ubiquitous, Bates (2000). Technological literacy, or the ability to use ICTs effectively and efficiently, is thus seen as representing a competitive edge in an increasingly globalizing job market

d. Benefit for teachers: ICT facilitates sharing of resources, expertise and advice, greater flexibility in when and where tasks are carried out; gains in ICT literacy skills, confidence and enthusiasm. Easier planning and preparation of lesson and designing materials, access to up-to-date pupil and school data, anytime, anywhere. Enhancement of professional image projected to colleagues, students are generally more “on task” and express more positive feelings when they use computers than when they are given other tasks to do. Computer use during lessons motivates students to continue to learning even outside school hours.

e. The use of ICT help to improve the Quality of Education: ICT can enhance the quality of education in several ways; by increasing learner motivation and engagement, by facilitating the acquisition of basic skills and by enhancing teaching training, Yanosky and Harris (2010). ICT are also transformational tools which, when used appropriately can promote the shift to a learner centered environment. Issues for consideration on ICT use in education When a decision is to be taken to use ICTs for educational purposes, we must be able to define and describe for what purpose the content will be used and also be very clear as to what delivery system we are going to use, Kling (2011). Such a decision should not be based on the technologies but on the conditions and contents in which we seek the use of ICTs e.g, access to media by the learners etc. Factors that will determine the choice of ICT use in education and of the content are

important. We must ensure that there is adequate reach and access. Thus, certain issues crop-up while considering the type of technologies to use in education, especially in a changing world like ours. Reddi (2009).

ISSUES AND CHALLENGES OF ICTE IN A CHANGING WORLD

a. The Issues of Access: This implies a way of entering or reaching a place. This issue is on whether ICTs can get to remote educational areas. What is the possibility of penetrating ICT education facilities into the rural areas? Can ICTs be made available to reach those rural areas? Another important conception here is whether the users will be given the ample opportunity or the right to use the gadgets. Access or reach is a very vital issue of attention while discussing ICT in education. In fact, access or reach has often posed a very big challenge to government, education official, teachers and students. Access or reach of ICT use in education is often influenced by such factors as poor funding, illiteracy, time, mobility and perceived relevance and awareness.

b. The Issue of Technology and People Driven Education: The use of technology today is gradually gaining more and more relevance in every field of study including education. Activities and processes in education today are being driven by both technology and technocrats. The issue of ICT in education is already on ground but the issue of people (technocrats) need therefore, to be addressed. Thus, the choice and use of ICTs in education depends upon the investment in human capital development first. Are computer experts on ground ie. Those who can effectively use the gadgets

c. Content Matters: What is the nature of content to be delivered is a major question to be answered. There are specially areas of content development that merit attention. These include: relevant, timely, local content and suitability. Content takes time and costs money to produce. Multimedia content suitable to be used by new ICTs takes longer and costs more. For instance, if we have to deliver content or knowledge in local language, in this part of the world, even fonts in local languages are not readily available, and if available cannot be integrated easily in to existing multimedia packages easily.

d. The issue of Participation: ICTs used for educational delivery are very numerous both in structure and in function. Consideration for procurement and use should also take into cognizance the convenience of the participants. Teachers and students activities in the teaching and learning processes should therefore, be properly enhanced by the ICTs considered for use in education.

e. The issue of Appropriateness: Educators in many ICT based effort in education, have yet

to determine what the most appropriate medium to deliver knowledge is. Appropriateness of medium and content is related to the issue of access or reach. Thus, ICTs for use in education must be appropriate enough to underscore its relevance, acceptability and usability. f. The issue of support and sponsorship: This focuses on government and private participation and partnership in the provision of ICTs for education. Government therefore, should be ready to sponsor ICT use in education. Again private partnership should also pick interest to support the use of ICT in education. This may be achieved through appropriate government policies that can focus private and non-governmental organizations focus on providing ICTs to educational institutions within their environs.

ICT GENERATED CHANGES IN EDUCATION

ICT in education is innovation which all countries are trying to embrace in this emerging world of technologies. Today, different ICT are found in institutions of higher learning and in fact, in almost all facets of human endeavors. Reddi (2009) noted that like all innovations that we have come to accept, ICTs also have strengths or positive changes and new activities it has generated into the education system. Some of these new changes or activities include:

- **Individualization of instruction:** This means that people learn as individuals and not as a homogeneous group. ICT allows each individual to relate to the medium and its content especially at his convenience.
- **Interactivity:** ICT permit each individual user to interact with the content, units, etc. or to interact with another learner elsewhere without attending to classes. Interactivity is also a way in which a person can relate to the content, ie. Go forward and backward in the content, start at any point depending upon prior knowledge instead of always in a sequential way, Kisilowska (2002).
- **Low per unit cost:** With ICT in education, the cost of education – both delivery and personal resources requirement is far reduced. For instance, where there is complete access, provision of personal computer and good network system, the purchase of textbooks and exercise books may be far reduced. All information and data can easily be accessed through the net. With this, per-person, ICTs tend to reduce the cost of education from very high to very low cost especially in the procurement of basic personal (education) resources like books, etc. Ekong, Igwe and Ekong, (2008).
- **Distance and climate insensitive:** ICT does not matter where you are, or how the weather is, you can still access and learn from it. The basic condition is that there must exist network interconnectivity and easy access.

- **Multiple Teaching Function:** ICT can serve multiple teaching functions to diverse audience. For instance, ICTs especially the computer and internet based can be useful in drills and practices; to help diagnose and solve problems, for accessing information and knowledge about various related themes. f. High Speed Delivery: ICT has very high speed delivery as well as wide reach at low cost. Thus, there is usually instant delivery of information especially when one tries to gain information through the web. g. Uniform Quality: If content is well produced and is of good quality, the same quality can be delivered to the rich and the poor, the urban and the rural equally at the same time, Fathi and Azadmanesh, (2007).

GENERAL IMPACT OF ICT ON EDUCATION IN A CHANGIND WORLD

Globalization and technological change processes that have accelerated progressively over the past few years have created a new global economy, powered by technology, filled by information and driven by knowledge. The emergence of this new global economy has serious implications for the nature and purpose of educational institutions. As the half-life of information continues to shrink and access to information continues to grow exponentially, schools cannot remain mere venue for the transmission of a prescribed set of information from teacher to student over a fixed period of time. Rather schools must promote "learning to learn," that is, the acquisition of knowledge and skills that make possible continuous learning over time. In so doing, concern over educational relevance and quality coexist with the imperative of expanding educational opportunities to those made vulnerable by globalization, noted by, Oduma (2010). Thus, the experience of introducing ICTs in the classroom and other educational settings all over the world suggest that the full realization of the educational benefits of ICT will be gradually unfolding. It is therefore, imperative to assert that ICT will continue to impact on education positively in order to ensure the realization of its relevance in this regard, some of the key issues to face educators and education policy makers in this instance include:

a. The Impact of ICT on Learning and Achievement: ICTs can empower teachers and learners, making significant contribution to learning and achievement. ICT can facilitate teaching considerably in many disciplines. Studies have not shown clearly the impact of ICT on students or pupils academic achievement. But it is on record that the use of ICTs in the teaching and learning of ICT related subject can considerably enhance both instruction and the learning achievement of students in those ICT related subjects. On the other hand, it is clear therefore, that more research need to be conducted to understand the complex link between ICTs learning and academic achievement, Kling (2011).

b. Impact on Teacher and Teaching: The use of ICTs in the classroom or in distance

education does not diminish the role of the teacher; neither does it automatically change teaching practices. Experience has shown that a variety of support and enabling mechanisms must be implemented to optimize teacher use of ICTs. While traditional teacher leadership skills and practices are still important, teachers must also have access to relevant, timely and ongoing professional development. They must have the time and resources to explore this new knowledge base and develop new skills.

c. Impact on Content and Curriculum: Accessing information is the main use of ICT in education. While ICTs, and the internet in particular, provide access to a format that makes them easily accessible and relevant to most teachers and learners in developing countries. Simply importing educational content through ICTs is fraught with difficulties, as well as questions of relevance to local needs. Experience shows that unless electronic educational resources are directly related to the curriculum, and to the assessment method used to evaluate educational outcomes, ICT intervention may not have positive educational impacts.

d. Impact on Education Research and Development Work:

Research and development is integral to the informed use of ICT for education. However, aside from being the subject of research itself, ICTs can also be used to gather much needed data on geographically distributed subjects such as students, university staff in learning center. This implies that surveys are now being conducted online through e-mail, online interview, using all forms of audio and videoconferencing. Collecting and analyzing data is also being automated using appropriate software for data analysis, survey questionnaires can be downloaded and submitted online and tabulation of data fathered can be automatically integrated and analyzed with statistical software.

CONCLUSION

ICT use in education is challenging. The countries world over pursue the priority agenda of ICT use in their education system. Globally, it is believed that national development today is found in a nation's power and skill to use ICT effectively. Effective use of ICT in education helps to train the needed man powers that are able to compete at international plain. Thus, ICT will continue to re-skill the workforce needed for the dynamic development of every nation. Nations especially the developing countries left behind in the struggle for ICT skill and ICT use in all facet of their endeavor, especially the education system will definitely suffer the bitterness of economic backwardness in the nearest future. Nigeria as one of the developing nations should not stop at the little effort so far made in ICT use, but should rather strive to cover more grounds

in ICT use and innovations.

RECOMMENDATIONS

It is recommended that functional ICTs in the school or education system may be enabled by the following parameters:

- Providing computer literacy training for university (education) personnel.
- The academic familiarity with computer software that can help them in teaching and learning activities.
- The academic familiarity with internet and the way of using it.
- The academic access to personal computers in their homes or offices.
- Keeping academics informed on new and effective ICTs instruments and equipments
- Improving academics beliefs and views through workshops and seminars on the potential positive impacts of ICTs features on improving the higher education.
- Availability of a well designed website or even an equipped class with PCs, video projectors and the other necessary equipments.

- The possibility of having enough budgets in faculty to equip the class and prepare necessary equipments.
- The presence of moods, cooperative motivations and enough coordination in education institutions' personnel for entering into new atmosphere.
- Encouraging students to attend and participate in workplaces and labs to use ICT features.
- Supporting students with financial resources.
- Encouraging students to procure personal computers in their homes or places of abode.
- Constantly improving students' abilities in computer literacy.
- Increasing students interest in digital features like e-books, slides and electronic pamphlets.

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THEY AND WE – TESTIMONIES SIGNIFICANT FOR HISTORICAL GEOGRAPHY OF SERBIA

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ABSTRACT
Irregular migrants (they) have been present in Serbia for more than a decade. They have appeared in groups and communicated in languages unknown to the local population (we). They have consisted of Asian and African peoples. They have leaved the homeland because of wars, economic reasons and search better quality of life. In common is that they are in "passing through Serbia". Their target destinations have located in Western or Northern Europe. In Serbia, they were detained by the COVID-19 pandemic and changes in the European Union's attitude towards migrants. The significance of the paper is for historical geography because it provides information about irregular migrants, which are almost non-existent in the scientific literature of Serbia. Irregular migrants are almost invisible in all statistics, because they refuse to be classified as asylum seekers. They have arrived in irregular ways, therefore it is impossible to state their exact number. The work was created on the basis of facts collected since 2018.

Information about irregular migrants was obtained in communication with the population that is in close contact with them or from electronic and written media. Volunteers who have engaged to communicate with irregular migrants have also given precious information. The work showed that the attitudes of the local population differ greatly depending on whether they had direct contact with irregular migrants or not. The local population has both positive and unpleasant experiences. Those who have not had direct contact base their views on prejudice. Therefore, there is a need to devote part of the media space of the public service to these ethnic groups.

Keywords: Serbia, irregular migrants, local population, historical geography

INTRODUCTİON

Many works deal with refugees, asylum seekers and migrants who have passed through the territory of Serbia during the previous decades. However, there are almost no papers that talk only about irregular migrants and their impact on the population of the Republic of Serbia. This is one of the reasons why it is important to leave evidence of their presence in the historical geography of Serbia. Irregular migrants have been walking around Serbia for more than a decade.

Serbia, like other countries in the Balkan region, is a transit country and a temporary destination, or unplanned waiting room (Bobić, Šantić, 2019). Irregular migration is any movement of the population from one state to another, which is not in accordance with the applicable legislation of the country of origin and the country of destination, as well as residence in a particular country contrary to applicable laws of that country. An irregular migrant is a person who has entered the country illegally without citizenship (Government 2018). As irregular migrants are a special category of the population on the territory of Serbia that "found itself in transit" there, so there are no data on them in any official statistics. There have been sporadic traces of their presence for more than a decade. AS (2012b) states that in 2011, the Ministry of the Interior of Serbia discovered about 10,000 immigrants on the Serbian-Macedonian border. They tried to enter and enter Serbia by train, highway or through the "green" border zone. Some of the immigrants discovered at the border crossing, in an attempt to enter illegally, were returned to Macedonia. Some of them asked for asylum, and with the appropriate certificates, they were sent to asylum centers (in the settlements of Banja Koviljača and Bogovađa). As some did not show up, it means that they abused their right to asylum and continued their illegal journey to rich EU countries. In 2011, about 1,100 illegal migrants were returned to Serbia from Hungary. The turning point happened in March 2016, when the borders and passages to the European Union were suspended for these people. Everyone was offered asylum. Some accepted it and some did not because they hoped to open the borders.

The presence of irregular migrants affects life in Serbia both directly and indirectly. Irregular migrants are mostly talked about by those who have been in contact with them, followed by the media, and are less frequently sporadically mentioned in scientific papers. The population in whose local environment the reception centers are located had the most contacts with them. Some information can be obtained from those who are in direct contact with them, such as volunteers, government officials, members of non-governmental organizations, security guards, soldiers, doctors and others. That is why this paper seeks to leave a testimony of their presence.

It is not possible to say with certainty how long they will be on the territory of Serbia. The only thing that can be understood is how their presence affects the local environments in which they live. The Covid 19 pandemic has attracted so much media attention that monitoring the presence of this population group in Serbia has been minimized. The idea of the work came from the stories of the population living near the border or the reception centers where irregular migrants are accommodated. Their presence affects the quality of life of the domicile population. Time will tell what consequences it can cause. It is indisputable that leaving a written trace about this group of people can gain significance in the future.

METODS

Generally known facts about irregular migrants were taken from the Office for Migrants and literature sources. Part of the research refers to the facts found in the media, obtained from the volunteers of the Center for Protection and Assistance to Asylum Seekers, and part consists of those obtained in communication with the population living near the reception centers. It was noticed that the population is reluctant to talk about migrants, but also about the reasons why this is so. The answer was most easily obtained from people who were in some way damaged by their presence.

Several direct semi structured interviews were done. The facts were collected between 2018 and 2022. Some respondents spoke from memory about events that happened even 5 years ago. All participants are inhabited in Serbia. Participants are divided in two groups. Respondents from the first group had contact with migrants, while the second group of respondents had those who had no contact with migrants. Respondents' profiles are given in brackets, so that the first data are gender (male or female f), age, location where the respondent lives, last two digits of the year when the statement was taken, contact (c - had contact or w - no contact).

Who are irregular migrants?

AS (2012b) writes that it all started in 2009 when there was a big conflict between immigrants, police and the local population in the Greek port of Patras. Through Patras, immigrants illegally entered trucks that were transported by ferry to Italy, traveling to the West. There were no border controls because both countries are members of the Schengen Agreement. Tighter controls when boarding ships have resulted in illegal migration changing to a route from Greece via Serbia to the West. ‘Arab spring’ (Bayat, 2013; Ribas Mateos, 2016; Bani Salameh 2019) has certainly significantly contributed to the mass migration of people from Southwest Asia and North Africa to Europe.

Back in April 2009, it was stated that the largest number of illegal migrants and asylum seekers enter the Republic of Serbia on the border with Macedonia and through the administrative border with Kosovo and Metohija. They have been observed at legal as well as illegal border crossings (AS, 2010). Irregular migrants are young men, often minors, or men in their thirties, and rarely people over the age of sixty. Among them is a family with small children and pregnant women. According to Mijatović, Nedeljković (2013), juvenile irregular migrants were also ordered. Drašković et all. (2019) talking about the position of particularly vulnerable categories in transit, testifying to the presence of unaccompanied minors, girls and women, and psychiatric users among irregular migrants. AS (2012) states that some of them seek asylum, while the vast majority only transit through the Republic of Serbia. They reside in the suburbs of settlements, abandoned hangars, and closed buildings or near abandoned factories and landfills. Some have money and rent apartments or small rooms to shelter from harsh weather conditions and people. For that reason, it was said for a whole decade (2009-2019) that the number of this group of people was constantly changing.

Lukić (2016) called all migrants on the Balkan route irregular, referring primarily to those who stopped to rest or renew contacts. According to Šelo Šabić (2017), 800,000 migrants passed through the territory of Serbia in 2015 and 2016. They used different means of transportation. According to Denda (2014), they are grouped into three categories: economic reasons (the Maghreb countries), fleeing from war, oppression, disagreements with the political regime (Syria, Eritrea, Afghanistan, Sudan) and combined reasons that are seen through danger from armed conf licts and the need for a better life, education (Somalia, Nigeria). During the research, in addition to the mentioned countries, the respondents stated that they also met with people from Iran and Pakistan. According to Beta (2013), immigrants from Algeria and other North African countries were also noticed, and the APC (2015) also mentions those from Morocco, Sri Lanka and Bangladesh. In the 2018 Strategy, the government states the structure of identified irregular migrants in 2016. That year, the majority were Afghans (38%), followed by Iraqis (32%), Syrians (11%) and Pakistanis (6%).

Solarević & Božić (2018) wrote that residents feel some fear and discomfort due to the arrival of migrants and refugees, which can be associated with a strong perception of their behavior, as well as religion, language, culture and hygiene, that is, cultural and behavioral patterns that are unknown to many people and are very different from those in Serbia. Laloš (2012) writes that cameras have been set up on the border between Hungary and Serbia. They catch even the slightest movement for miles around, and patrol helicopters and patrol boats stand ready at the

ready if anyone just tries to get through the European ramparts. Until the construction of the "wall" on the Hungarian border (Székely & Kotosz, 2018), in September 2015 (Silaški & Đurović, 2019), there were illegal crossings. However, the "wall" kept some in Serbia. Fence along the border is 174 km long (Šantić et al, 2017). This closure caused redirecting the refugees towards Croatia and Slovenia. In November, the first joint restrictive measures were adopted by Croatia, FYR Macedonia, and Serbia as a result of Slovenia's request to redirect migrants from non-war torn countries back to Croatia (Šelo-Šabić & Borić, 2016). On March 2016, most of the countries on the Balkan Route have announced that their borders were definitely closed to irregular migrants (Commissariat for Refugees and Migration, 2016). However, irregular migrants, especially families with children, were released in small numbers every day until 2019, ie until the outbreak of the Kovid 19 pandemic (Babić & Majer, 2020). During 2020, a fence was erected between Serbia and Northern Macedonia (Đukić Pejić, 2021), and it is noticed that in 2021, irregular migrants from Afghanistan and Syria arrive from the territory of Kosovo and Metohija, the Kosovska Mitrovica - Raška railway, across the administrative border at Jarinje.

If irregular migrants are mentioned somewhere (in statistical reports), their number also refers to refugees, asylum seekers, and migrants. Irregular migrants are not visible in the legal system. They did not express their intention to seek asylum, and it is believed that they will migrate further. Serbia offers them asylum, with which they get an identity and certain rights, for example, to manage the money they have in their bank accounts. But, according to the Executive Director of the Center for Protection and Assistance to Asylum Seekers (2019), they refuse.

According Galijaš (2019) even if a report is filed, those responsible for the violence go unpunished, precisely because they have no legal status. If individuals are charged with a criminal offence or are caught at an illegal border crossing, the law stipulates that they should be deported from the country. But this measure is futile both in Serbia and in the rest of Europe, because there is nowhere the refugees can be deported to: it is impossible to send anyone back to Syria or to parts of Iraq. So, those who break the law continue to live in Serbia, and keep trying to enter the EU.

Todorović (2011) mentions that irregular migrants seek asylum only to avoid penalties for illegal border crossing. The asylum procedure consists of two phases and lasts about five months. With the submitted request, an ID card was obtained with which one can move freely and free medical assistance was provided. Economic refugees cannot get asylum. This is best

illustrated by the data received by the BBC (2021) from the Ministry of the Interior, UNHCR and the Belgrade Center for Human Rights, according to which a total of 647,512 irregular migrants expressed their intention to seek asylum by entering Serbia from 2008 to the end of March 2020. (Which does not necessarily mean that they really did), and in the same period only 173 of them were approved.

Reception Centers

According to the Commissariat for Refugees (2021), there are asylum centers at six locations. There are people in them who have expressed their intention to stay in Serbia. In that way, they entered the appropriate procedure at the State Asylum Office. Unlike them, there are irregular migrants in the reception centers. Reception centers are considered transit centers.

At the beginning of the migrant crisis in Serbia, there was one pre-reception center for migrants and three reception centers. The pre-reception was located in the village of Miratovac on the border between Serbia and Macedonia. The first reception centers were organized in Preševo on the border with Macedonia, Kanjiža on the border of Serbia with Hungary and Principovac on the border with Croatia near Šid. As their capacities were not sufficient, others were established.

The Government (2018) announced that in February 2017, there were 12 reception rooms with a total capacity of 6,900 beds. Of that, 5,600 seats are in solid buildings and 1,300 in slave halls. The installation of slave halls in locations closer to the northern borders was a response to the increased needs in the conditions of mass influx of migrants in order to urgently accept and take care of them. After the formal closure of the Western Balkan route (March 2016), between 200 and 400 migrants stayed in the centers. In May 2017, there were 13 operational reception centers) with 6,165 people accommodated. These numbers include irregular migrants, but also asylum seekers.

The latest data that could be obtained show that there are fourteen reception centers in Serbia (Figure). Capacities, depending on the data source, range between 4758-5050 bearings (Table). Data from the beginning of 2019 show that for most, eight out of fourteen, reception centers are not available. The available data at the time numbered 2,338 irregular migrants, which accounted for about half of the projected capacity.

According to research, some reception centers will be closed if there are fewer irregular migrants due to rationalization. Irregular migrants are transferred to other reception centers. In the reception centers, irregular migrants have the right to temporary accommodation, food and water, medical and any other assistance.

Table Receptions centeres of Serbia

Location	Region	Founded	Capacity	Number of migrants (January 2019)[2]
Subotica	Vojvodina	2015	150	No data
Šid	Vojvodina	2015	600[1]-210[2]	173
Principovac	Vojvodina	2015	250	373
Adaševci	Vojvodina	2015	750	715
Sombor	Vojvodina	2016	120	No data
Banatska Topola	Vojvodina	2017	140[1]- 240[2]	No data
Preševo	E and SE Serbia[3]	2015	1200[1]	No data
Dimitrovgrad	E and SE Serbia	2016	250[1]-86[2]	No data
Bujanovac	E and SE Serbia	2016	250[1]-220[2]	203
Bosilegrad	E and SE Serbia	2016	50[1] -60[2]	No data
Pirot	E and SE Serbia	2016	250[1]-192[2]	173
Divljana near Bela Palanka	E and SE Serbia	2016	150[1]-280[2]	No data
Vranje	E and SE Serbia	2017	140[1]-250[2]	No data
Obrenovac	Beograde region	2017	750[1]	701
Total			5050[1]-4758[2]	2338

Source: https://www.azilsrbija.rs/zastita-i-prihvat[1]
https://kirs.gov.rs/lat/azil/centri-za-azil-i-prihvatni-centri[2]
[3]E and SE Serbia means East and Southeast Serbia

Galijaš (2019) writes that in practical terms, building refugee centres in Sjenica and Tutin was not an economical solution for the state, as the centres are at about 1,000 and 760 metres above sea level, with snowfall between October and March, making them expensive locations to keep heated. Their physical distance from Belgrade also complicates efficient management. The only excuse for this is that 'Muslims have it easier in Muslim environments.'

According to Đurović (2019), the conditions in Serbia are different. Conditions in asylum centers are far more decent than those in transit centers. For example, in the transit center in Adasevci, there are no conditions for a normal life, there is no drinking water. That place is isolated and far from the city center. Single men and orphans are most often accommodated in Obrenovac near Belgrade. Many of them do not have a bed. Migrants and refugees complain about the terrible conditions in which they live, the violence that reigns there, and often the behavior of officials from the Commissariat for Refugees.

Tanjug (2019) writes that the Center for Protection and Assistance to Asylum Seekers (CZA) believes that the existing centers for the accommodation of minors are not adequate and appeals for the opening of a special center for the reception of these children. In July 2019, 300 to 600 migrant children stayed in Serbia without their parents. They were assigned a guardian, provided accommodation, psychosocial support. The most numerous are teenagers between the ages of 14 and 17, and the growth of younger children is also noticeable. Marinković (2020) writes that in April 2020, about 8,800 people were accommodated in 20 reception and asylum centers, of which more than 1,100 were children.

Figure Receptions centeres of Serbia



Source: https://www.azilsrbija.rs/zastita-i-prihvat/

RESULTS AND DİSCUSSİON

There are few scientific papers on irregular migrants in Serbia. The inspiring research of

Petrović and Pešić (2017) deserves the greatest attention, but even after it, irregular migrants continued to move through Serbia. Irregular migrants who are not in the reception centers are known from the media or from the stories of the population. For example, Jevtović and Bajić (2018) analyzed the image of migrants provided by the daily press. Laloš (2012) writes that irregular migrants were visited by some political parties and the Red Cross. The non-governmental organization Eastern European Mission provides great assistance.

Volunteers are the most in contact with irregular migrants. People who apply to volunteer are of different profiles. There are many young people among the volunteers, but there are also older citizens. Volunteers work in different professions and have acquired different levels of education. They are of different property and other status. The motives for their engagement are always a strong need and awareness to help people in need. By their actions, volunteers awaken solidarity. They trigger a wave of change in interpersonal relationships. Volunteers say it would be best for local communities and society as a whole to be based on the principles of solidarity, humanity and respect for human rights. In addition to domestic volunteers, some of the volunteers are young foreign students who are doing professional student internships at the Center for Protection and Assistance to Asylum Seekers (APC / CZA). Pavlović (2016) found that most citizens are compassionate and respectful to migrants, as long as it remains implicit that they will continue their journey.

Krasić et al testify about the integration of people found on the territory of Serbia (2017). They write that around 400 teachers in nine school catchment areas near the asylum and reception centres had received specific training and thorough instruction on how to put the Ministry's 'Guideline' into practice. Special IT-based applications have helped children learn the Serbian language in a separate group, while they have widened their knowledge of all other school subjects through an integrated curriculum which they share with the Serbian children.

According Galijaš (2019) irregular migrants relate how the Hungarian police and military pushed them back to Serbia. She found that there is no prevention of human trafficking or smuggling. Refugees often choose the route through Serbia because they believe it is a safe passage posing little risk to life, and without extensive pushbacks or serious and systematic police maltreatment, they nevertheless have to survive without any institutional or legal protection.

According to the Center for Protection and Assistance to Asylum Seekers, more than 16,000 migrants and refugees entered Serbia in the first half of 2019. More than 37% of them were women and children. At any given time, there are more than 5,000 migrants in Serbia, of which

about 3,000 are housed in state centers. The rest are housed in alternative accommodation, in the open along the borders, in urban cores. In the period from January 1, 2019 to August 31, 2019, 7,396 people expressed their intention to seek asylum, and 14 refugee protections and 15 subsidiary protections were granted. Every day, hundreds of migrants enter Serbia from the direction of Northern Macedonia, Kosovo, Montenegro, while hundreds of them try to leave Serbia every day in the direction of Croatia, Bosnia, Hungary, and even Romania (KzZPiPPM, 2019). According Galijaš (2019), following the closure of the Balkan route, Serbia began receiving financial support from the EU to cover the migrants' basic needs at the collective centres: health services, clothing, food, water, child-friendly spaces, and informal education in things like sewing or learning the language, and so on. Indeed, between the beginning of the refugee crisis and July 2018, the EU allocated more than 25 million euros in humanitarian aid to Serbia specifically to assist refugees and migrants.

The Government (2018) adopted the Strategy for Combating Irregular Migration in the Republic of Serbia for the period from 2018 to 2020. Savanović (2021) quotes the words of the President of Serbia, who says that 38,226 illegal border crossings were prevented in 2020, which is an increase of 89% compared to 2019. In June 2021, there were 3,977 migrants from Syria, Afghanistan, Bangladesh and Pakistan. That is why Serbia signed an agreement with the EU worth 11 million euros for the needs of migration management. Irregular migrants do not want to stay in Serbia, but they are there until further notice. According to Đurić et al. (2014), based on the 2011 Census and the size of ethnic groups in Serbia, it can be said that there are more irregular migrants than Egyptians, Jews, Armenians, Russians, Turks, Cincars, Czechs and others. People in Serbia know how much the mentioned ethnic groups have left their mark in the cultural, scientific, etc. life of Serbia. The obtained research results will be divided into those found in various media and those obtained by interviewing the population.

Selected facts about irregular migrants taken from the Serbian media

Irregular migrants are most often mentioned in the electronic media. The Center for Protection and Assistance to Asylum Seekers has existed since the end of 2007. The first mention of migrants who did not seek asylum dates back to the beginning of 2012, when they were given help due to frostbite. At that time, due to snow and strong wind in the north of Serbia, in Subotica, about a hundred people were taken care of. A fifth had health problems and frostbite (APC, 2012). The media wrote about the locations of irregular migrants. Laloš (2012) stated that some managed to settle in private houses, while most, while waiting for the opportunity to cross the well-guarded Schengen border, found temporary accommodation in the city dump.

Thus, AS (2012) states that since mid-2011 there has been a 'Jungle'. She was just one of the stops for hungry, tired and scared irregular migrants. It is located under cardboard and plastic roofs near Subotica, in the north of Serbia. Migrants from Pakistan, Afghanistan, India and Somalia gather and temporarily stay in it. They went to the settlements to buy food and medicine. They were afraid of being arrested by the police or harassed. Places such as 'Jungle' were visited by members of the Center for Protection and Assistance to Asylum Seekers and the Eastern European Mission, a local humanitarian organization. They helped irregular migrants to survive, to realize their legal position and existing legal alternatives in the Republic of Serbia. According to the AS (2012a), Pakistanis and Afghans clashed in the illegal settlement of Jungla. One person lost his life. Illegal migrants from Somalia were among them at the time. Rujević (2015) wrote about thousands of irregular migrants waiting at the border between Serbia and Croatia to board a train to Zagreb. Politika (2015) wrote about irregular migrants at the beginning of the most massive crossings through Serbia. She stated that migrants gathered in parks in residential areas, landfills or cemeteries. The media also write about conflicts among migrants. According Sovilj (2017) Serbia showed that negative altitudes towards migrants arose due to security concerns. While many Serbian citizens donated food and equipment, they showed a lower level of readiness to initiate any closer interaction. Beta (2019) quoted the representatives of the Center for Protection and Assistance to Asylum Seekers, according to which irregular migrants from the territory of Croatia return to Serbia every day. Irregular migrants who crossed the border in 2016 were returning from the territory of Hungary. Đurović (2019a) said that it was estimated that migrants who legally wanted to move to Hungary waited for about three years, and during that time lived in Serbia. They were employed in deficient occupations in Serbia and were not in competition with the domestic labor force. Maričić (2020) wrote that migrants from Syria and Iran, by making masks, contributed to the fight against the Covid 19 pandemic. In addition, they assisted the local population in other matters. They were accommodated in the reception center in Bujanovac. Marinković (2020) noted that migrants from Principovac (western Serbia) did not respect the measures of distance and gathering in groups during the Covid 19 pandemic. The Telegraph (2020) pointed out that migrants, in the absence of money, engage in robberies, divide into clans, and clash. According to the portal Subotica.com (2020), problems were registered in Kelebija, Ljutov, Čikerija, Bački Vinogradi. But, according to Lalic (2020), migrants were also 'targets of attacks' by the local population. RTV (2021) broadcasts the news of Tanjug that the residents of Gornji and Donji Tavankut and Ljutovo (northern Serbia) received greater security protection from the state. They submitted a

petition with 2,000 signatures due to the large number of migrants in their settlements. Subotica police have increased the number of patrols. They include members of the traffic, border police and other police departments. The BBC (2021) reports that 1.5 million migrants have been smuggled along the Balkan route since 2015. It divides smugglers, based on the work they have, into three types. Then, it reveals the prices of movement across the territory of the Balkans, but also across international borders. Đukić Pejić (2021) states that there are traces (food waste produced outside the territory of the Republic of Serbia) of the presence of irregular migrants at the administrative crossing Jarinje. During 2021, more than 68,000 people passed through reception centers in Serbia (RSE, 2022). Islam (2022) writes that officials in Serbia say that in the last few months, more and more migrants from India have joined migrants from other South Asian countries in order to arrive in the European Union on an irregular basis. According to (Mitrović, Maričić, 2021, DW, 2022), citizens of Tunisia and India do not need a visa to enter Serbia, Albania and Bosna and Herzegovina. About 100 Indian migrants live in the Kikinda reception center (northern Serbia) after they were denied entry into the European Union. As RSE (2022) learned from the Commissariat, 4,350 people are staying in 13 active camps in Serbia. Most refugees and migrants in the camps are from Afghanistan (about 35%) and Syria (about 22%). Đurović (2022) also mentions migrants who came from the Maghreb, Somalia, Pakistan, Bangladesh and others. The increased number of people coming to Serbia from Burundi, where they are fleeing due to ethnic and political persecution, is also mentioned. So migrants are present. The latest news tells about their conflicts (Pavkov, 2022), about their self-initiated camps near the border (Ostojić, 2022) and about how concerned the local population is for their own safety. Smugglers are armed (ENS, 2022). Knives, machetes, sabers and boxers, as well as 182 pieces of ammunition of different calibers, were found with irregular migrants (Pavkov, 2022a).

Irregular migrants are no longer in the focus of the media. They are mentioned sporadically. However, the population of Serbia, which is not in a position to be in direct contact with them, can only find out through the media that they still exist in Serbia. Residents who were in contact provide their perspective on the story.

Survey

Between answers there are found difference. Generally, more positive responses are obtained from people who had no contact with migrants. The main findings are:

1) What are your experiences with irregular migrants?

Different answers were received to this question. Some are negative (further negative attitudes),

such as: `They rob cottages, steal crops, kill cattle, cause fires` (m, 65, Bogovođa, 18, c); 'My field was in their way, so a trace of their passage was seen in the form of trampled plants' (m, 35, Subotica, 18, c); 'They picked my orchard' (f, 65, Subotica, 18, c); 'The neighbors' laundry disappeared from the dryer that was standing in the yard.' (f, 57, Šid, 18, c); 'There are irregular migrants who are not in reception centers, but are located in settlements that are very close to the borders with Hungary and Croatia' (m, 44, Kelebija, 19, c); 'I heard that they are located in weekend houses near the Majdan water reservoir. They are mostly abandoned during the colder part of the year' (f, 62, Horgoš, 20, c);

Some of the respondents also mentioned positive attitudes (further positive attitudes). `Back in 2012, we collected clothes, shoes and medicines for these people` (f, 51, Subotica, 20, c); `I taught asylum seekers to sew and weave. We agreed with our hands and feet` (f, 70, Bogovađa, 19, c); 'They came to help after the flood. I remember they said they came from Algeria, Syria, Senegal, Tunisia, Niger, Congo and Afghanistan. I heard that they also helped in Obrenovac` (m, 68, Krupanj, 18, c); 'A Syrian told me that there is no going back and there will never be again and that with this knowledge he continues to go through life' (m, 28, Presevo, 18, c); 'I will never forget their stories about the war, suffering and fear in the cities they come from, about the torments and problems they faced until they reached Serbia and about the uncertainty in which they live, trying to continue their journey as soon as possible' (m, 28, Adasevci, 19, c); 'I remember when in March 2016, the changed rules border crossing caused so much despair, fear, uncertainty, problems to those who found themselves in Serbia, and their final destination was far northwest of it' (m, 41, Belgrade, 18, c); 'I remember counting about a hundered irregular migrants in the parks around the bus station in April. I heard that they are from Afghanistan, Iraq and Somalia and that they arrived on foot, and that some of them have injuries from the hard road` (m, 29, Belgrade, 19, c); 'I heard that there are about 100 Pakistanis in the forest, including many children. They have problems with food, warm clothes and are exhausted` (m, 52, Sombor, 18, c); 'Irregular migrants are staying in Grafosrem (which is an abandoned factory) trying to cross the border with Croatia. Others come here to get food from an organization that provides them with humanitarian aid every day. It is estimated that there are about 100 of them around the border, originally from Afghanistan, Algeria and Tunisia' (m, 33, Sid, 18, c); 'I saw them being brought back from Hungary barefoot. Maybe it's up to the authorities, and maybe for some reason they took off their shoes` (f, 24, Subotica, 19, c);'Even after the blizzard, they tried to cross. I am sorry to hear that they survived the violence before returning to Serbia' (m, 25, Subotica, 2022, c).

This question was not asked to respondents who did not have direct contact with irregular migrants. This may be an explanation for why no answers were identified that could be classified as indifferent.

2) How do you look at migrants?

Negative attitudes -'I see them as a workforce, with which we are very deficient in some activities.' (m, 55, Belgrade, 18, c) 'When I hear them fighting, killing and dying, they make me angry.' (f, 48, Subotica, 20, c); 'He could be a good neighbor, but not a son-in-law.' (f, 69, Kikinda, 20, c); 'I'm intimidated. One day, about 500 of them crossed the railway (Photo). They went in groups of 10-15 people '(m, 54, Raška, 21, c) 'Ever since I heard about the shootings and read about them being armed, I'm afraid' (f, 70, Subotica, 22, w)

Positive attitude - 'I think that, as Tanja Fajon says, it is inappropriate to raise barriers in the Schengen era and restrict their movement.' (f, 35, Novi Sad, 18, c); `Human rights and freedoms of movement are endangered, which is one of the basic principles of the European Union` (f, 33, Novi Sad, 18, c); 'I took them food on the route of the road they were passing through and wished them a happy journey. They did not want to stay. We need to help people get where they are going'. (m, 42, Sombor, 18, c); `I look at people who are willing to do anything to get to their desired destination. Women take off hijabs, children give European names… `(f, 39, Sid, 20, c) `Irregular migrants have different life circumstances. As they pass through Serbia, some give birth, lose and find family members… `(f, 42, Sid, 18, c); 'Life happens to these people in its positive and negative manifestations' (m, 48, Novi Sad, 22, c)

Indifferent - 'I watch them pass through the city every day, in small or large groups. They don't mind. They act exotic and attract my attention personally '(f, 45, Novi Sad, 21, c); `I never saw them. I have no opinion.` (m, 31, Negotin, 19, w). They set off on their own. I read somewhere that they got paid for it. It is not clear to me, why didn't they fly over, but walk and pay the smugglers? (m, 26, Belgrade, 18, w).



Photo Migrants in Vladičin Han, Serbia (Dejanović, 2019; photo: Flickr, Freedom House)

3) Do you feel xenophobic?

Positive attitudes - ’I didn't. I see in migrants a new ethnic group in our Vojvodina that can enrich it with its experience, culture, diversity`. (f, 38, Novi Sad, 20, w)

Negative attitudes - ’Yes. I don't like when someone doesn't speak the language I understand. (f, 70, Subotica, 18, c); "Yes, especially when I hear something bad about their behavior." (f, 56, Subotica, 22, w); ‘Yes, I do. I doubt that he will leave Serbia. Not because it’s their will, but because they fail (m, 34, Horgoš, 20, c). We have few children and they have many. To put it mildly, we will disappear in an instant ’(m, 66, Kraljevo, 18, w)

Indifferent -`Why would I be? I have not met any migrants. I'm not interested in them. (m, 50, Novi Sad area, 22, w)

4) Do you think that migrants have changed something in the life of Serbia?

From the part of the answers received, it can be concluded that the respondents saw some good aspects in the presence of irregular migrants.

Positive attitudes -’Yes, as one of the volunteers, I had the opportunity to listen to different life

stories, to observe difficult and uncertain moments in their lives and thus realize how happy I am to be able to provide them with psychological support and to live in a country where peace reigns.' (m, 24, Preševo, 18, c); 'I know that it changed the life of my friend who is an artist who was strongly inspired by the migrant crisis.' (f, 29, Belgrade, 19, w); 'For now, a little, but we could build a museum for them in Vojvodina, an ethno house, and tourism could take on another dimension because of them' (f, 36, Kikinda, 19, w). `Migrants can help with labor shortages`. (m, 72, Preševo, 18, c) 'They can affect greater road controls. As a taxi driver, I had offers to help migrants, but I refused due to frequent police checks' (m, 33, Belgrade, 18, c)

Negative attitudes - In 2015, the migrant crisis has closed the Subotica-Szeged railway`. (f, 30, Subotica, 19, w); My neighbors are scared of stories of bad behavior towards the domicile population (m, 38, Šid, 20, w); `I think that workers and investors are most afraid of migrants`. (m, 54, Belgrade, 18, c)

Indifferent - 'Yes. The feeling of their presence. I saw them for the first time in 2015. They pass. They are different. This year there are more of them again. The border is obviously not impermeable.' (m, 46, Subotica, 22, c) 'They are not in mine, but I am sure that there are people in their lives who live in settlements where there are reception centers` (f, 35, Novi Sad, 18, w); 'I read in the newspapers that some migrant children will go to Serbian schools, and I know that this will change the lives of the children in whose classes they find themselves.' (f, 32, Loznica, 20, w) ` It depends on their number, the behavior of the authorities, but also their way of life `. (f, 24, Preševo, 18, w) `They certainly bring a new experience to anyone who has any verbal contact with them`. (f, 49, Subotica, 20, c)

5) What do you think, how much the attitude towards immigrants depends on the origin of the inhabitants?

Positive attitudes – 'I also fled the war and I understand people who simply do not want to live in conflicts in the affected areas ` (f, 67, Bačka Palanka, 21, w) 'It depends very much, according to the popular one 'The full does not trust the hungry'' (m, 69, Šid, 21, c)

Negative attitudes on this issue were not recognized.

Indifferent - 'It depends. People in Vojvodina who came from somewhere better understand newcomers.' (f, 54, Subotica, 22, c)

6) Do you expect that the next census will show the presence of migrants on the territory of Serbia?

Positive attitudes – 'You never know in Serbia ` (m, 36, Belgrade, 19, w) **'**Probably not,

because I don't have the impression that there are a lot of them `. (f, 24, Smederevo, 18, w)

Negative attitudes -`I notice that young and reproductive people are migratin. I would not be surprised if there are as many as are needed to be seen as a separate ethnic group in the census.' (m, 49, Belgrade, 22, c) 'I don't know, only those who organize them know that' (f, 44, Loznica, 18, c)

Indifferent - 'I don't think anyone now knows how the story of these "stuck" people in the passage will end.`. (m, 40, Šid, 18, c) 'No, they just want to leave. They are fleeing from one misery and they do not need another'. (m, 30, Subotica, 18, c) 'It depends on who it is. In 2017, we saw them as one group, and they are made up of dozens of different groups.' (f, 45, Novi Sad, 18, c)

Irregular migrants are usually unwilling to communicate. They often do not want to communicate with women researchers. They like to talk to volunteers. They like the presence of a psychologist, because it means the understanding, advice and kindness they receive from people in the profession. That is why the opinion of irregular migrants was obtained through volunteers.

1) Your perception of life in Serbia?

`They don't beat us, they don't break our phones and they don't let dogs on us like in Hungary.` (m, 22, Kelebija, 20); `Thank you Serbia, may Allah help you.` (m, 30, Preševo, 19); `Serbia is trying to take care of us. I received the vaccine.` (m, 24, Belgrade, 21); `We meet basic needs, but our spiritual life is unfulfilled` (m, 19, Šid, 18); 'It is peaceful in Serbia, but rarely does anyone care about us' (m, 32, Subotica, 18); 'I would like to help, to work, just so that there is no war' (m, 26, Loznica, 19)

2) Are you planning to seek asylum?

'No, I don't want to stay here' (m, 23, Sombor, 19); `No, I want to go to the Netherlands, Germany, France… because I have relatives, friends, compatriots there`. (m, 44, Krnjača, 19); 'Yes, just to make life easier until I move on' (f, 35, Bogovađa, 20); 'I've been looking for it and I've been waiting for it for a month' (f, 22, Tutin, 20).

CONCLUSİON

Irregular migrants have been passing through Serbia for more than a decade. They are satisfied with the hospitality, but they do not want to seek asylum. Their desired destinations are further north and west of Serbia. Since 2019, with the onset of the pandemic, the borders of the European Union, which they aspire to, have been closed for them. If they manage to cross them,

they must be returned to Serbia. Their intentions to continue the journey are clear, but the chances of that happening are minimal for now. Every new irregular migrant starts waiting for his luck or chance. Some decide to ask for asylum because it makes their life easier (it provides accommodation, food, medical and psychological protection), but there are also optimists who believe that one day they will reach their desired destination. With a volume of almost 4,000, according to the latest data found, it can be said that they are more numerous than some ethnic groups that have existed on the territory of Serbia for centuries and influence the characteristics of life in it.

It was easier to find interlocutors on this topic in the border areas than anywhere else. The conducted research on the perception of irregular migrants among the population of Serbia gave great differences in the answers. They are most influenced by the experiences the interviewees had with irregular migrants. A large part of the population of Serbia had no contact with migrants and was informed about them exclusively through the media. This part is full of compassion, understanding or completely indifferent. A smaller part of Serbian residents, who were in contact with them, have positive and negative emotions. The positive ones arose as a result of the help that migrants provided to the local population in different ways. Volunteers who help irregular migrants find their way have a positive attitude. These are the most knowledgeable residents of Serbia who understand that all life situations happen to migrants 'in transit'. The offenses of irregular migrants are interpreted as an effort to survive. Negative emotions were observed only among those residents of Serbia who had or still have material damages from irregular migrants or are afraid of them due to various prejudices.

Considering that irregular migrants pass through Serbia and exist more illegally than legally and that they are members of numerous African and Asian countries, this work represents an important testimony for the historical geography of Serbia. At the same time, this paper is a note about the space, time and conditions in which irregular migrants moved through Serbia. De facto, these people leave different traces (cultural, demographic, economic and etc) in different segments of the life of the local population. Differences among irregular migrants were also observed, considering the country of origin. One day, when everyone will be able to move freely again, it will be possible to make a detailed analysis of how many of these people remain on the territory of the Republic of Serbia and how they will demographically affect its future.

ACKNOWLEDGMENT

This research is funded by the Provincial Secretariat for Higher Education and Scientific Research of the Vojvodina Province, Serbia, as the part of the project numbered 142-451-2615/2021-01/2.

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BÖLGESEL VE SEKTÖREL PERSPEKTİFTEN TÜRKİYE'DE DIŞ TİCARETİN GELİŞİM SÜRECİ

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ÖZET
Ülkelerin liberal ticari uygulamaları benimsemesiyle birlikte dünya genelinde yeni bir ekonomik düzen oluşmuştur. Bu düzen ülkeler arasında ekonomik bağımlılığı ve rekabeti artırmıştır. Dünya ticaretinde yer edinebilmek için ülke ihracatının, ekonomiyi destekler düzeyde olması gerekmektedir. Ülke ekonomisi için büyük önem taşıyan dış ticaret verilerini oluşturan sektörlerin dağılımı sayesinde ülkenin hangi sektörde daha gelişmiş olduğu ve hangi sektörün ülke ekonomisine daha fazla katkı sağladığı görülebilmektedir. Çalışma, Türkiye'nin 1980 yılı sonrası dışa açılma döneminden günümüze kadar olan Türk dış ticaretinin gelişimini göstermekte ve dış ticaretin ülke grupları ile sektörlere göre dağılımını belirli dönemler halinde ele almaktadır. Aynı zamanda çalışmada Türkiye'nin ticaret politikasının değişmesiyle birlikte toplam dış ticaretinin içinde Avrupa Birliği ülkelerinin payının azaldığı ve Türkiye'nin Avrupa yoğunluklu dış ticaretinin yönünün tüm dünyaya doğru genişlediği belirtilmektedir. Türkiye'nin bölgesel ve sektörel olarak güçlenmesi ile birlikte ekonomik ve siyasi etkinliğinin artacağı öngörülmektedir.

Anahtar Kelimeler: Türk Dış Ticareti, Ticaretin Bölgesel Dağılımı, Ticaretin Sektörel Dağılımı.

THE DEVELOPMENT PROCESS OF FOREIGN TRADE IN TURKEY FROM REGIONAL AND SECTORAL PERSPECTIVES

ABSTRACT

With the adoption of liberal commercial practices by countries, a new economic order has emerged throughout the world. This order has increased economic dependence and competition among countries. In order to have a place in world trade, the country's exports must be at a level that supports the economy. Thanks to the distribution of sectors that make up the foreign trade data, which is of great importance for the country's economy, it can be seen in which sector the country is more developed and which sector contributes more to the country's economy. The study shows the development of Turkish foreign trade from the post-1980 period of opening up to the present day, and deals with the distribution of foreign trade according to country groups and sectors in certain periods. At the same time, it is stated in the study that with the change in Turkey's trade policy, the share of European Union countries in total foreign trade has decreased and the direction of Turkey's European-dominated foreign trade has expanded towards the whole world. It is predicted that with the regional and sectoral strengthening of Turkey, its economic and political efficiency will increase.

Keywords: Turkish Foreign Trade, Regional Distribution of Trade, Sectoral Distribution of Trade.

1. GİRİŞ

Dünyadaki teknolojik gelişmelere duyarlı olarak artan talebin dünya ticareti üzerindeki etkisi ülkeleri dış ticarete daha entegre hale getirmiştir. Bu konuda söz sahibi olmak ve ticaret akışını devam ettirmek isteyen ülkeler diğer ülke veya ülke grupları ile ticaret anlaşmaları yapmakta ve ticari ağlarını güçlendirmektedirler. Günümüzde ticaretten bağımsız bir ilerleme ülkeler bakımından söz konusu olmayacaktır. Nitekim 2. Dünya savaşı sonrasında ülkelerin serbest ticaret kapsamında uygulamış oldukları politikalar neticesinde günümüzde en gelişmiş ülkelerin uluslararası ticarette payları en yüksek olan ülkeler olduğu görülmektedir.

Diğer taraftan bilinen ticaret teorilerinin aksine ülkelerin aynı ürünlerde uzmanlaşması üretimin verimliliği ve ürün çeşitliliği konularına olan önemi daha da artırmıştır. Yüksek katma değer yaratan sektörlerdeki güçlenme ülke ekonomisi üzerinde belirgin bir etki yaratmaktadır. Nitelik ve nicelik olarak farklılık gösteren sektörlerdeki gelişmeler ülkelere hem uluslararası ticarette rekabet ve siyasi güç avantajı sağlarken hem de ülke refahını artırmada etkili olmaktadır. Sürdürülebilir büyüme ve rekabet edebilir düzeyde bir ülke olabilmek için ithalata dayalı bir büyümeden ziyade ihracat odaklı politikalar uygulanmalıdır. Ülkenin katma değeri yüksek, ileri teknolojili ürünler üretmesi ve bu ürünlerin ihracatında ülke çeşitliliği sağlaması gerekir.

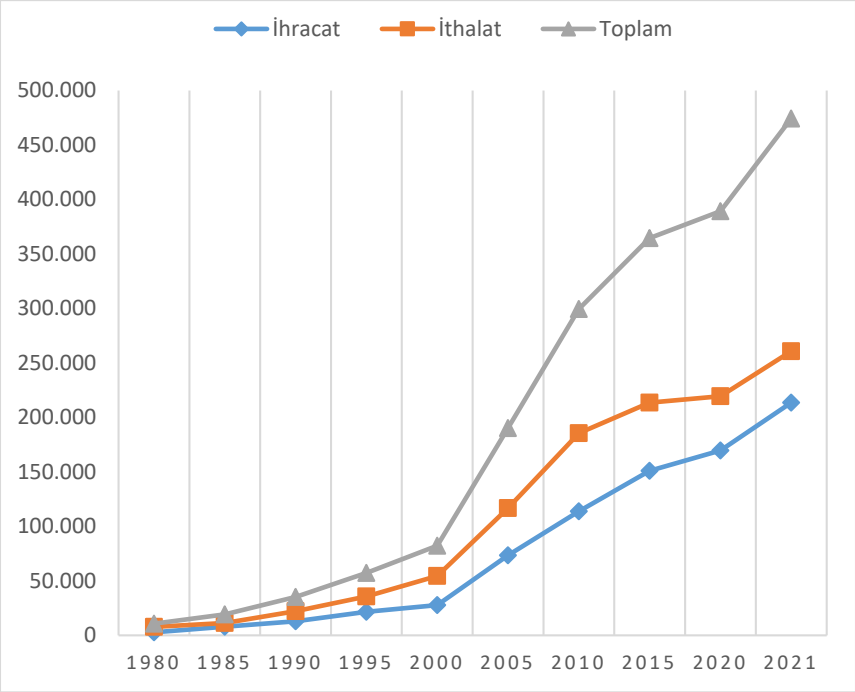
Bu çalışmanın konusunu, 1980'li yıllardan günümüze kadar olan dış ticaretteki bölgesel ve sektörel gelişmelerin Türkiye özelinde incelenmesi oluşturmaktadır. Çalışmanın ilk bölümünde Türkiye'nin dış ticaret potansiyeli ve dünya ticareti içerisindeki yeri verilere dayanılarak yorumlanacaktır. İkinci bölümde ise, ülke gruplarına göre ihracat ve ithalat verileri incelenerek belirli periyotlar halinde ülkenin dış ticaretteki sektörel dağılımı ele alınacaktır. Çalışmada, Türkiye'nin dış ticaretinin sektörel dağılımında ürün bazında ve işlem hacmi en fazla olan sektörler olan tarım-ormancılık, madencilik-taşocakçılığı ile üretim başlıkları kapsamında Uluslararası Standart Sanayi Sınıflamasına (ISIC) göre değerlendirme yapılmıştır.

2. TÜRKİYE'NİN DIŞ TİCARET POTANSİYELİ

Türkiye'de 1980 öncesi dönemde kalkınma stratejisi olarak genel itibariyle ithal ikamesine dayalı bir strateji uygulanmıştır. 1980 sonrasında ise serbest piyasa ekonomisine geçiş dünya ekonomisine benzer şekilde gerçekleşmiş ve ihracata dayalı bir politika izlenilmiştir (Orkunoğlu Şahin, 2022: 83). Ülkelerin rekabet gücünün en büyük göstergelerinden olan ihracat, dışa açık politikalara yönelik uygulamaları daha da önemli hale getirmiştir. Buna yönelik uygulamalardan biri olan ve 1996 yılında başlayan Gümrük Birliği süreciyle birlikte Türkiye, Avrupa Birliği (AB) ülkelerine karşı ticaretini rekabete açmıştır (Çoban, 2018: 733).

Karşılaştırmalı üstünlükler teorisine göre gelişmekte olan ülkelerde yatırım için gerekli olan sermayenin ithalat yoluyla temin edilmesi, bu malların yurtiçinde üretimi göreceli olarak daha pahalı ise doğru bir tercih olacaktır. Yatırımların artması üretimi arttıracak, artan üretimle iç fiyatların düşmesi ise ihracatı kolaylaştıracaktır. Ancak ithalata bağlı büyüme ve büyümeye bağlı ihracat artışı sürdürülebilir olmalıdır. Eğer ihracat oranlarındaki artış, ithalat oranlarındaki artıştan daha düşük olursa, hem dış ticaret açığı olur hem de büyümenin ithalata bağımlı bir seyir izler (Aktaş Şenkardeşler, 2018: 125).

Dış ticaretinin sektörel dağılımında ürün bazında ve işlem hacmi en fazla olan sektörler olan tarım-ormancılık, madencilik-taşocakçılığı ile üretim sektörlerinde olan pozitif yönlü gelişmeler ekonomik büyümeye ve ülkenin gelişmişlik düzeyine katkı sağlamaktadır. Tarım; yaşamın idame ettirilebilmesi, ülkenin gelirine katkısı, birçok sektörün hammadde kaynağı olması, ihracat üzerindeki etkisi ve ekolojik dengeye olan katkıları sebebiyle bütün boyutlarıyla toplumun tüm kesimlerini ilgilendiren vazgeçilmez bir sektördür (Doğan vd., 2015: 30). Ayrıca tarım sektörünün ülkelerin ekonomik kalkınmaları üzerindeki yarattığı olumlu etkilerden bir diğeri ise dış ticaret yolu ile döviz girdisinin sağlıyor olmasıdır (Deran, 2005: 29). Diğer taraftan madencilik sektörü ihtiyaç duyulan hammaddelerin sağlanması, birçok sanayi kolunun ilk tedarikçisi olması ve diğer sektörler için önemli bir pazar olması dolayısıyla tüm dünyada özel bir öneme sahiptir (TOBB, 2008; Sönmez, 2016: 316). Ülkenin lokomotifi olan üretim ise sanayileşmenin artan kapasitesi ve sanayi sektörünün desteklenmesi ile dış talepteki artışa cevap verebilir nitelik kazanmış, 1980 öncesinde oluşturulan üretim kapasitesinin etkin kullanılması sonucunda 1980 sonrasında üretim işgücü verimliliğinin artmasına yol açmıştır (TÜSİAD, 2005: 31).



Şekil: Türkiye'de Dış Ticaretin Gelişimi (1980-2021)

Kaynak: Dünya Ticaret Örgütü web sitesindeki veriler derlenerek oluşturulmuştur.

Şekilde Türkiye'nin 1980 sonrası dış ticaretteki gelişimi 5 yıllık dönemler halinde gösterilmektedir. Şekilde serbestleşme döneminden sonra hem ihracatta hem de ithalatta hızlı bir artış olduğu görülmektedir. Özellikle 2000 yılından sonra keskin bir artış olmuştur. Gerek ekonomik gerekse dış ticaret politikaları ve ılımlı siyasi politikalar, ülkenin kriz dönemlerinden sonra hızla toparlanmasına neden olmuştur. İthalatın her zaman ihracattan daha yüksek olduğu grafikte daha net görülmektedir. 1980'den bu yana tablo değişmemiştir ve bu durum artık Türkiye'nin kronik sorunlarından biri haline gelmiştir.

Tablo 1: Türkiye'nin Dünya Ticareti İçerisindeki Yeri (Milyon Dolar)

Yıllar	Dünya Ticareti			Türkiye'nin Dış Ticareti			Türkiye'nin Dünya Ticareti İçerisindeki Yeri (%)		
	İhracat	İthalat	Toplam	İhracat	İthalat	Toplam	İhracat	İthalat	Toplam
1980	2,036,136	2,077,186	4.133,322	2,910	7,910	10.820	0,14	0,38	0,26
1985	1,952,890	2,015,516	3.968,406	7,958	11,344	19.302	0,40	0,56	0,48
1990	3,489,739	3,599,975	7.089,714	12,959	22,303	35.262	0,37	0,61	0,49
1995	5,167,620	5,285,272	10.452,892	21,599	35,710	57.309	0,41	0,67	0,54
2000	6,454,020	6,647,491	13.101,511	27,775	54,503	82.278	0,43	0,82	0,62
2005	10,510,292	10,785,263	21.295,555	73,476	116,774	190.250	0,69	1,08	0,88
2010	15,303,993	15,438,092	30.742,085	113,883	185,544	299.427	0,74	1,02	0,88
2015	16,560,762	16,736,050	33.296,812	150,982	213,619	364.601	0,91	1,27	1,09
2020	17,618,935	17,828,012	35.446,947	169,651	219,515	389.166	0,96	1,23	1,09
2021*	15.001,109	18.065,288	33.066,397	225,264	271,422	496.687	1,50	1,50	1,50

Kaynak: Dünya Ticaret Örgütü web sitesindeki veriler derlenerek oluşturulmuştur.
*TÜİK (Dış Ticaret İstatistikleri) verilerinden alınmıştır.

Tablo 1'de Dünya ticareti ve Türkiye'nin dış ticaret rakamları 1980'den günümüze 5 yıllık periyotlarda verilmektedir. Tabloda Türkiye'nin dünya ticaretindeki payının düşük olduğu görülmektedir. Ancak serbestleşme ile birlikte bu pay sürekli artmıştır. 1980'de toplam pay %0.26 iken 2021'de %1.50'dir. Ancak bu oranlar ülke için yeterli değildir. Türkiye için liberalleşmenin etkisi daha çok ithalat tarafında olmuştur.

3. BÖLGESEL VE SEKTÖREL PERSPEKTİFTEN TÜRKİYE'DE DIŞ TİCARET

AB'nin dünya ticaretindeki payı yüksektir. Türkiye özellikle coğrafi konumu nedeniyle dış ticaretinin önemli bir bölümünü AB ile yapmaktadır. Türkiye'nin dış ticaret verileri incelendiğinde Avrupa bölgesine ciddi bir bağımlılığın olduğu görülmektedir. Bu yüksek bağımlılık, ülkeyi ticaret ve ekonomi açısından riskli bir konuma sokmaktadır. Olası bir çatışma durumunda AB ile ticaretin kesintiye uğraması ülkeyi ekonomik krize sürükleyebilir. Öte yandan dış ticarette ülke çeşitliliği, ülke ekonomisini olumsuz dış etkenlere karşı daha korumalı hale getirecektir. Bu bağlamda Türkiye'nin dış ticaretini geliştirmek, rekabet edebilir bir düzeye getirmek, refah düzeyini yükseltmek, cari açığı azaltmak ve ekonomik büyümeyi sağlamak için yeni pazarlar yaratması ve yeni ticari ortaklar bulması gerekmektedir. Türkiye'nin ticari gücü arttıkça diğer ülkelere karşı konumu da güçlenecektir (Artekin ve Duran, 2022: 50).

Tablo 2: 1980-2000 Döneminde Ülke Gruplarına Göre Türkiye'de Dış Ticaret Rakamları (Milyon Dolar)

	1980		**1985**		**1990**		**1995**		**2000**	
	İhracat	**İthalat**	**İhracat**	**İthalat**	**İhracat**	**İthalat**	**İhracat**	**İthalat**	**İhracat**	**İthalat**
Avrupa	1.242	2.203	3.547	3.547	6.893	9.328	11.078	16.861	14.511	26.610
Orta Doğu ve Kuzey Afrika	654	3.026	3.338	3.658	2.270	3.581	2.970	3.846	3.926	6.869
Amerika	127	442	506	1.149	968	2.282	1.514	3.724	3.135	3.911
İsviçre	125	348	128	187	293	537	238	816	239	891
Japonya	36	113	43	507	239	1.120	180	1.400	149	1.621
Diğer	726	1.777	396	2.388	2.297	5.454	5.656	9.062	5.815	14.601

Kaynak: TCMB Yıllık Raporlarından derlenerek oluşturulmuştur.

Tablo 2'de 1980-2000 yılları arasında ülke gruplarına göre ihracat ve ithalat rakamları verilmektedir. İhracat, 1980 yılında toplam 2.910 milyon dolarken 2000 yılında 27.775 milyon dolara ulaşmıştır. En çok ihracatın yapıldığı yer belirgin bir farkla Avrupa bölgesidir. Orta Doğu ve Kuzey Afrika ikinci, Amerika üçüncü sırada yer almaktadır. Türkiye'nin dış ticaret hacmi bu dönem itibariyle artmıştır. Ancak bu daha çok ithalata bağlı olarak gelişen bir ticaret hacmidir. Bu dönemde 1994 Krizi, 1998 Rusya Krizi ve 1999 Marmara depremi sırasında ithalatta düşüşler olsa da genel ivme hep yukarı yönlüdür. 1991 yılında 21.047 milyon dolar olan ithalat, 2000 yılında 54.503 milyon dolara ulaşmıştır. İthalattaki artış oranı toplamda yüzde 61'dir. İhracatta olduğu gibi ithalatın da daha çok Avrupa Birliği ülkeleri ile yapıldığı görülmektedir. 1990-2000 döneminde Türkiye'nin toplam ithalatının neredeyse yarısı Avrupa'dan yapılmıştır. Orta Doğu ve Kuzey Afrika ikinci, ABD üçüncü sırada yer alıyor. İhracatta olduğu gibi ithalatta da sıralama değişmemiştir.

Tablo 3: 2005-2021 Döneminde Ülke Gruplarına Göre Türkiye'de Dış Ticaret Rakamları (Milyon Dolar)

	2005		**2010**		**2015**		**2020**		**2021**	
	İhracat	**İthalat**	**İhracat**	**İthalat**	**İhracat**	**İthalat**	**İhracat**	**İthalat**	**İhracat**	**İthalat**
Avrupa	41.365	52.695	52.685	72.180	63.998	78.681	70.019	73.338	93.082	85.386
Orta Doğu	10.184	7.966	23.294	13.011	31.085	13.575	31.333	20.274	38.363	16.123
Afrika	3.631	6.047	9.283	4.824	12.448	5.099	15.240	7.310	21.217	8.223
Amerika	4.910	5.375	3.762	12.319	9.225	16.773	14.570	19.633	22.444	23.095
Diğer Asya Ülkeleri	3.497	20.582	8.581	40.343	10.307	53.339	12.775	49.030	17.234	68.243
Diğer	9.889	24.109	16.278	42.867	16.775	39.767	16.719	39.949	32.925	70.343

Kaynak: TCMB Yıllık Raporlarından derlenerek oluşturulmuştur.

*TCMB Faaliyet Raporlarında 2003 yılı sonrasında ülkelere göre ihracat verileri olmadığından dolayı bu yıldan sonraki veriler SSB (Temel Ekonomik Göstergeler) ve TÜİK (Dış Ticaret İstatistikleri) verilerinden derlenerek yeniden kategorize edilmiştir.

Tablo 3'te 2005-2021 yılları arasında ülke gruplarına göre ihracat ve ithalat rakamları verilmektedir. Tabloda toplam ihracatta en büyük paya sahip grubun Avrupa Birliği ülkeleri olduğu görülmektedir. İkinci sırada Ortadoğu, üçüncü sırada Afrika yer alıyor. Aynı zamanda Ortadoğu ülkelerine yapılan ihracat bu dönemde öne çıkmaktadır. Strateji ve Bütçe Başkanlığı (SBB)'nin verilerinde, özellikle bu dönem sonunda Avrupa ülkelerinin yanı sıra Birleşik Arap Emirlikleri (BAE), Irak, İsrail, Rusya, Suudi Arabistan, Çin, Mısır ve Ukrayna'nın en çok ihracat yapılan ülkeler arasında olduğu belirtilmektedir. Bu tabloda ihracatta olduğu gibi ithalatın da daha çok Avrupa Birliği ülkeleri ile yapıldığı görülmektedir. Tabloda Diğer Asya Ülkelerindeki önemli ithalat rakamları da dikkat çekmektedir. Bu artışla birlikte Diğer Asya Ülkeleri, bu dönemde de en fazla ithalat yapılan ikinci ülke grubu olmuştur. Ortadoğu ise üçüncü sırada yer almaktadır. SBB'nin verilerine göre bu dönemde AB ülkelerinin yanı sıra Çin de ithalatta ön sıralarda yer almaktadır. BAE, Rusya, Irak, Güney Kore, Japonya ve Hindistan en çok ithalat yapan ülkeler arasında yer almaktadır.

Son yıllarda küresel ekonominin ağırlık merkezi gelişmiş ülkelerden gelişmekte olan ülkelere ve Asya'ya kaymıştır. Asya bölgesinin son 20 yılda yaşadığı yüksek büyüme oranı ve mal ihracatındaki artış bölgeyi daha cazip hale getirmiştir. Bu durum, birçok ülke için yeni bir pazar fırsatı sunmaktadır. Dış ticaret artık bölgesel değil küresel bir arenada işlemektedir. Ucuz işgücü ve ölçek ekonomileri sayesinde düşük fiyatlar, Asya'nın Türkiye'nin ithalatındaki payının artmasına neden olmuştur (Akdemir ve Kotil, 2015: 2).

Türkiye ekonomisinde ürün bazında ihracatın sektörel yapısı; tarım sektörü, madencilik sektörü ve üretim sektöründen oluşmaktadır. Ülke ekonomisi için büyük önem taşıyan dış ticaret verilerini oluşturan sektörlerin dağılımı sayesinde ülkenin hangi sektörde daha gelişmiş olduğu ve hangi sektörün ülke ekonomisine daha fazla katkı sağladığı görülebilmektedir (Mazlum, 2020: 62). Türkiye'de ihracat ve ithalatın sektörlere göre dağılımı Uluslararası Standart Sanayi Sınıflamasına (ISIC) göre yapılmaktadır. Tablo 4, Türkiye'de 1980-1990 yılları arasında ihracatın sektörlere göre dağılımını göstermektedir.

Tablo 4: 1980-1990 Yılları Arası Türkiye'de İhracatın Sektörel Dağılımı (ISIC-Milyon Dolar)

Yıllar	İhracat							
	Tarım, Hayvancılık ve Diğerleri	Değişim (%)	Madencilik ve Taşocakçılığı	Değişim (%)	Üretim	Değişim (%)	Diğerleri	Değişim (%)
1980*	1.654,8	23.1	190,9	44.1	1.064,8	35.5	-	-
1981*	2.172,9	31.3	193,1	1.1	2.297,0	115.7	-	-
1982*	2.122,8	-2.3	174,3	-9.7	3.448,5	50.1	-	-
1983	1.880,6	-11,4	188,9	8.3	3.658,3	6.0	-	-
1984	1.749,2	-7.0	239,8	26.9	5.144,6	40.6	-	-
1985	1.719,4	-1.7	243,8	1.7	5.994,9	16.5	-	-
1986	1.885,6	9.7	246,9	1.3	5.324,3	-11.2	-	-
1987	1.852,5	-1.8	272,3	10.3	8.065,2	51.5	-	-
1988	2.341,4	26.3	377,2	38.5	8.943,4	10.8	-	-
1989	2.125,5	-9.2	412,9	9.4	9.086,3	1.5	-	-
1990	2.347,2	10.4	331,5	-19.7	10.280,6	13.1	-	-

Kaynak: SBB (Temel Ekonomik Göstergeler) veri tabanından derlenmiştir.
*TÜİK (Dış Ticaret İstatistikleri) veri tabanından alınmıştır.

Tabloda 1981 yılından itibaren tarım sektörünün ihracattaki payının hızlı bir düşüş dönemine girdiği ve ekonomi üzerindeki etkisini kaybetmeye başladığı görülmektedir. Ancak bu durum rakam olarak değil diğer sektörlerin daha hızlı büyümesi nedeniyle, tarımın payının yıllar itibariyle oransal olarak geride kalmasını ifade etmektedir. 1980 yılında tarım sektörünün payı yüzde 57 iken 1990 yılında yüzde 18'e gerilemiştir. İhracatın sektörel yapısı içerisinde yer alan bir diğer sektör madencilik sektörüdür. 1980 yılında madencilik sektörünün ihracattaki payı yüzde 6 iken 1981 yılından sonra bu oran düşmeye başlamıştır. Madencilik sektörü 1990 yılında yüzde 3'e gerilemiştir. Ülke ekonomisi için büyük önem taşıyan üretim sektörü, 1980 yılına kadar tarım sektöründen sonra ekonomiye en fazla katkı sağlayan sektör olmuştur. Üretim

sektörünün 1980 yılındaki payı yüzde 36'dır. Üretim sektörü 1981 yılından sonra hızlı bir büyüme sürecine girmiştir. İhracatta belirleyici sektör olan üretimin payı 1990 yılında yüzde 79'a yükselmiştir. 1980 yılında 1,06 milyar dolar olarak gerçekleşen üretim sektörü ihracatı 1990 yılına gelindiğinde 10,2 milyar dolar seviyesine çıkarak belirgin bir artış göstermiştir. Bu gelişmede serbestleşme ve dışa açık politikalar ile birlikte sanayi sektörünün desteklenmesi amacıyla izlenen politikaların rolü yüksektir.

Tablo 5: 1980-1990 Yılları Arası Türkiye'de İthalatın Sektörel Dağılımı (ISIC-Milyon Dolar)

Yıllar	**İthalat**							
	Tarım, Hayvancılık ve Diğerleri	**Değişim (%)**	**Madencilik ve Taşocakçılığı**	**Değişim (%)**	**Üretim**	**Değişim (%)**	**Diğerleri**	**Değişim (%)**
1980*	79,7	118.2	3.154,4	195.4	4.674,8	17.8	-	-
1981*	143,0	79.4	3.517.4	11.5	5.272,1	12.7	-	-
1982*	189,5	32.5	3.713,1	5.5	4.939,1	-6.3	-	-
1983	138,1	-27.1	3.441,5	-7.3	5.655,4	14.5	-	-
1984	417,7	202.5	3.644,1	5.9	6.695,1	18.4	-	-
1985	375,3	-10.2	3.626,3	-0.5	7.342,0	9.7	-	-
1986	457,4	21.9	2.145,4	-40.8	8.502,0	15.8	-	-
1987	782,3	71.0	3.034,1	41.4	10.341,4	21.6	-	-
1988	404,9	-48.2	2.939,1	-3.1	10.991,4	6.2	-	-
1989	782,4	93.2	3.043,1	3.5	11.966,6	8.8	-	-
1990	995,8	27.3	4.252,9	39.8	17.053,4	42.5	-	-

Kaynak: SBB (Temel Ekonomik Göstergeler) veri tabanından derlenmiştir.
*TÜİK (Dış Ticaret İstatistikleri) veri tabanından alınmıştır.

Türkiye ithalatının sektörel dağılımında hakim sektör üretimdir. Üretimi takip eden sektörler sırasıyla madencilik ve tarım sektörleridir. 1980 yılında üretim sektörünün toplam ithalat içindeki payı yüzde 59 iken 1990 yılında bu oran yüzde 77'ye çıkmıştır. Aynı dönemler için madencilik ve tarım sektörlerinin payı sırasıyla yüzde 40, yüzde 1, yüzde 19 ve yüzde 4'tür. Sonuç olarak, Türkiye ithalatının sektörel dağılımında ağırlıklı sektör, ihracatın sektörel dağılımında olduğu gibi üretim sektörüdür.

Tablo 6: 1991-2000 Yılları Arasında Türkiye'de İhracatının Sektörel Dağılımı (ISIC-Milyon Dolar)

Yıllar	İhracat							
	Tarım, Hayvancılık ve Diğerleri	Değişim (%)	Madencilik ve Taşocakçılığı	Değişim (%)	Üretim	Değişim (%)	Diğerleri	Değişim (%)
1991	1.223,5	-47.8	282,4	-14.8	12.077,8	17.4	-	-
1992	1.184,7	-3.17	266,3	-5.6	13.263,6	9.8	-	-
1993	1.044,3	-11.8	233,0	-12.4	14.067,8	6.0	-	-
1994	1.065,6	2.3	263,4	12.8	16.775,8	19.2	-	-
1995	947,0	-11.0	390,8	48.2	20.298,1	21.0	-	-
1996	1.009,1	6.5	223.7	-42.8	21.578,8	6.3	15,5	-
1997	2.678,9	165.4	404,3	81.1	23.132,2	7.2	12,5	-19.3
1998	2.699,7	0.7	363,7	-10.1	23.873,5	3.2	19,9	59.2
1999	2.394,2	-11.3	385,0	6.0	23.754,7	-0.4	15,4	-22.6
2000	1.973,3	-17.5	400,4	3.8	25.339,6	6.6	37,1	140.9

Kaynak: SBB (Temel Ekonomik Göstergeler) veri tabanından derlenmiştir.

1991-2000 yılları arasında Türkiye'de ihracatın sektörel dağılımında üretim sektörünün hakimiyetini sürdürdüğü görülmektedir. 2000 yılında üretim sektörü ihracatı 25,3 milyar dolar seviyesine çıkmıştır. Bu dönemde 1994 krizi, 1997 Uzak Doğu krizi ve 1998 Rusya krizinin yanı sıra 1999 yılında yaşanan Marmara depremi üretim sektörünün artış hızını sekteye uğratmıştır. Tarım ve madencilik sektörünün bir önceki döneme benzer oranda olduğu söylenebilir. 1991 yılında tarım sektörünün payı yüzde 9 iken 2000 yılında yüzde 7'ye gerilemiştir. Madencilik sektörüne bakıldığında ise yüzde değişmediği ve her iki dönem için de yüzde 2 oranında kaldığı görülmektedir. Öte yandan üretim sektörünün ihracattaki payı 1991 yılında yüzde 89 iken 2000 yılında bu oran yüzde 91'e yükselmiştir. İmalat sanayi sektörü bu dönemde ekonomiye en fazla katkı sağlayan sektör olmuştur. Ancak bu dönemde bir önceki dönemde olduğu gibi 1994 yılına kadar ihracatta herhangi bir artış olmamıştır. Bunun en önemli nedeni, üretimin alt sektörleri açısından ihracatta önemli bir değişimin sağlanamamasıdır. Özellikle dönemin sonlarına doğru Türki Cumhuriyetler ile ticaret artmış ve 1994 yılında uygulanan istikrar politikaları bu artışı desteklemiştir. Dönem sonundaki durgunluk, tek pazara dayalı olarak yapılanan Türkiye sanayisinin 1998 krizine tepkisi olarak değerlendirilebilir.

Tablo 7: 1991-2000 Yılları Arasında Türkiye'de İthalatının Sektörel Dağılımı (ISIC-Milyon Dolar)

Yıllar	İthalat							
	Tarım, Hayvancılık ve Diğerleri	Değişim (%)	Madencilik ve Taşocakçılığı	Değişim (%)	Üretim	Değişim (%)	Diğerleri	Değişim (%)
1991	552,1	-44.5	3.296,7	-22.4	17.198,3	0.8	-	-
1992	635,2	15.0	3.345,8	1.5	18.889,6	9.8	-	-
1993	1.073,0	68.9	3.358.5	0.3	24.996,9	32.3	-	-
1994	589,5	-45.1	3.311,3	-1.3	19.369,2	-22.5	-	-
1995	1.446,5	145.5	3.961,4	19.6	30.301,2	56.4	-	-
1996	1.650,2	14.1	4.773,5	20.4	36.138,0	19.2	-	-
1997	2.420,2	46.6	5.138,0	7.6	40.907,8	13.1	91,8	-
1998	2.129,8	-12.0	3.757,6	-26.8	39.914,0	-2.4	120,0	30.7
1999	1.654,8	-22.3	4.253,7	13.2	34.687,8	-13.0	90,5	-24.5
2000	2.128,7	28.6	7.104,7	67.0	45.018,1	29.7	251,3	177.6

Kaynak: SBB (Temel Ekonomik Göstergeler) veri tabanından derlenmiştir.

Tablo 7'de 1991-2000 yılları arasında ithalatta en büyük payın üretime ait olduğu görülmektedir. Ardından sırasıyla madencilik ve tarım sektörleri gelmektedir. Aynı dönemdeki ihracat rakamları ithalat rakamları ile karşılaştırıldığında tarım sektöründe benzer rakamlar olmasına rağmen madencilik ve üretim sektörlerinde ithalat ve ihracat arasındaki fark oldukça yüksektir. Bu durumun nedeni, ihracatın bileşiminde ithal girdilerin yüksek oranda kullanılmasıdır. Bu sektörlerin ihracatındaki artış ne kadar büyük olursa, ithalatlarındaki artış da o kadar büyük olur. Ancak, ihracat bir dereceye kadar ülkelere doğrudan fayda sağlarken, ithalat dolaylı fayda sağlamaktadır. 1991 yılı için tarım, madencilik ve üretim sektörlerinin oranları sırasıyla yüzde 2, yüzde 16 ve yüzde 82 iken, 2000 yılı için yüzde 6, yüzde 13 ve yüzde 81'dir.

Tablo 8: 2001-2010 Yılları Arasında Türkiye'de İhracatının Sektörel Dağılımı (ISIC-Milyon Dolar)

Yıllar	İhracat							
	Tarım, Hayvancılık ve Diğerleri	Değişim (%)	Madencilik ve Taşocakçılığı	Değişim (%)	Üretim	Değişim (%)	Diğerleri	Değişim (%)
2001	2.006,1	1,6	348,7	-12,9	28.826,0	13,0	128,8	247,1
2002	1.805,7	-10,0	387,2	11,1	33.701,6	16,9	147,3	14,4
2003	2.201,4	21,9	469,1	21,2	44.378,4	31,7	182,8	24,1
2004	2.644,9	20,1	649,2	38,4	59.579,1	34,3	232,2	27,0
2005	3.468,3	31.1	810,2	24,8	68.813,4	15,5	384,4	65.5
2006	3.611,4	4.1	1.146,3	41,5	80.246,1	16,6	530,8	38.0
2007	3.882,2	7.5	1.660,6	44,9	100.965,6	25,8	645,5	21.6
2008	4.169,8	7.3	2.155,0	29,8	125.133,5	23,9	507,4	-21.3
2009	4.536,5	8.8	1.682,9	-21,9	95.449,2	-23,8	473,8	-6.7
2010	5.090,7	12.2	2.687,1	59,7	105.466,7	10,5	638,7	34.8

Kaynak: SBB (Temel Ekonomik Göstergeler) veri tabanından derlenmiştir.

Tarım ihracatının tarımsal üretim içindeki payının 1980'den 2000 yılına kadar düşme eğiliminde olduğu görülmektedir. 1980 yılında yüzde 57'den 2000 yılında bu oran yüzde 7'ye düşmüştür. Aynı dönemde madencilik sektörünün payında da azalma görülmektedir. 1980 yılında madencilik sektörünün payı yüzde 6 iken, 2000 yılında yüzde 2 olmuştur. Aynı dönemde üretim sektörünün ise payı artmıştır. 1980 yılında yüzde 37 olan üretim sektörünün payı, 2000 yılında yüzde 91'e yükselmiştir. Bu iki sektördeki düşüş, üretim ürünlerindeki artış kadar olmamıştır. Bunun nedeni, 1980'lerden itibaren korumacı ve ithal ikameci bir politika yerine ihracata yönelik, dışa dönük bir politikanın benimsenmiş olmasıdır. 2010 yılında tarım, madencilik ve üretim sektörlerinin toplam ihracat oranları sırasıyla yüzde 4, yüzde 2 ve yüzde 93 olmuştur. Diğer sektörlerin payı ise yüzde 1'dir.

Tablo 9: 2001-2010 Yılları Arasında Türkiye'de İthalatın Sektörel Dağılımı (ISIC-Milyon Dolar)

Yıllar	İthalat							
	Tarım, Hayvancılık ve Diğerleri	Değişim (%)	Madencilik ve Taşocakçılığı	Değişim (%)	Üretim	Değişim (%)	Diğerleri	Değişim (%)
2001	1.410,2	-33,7	6.576,8	-7,3	32.686,1	-26,0	726,0	188,9
2002	1.703,8	20,8	7.192,3	9,4	41.383,0	26,6	1.274,6	75,4
2003	2.537,8	48,9	9.020,5	25,4	55.689,8	34,6	2.091,6	64,1
2004	2.758,3	8,7	10.980,9	21,7	80.447,3	44,5	3.346,3	60,0
2005	2.825,6	2.4	16.321,2	48,6	94.208,3	17,1	3.419,1	2.1
2006	2.935,0	3.8	22.033,8	35,0	110.378,8	17,2	4.228,6	23.6
2007	4.671,1	59.1	25.310,6	14,9	133.879,2	21,3	6.125,9	44.8
2008	6.433,0	37.7	35.649,7	40,8	150.249,0	12,2	9.628,5	57.1
2009	4.625,0	-28.1	20.624,6	-42,15	111.030,5	-26,10	4.648,1	-51.7
2010	6.490,0	40.3	25.932,5	25,74	145.366,9	30,93	7.754,7	66.8

Kaynak: SBB (Temel Ekonomik Göstergeler) veri tabanından derlenmiştir.

Üretim sektörü 2001-2010 yılları arasında en büyük ithalat yapılan sektör olma konumunu korumuştur. 2001 yılında üretimin payı yüzde 79 iken, 2010 yılında yüzde 78'e gerilemiştir. Bu dönemde üretim sektörünün ithalatında küçükte olsa bir azalma görülmesine rağmen madencilik sektörünün rakamları 2009 yılı hariç sürekli artmıştır. Ancak 2009 yılındaki azalmanın da etkisiyle 2001 yılında madencilik sektörünün toplam ithalat içindeki payı yüzde 16 iken 2010 yılında yüzde 14'e gerilemiştir. Söz konusu ithalatın büyük bir kısmı enerji hammaddelerinden oluşmaktadır. Türkiye'de ithalat yapılan bir diğer sektör de tarım sektörüdür. 2001-2010 yılları arasında bu sektörün toplam ithalat içindeki payı sırasıyla yüzde

3 ve yüzde 4 olmuştur. Diğer sektörlerin payı ise yüzde 2 ile yüzde 4 arasında değişmektedir. Bu dönemde TL'nin aşırı değerlenmesine bağlı olarak ihracatı sürdürmek ve artırmak için ithal girdilerin tercih edilmesi rakamlarda önemli artışa neden olmuştur.

Tablo 10: 2011-2021 Yılları Arasında Türkiye'de İhracatının Sektörel Dağılımı (ISIC-Milyon Dolar)

Yıllar	İhracat							
	Tarım, Hayvancılık ve Diğerleri	Değişim (%)	Madencilik ve Taşocakçılığı	Değişim (%)	Üretim	Değişim (%)	Diğerleri	Değişim (%)
2011	5.352,6	5.1	2.805,4	4,4	125.962,5	19,4	786,3	23.1
2012	5.380,2	0.5	3.160,8	12,7	143.193,9	13,7	727,8	-7.5
2013	5.911,5	9.8	3.879,4	22,7	141.358,2	-1,3	653,5	-10.1
2014	6.376,2	7.8	3.406,1	-12,2	147.059,4	4,0	768,4	17.6
2015	6.124,8	-3.9	2.798,9	-17,8	134.389,9	-8,6	535,3	-30.3
2016	5.811,1	-5.11	2.676,8	-4,4	140.346,0	4.4	445,8	-16.8
2017	5.579,3	-1,9	3.497,9	31,7	154.698,1	10,2	619,8	39.1
2018	5.846,6	4,8	3.393,8	-3,0	167.064,0	8,0	751,4	21.3
2019	5.588,6	-4,4	3.200,3	-5,7	171.218,6	2,5	689,4	-8.2
2020	5.956,9	6,6	2.932,2	-8,4	159.952,8	-6,6	653,8	-5.2
2021	7.160,0	20,2	4.059,7	38,4	212.854,9	33,1	1.029,2	57.5

Kaynak: SBB (Temel Ekonomik Göstergeler) veri tabanından derlenmiştir.

2011-2021 yılları arasında gözlemlenen verilere göre, son 11 yılda Türkiye'nin ihracatında en büyük payı üretim almıştır. Üretim sektörü içinde otomotiv sektörü ve tekstil sektörü Türkiye'nin uzmanlaştığı alanlarda dikkat çekmektedir. Bu sonuçlara göre, Türkiye'nin ihracatında tarım sektörü ve madencilik sektörü bir önceki döneme göre rakam olarak artmasına rağmen yüzde olarak geride kalmıştır. Tarım ihracatının tarımsal üretimdeki payının 2011'de yüzde 4'ten 2021'de yüzde 3'e gerilediği görülmektedir. Aynı dönemde madencilik sektörünün payı her iki yılda da yüzde 2'de sabit kalmıştır. Aynı dönemde üretim sektörünün payı ise artmıştır. 2011 yılında yüzde 93 olan üretim sektörünün payı, 2021 yılında yüzde 95'e yükselmiştir. Diğer taraftan Covid-19 pandemisi nedeniyle pandemi yılı ve onu takip eden süreçte birçok ülkenin ve sektörlerinin dış ticareti azalmıştır.

Tablo 11: 2011-2021 Yılları Arası Türkiye'de İthalatın Sektörel Dağılımı (ISIC-Milyon Dolar)

Yıllar	İthalat							
	Tarım, Hayvancılık ve Diğerleri	Değişim (%)	Madencilik ve Taşocakçılığı	Değişim (%)	Üretim	Değişim (%)	Diğerleri	Değişim (%)
2011	8.943,9	37.7	37.331,4	44,0	183.930,3	26,5	10.636,2	37.1
2012	7.502,8	-16.1	42.246,8	13,2	176.235,0	-4,2	10.560,4	-0.7
2013	7.776,0	3.6	38.205,1	-9,6	196.822,8	11,7	8.857,3	-16.1
2014	8.657,9	11.3	37.126,1	-2,8	187.742,2	-4,6	8.650,9	-2.3
2015	7.264,7	-16.0	27.608,8	-25,6	166.821,2	-11,1	5.566,5	-35.6
2016	7.097,4	-2.2	19.008,9	-31,1	167.243,4	0,3	5.268,7	-5.3
2017	9.374,4	27,6	26.224,9	38,2	195.866,0	14,6	6.967,3	32.2
2018	9.498,1	1,3	28.978,6	10,5	184.463,1	-5,8	7.965,2	14.3
2019	9.835,4	3,6	31.695,9	9,4	162.143,2	-12,1	6.507,2	-18.3
2020	9.834,2	0,0	22.334,1	-29,5	179.808,7	10,9	7.379,8	13.4
2021	12.082,1	22,9	40.086,4	79,5	205.981,2	14,6	13.073,8	77.1

Kaynak: SBB (Temel Ekonomik Göstergeler) veri tabanından derlenmiştir.

Türkiye'de ithalat, son 11 yılda ihracattaki gelişme sürecine benzer bir eğilim göstermiştir. Sektörlerin paylarına bakıldığında en büyük payın üretimde olduğu görülmektedir. Ancak 2011 yılında yüzde 76 olan üretim sektörünün payı, 2021 yılında miktar olarak artmasına rağmen, oran olarak aynı kalmıştır Tarım sektörünün ithalat içindeki payı dönem başında ve sonunda yüzde 4'te sabit kalmıştır. 2011 yılında madencilik sektörünün payı yüzde 16 iken, 2021 yılında göreli olarak yüzde 15'e gerilemiştir. Diğer sektörlerin payı 2011 yılında yüzde 4 iken 2021 yılında yüzde 5 olmuştur. Tabloda madencilik sektörünün ithalattaki yüksek payı dikkat çekmektedir. Türkiye başta petrol ve doğalgaz olmak üzere enerji kullanımında dışa bağımlı bir ülke olduğundan bu durum ülkenin ithalat hacmini önemli ölçüde artırmaktadır. Diğer taraftan tarım ürünleri ithalatındaki oransal olarak yüksek olan bu artış, Türkiye'de uygulanan yanlış politikaların veya tarımsal üretimde verimliliğin düştüğünün bir göstergesidir. Tarımda uzmanlaşmanın olmaması, gübre, ilaç, mazot gibi ürünlerin pahalı oluşu, hayvan hastalıkları ile ilgili mücadelenin yetersiz oluşu ve yeterli üretim planlamasının yapılmaması başlıca tarım sektörü ile ilgili sorunlar olarak söylenebilir.

SONUÇ VE DEĞERLENDİRME

Liberal ekonomi anlayışı ile birlikte uluslararası ticaret hacmini arttırmak ve dünya üzerindeki konumunu güçlendirmek birçok ülke bakımından en temel ekonomi politikası haline gelmiştir. Ülkeler bu sayede yeni pazarlar için üretim potansiyellerini kullanarak büyüyebilir, teknolojik yetersizlikleri ve kaynak açıkları varsa eksiklerini dış ticaret ile giderebilir hale gelmişlerdir.

Türkiye, 1980 yılı öncesinde ithal ikameci bir kalkınma politikası izlerken 1980 yılı sonrasında serbest piyasa şartlarına uyum sağlayarak ihracata yönelik bir strateji izlemiştir. Bunun neticesinde Türkiye'nin dış ticareti yıllara ve ülke gruplarına göre incelendiğinde, serbestleşme döneminin ardından toplam dış ticaretin hızla arttığı, 1980 yılında 10.819 milyon dolar olan ticaretin 2021 yılında 496.687 milyon dolara ulaştığı görülmektedir. Ülke grupları dikkate alındığında tüm dönemlerde en fazla ticaretin Avrupa ülkeleriyle yapıldığı görülmektedir. 2000'li yıllarla birlikte Ortadoğu, Afrika ülkeleri ve Diğer Asya ülkelerine ihracat hız kazanmıştır. 2021 yılında Türkiye'nin toplam ticaretinde ülkelerin paylarına baktığımızda; Avrupa ülkeleri %35.9, Diğer Asya Ülkeleri %17.2, Orta Doğu %10.9, ABD %9.1, Afrika %6.2 ve Diğer ülkelerin %20.7 paya sahip olduğu görülmektedir. Avrupa ülkeleri dönem sonu ihracat rakamları daha detaylı incelendiğinde, Avrupa ülkeleri ile yapılan toplam dış ticaretin toplam ticaret içindeki payı yaklaşık değerleri sırasıyla 1990 yılında yüzde 46, 2000 yılında yüzde 50, 2010 yılında yüzde 41, 2020 yılında yüzde 39 ve 2021 yılında ise yüzde 36 olarak gerçekleşmiştir. Diğer ülkelerle ticaretin payı arttıkça Avrupa ülkelerinin payının azaldığı görülmektedir. Böylece olası bir ticari risk durumunda Türkiye, belirli bir bölgeye bağlı kalmanın maliyetini azaltacaktır.

Türkiye'nin 1980 yılından günümüze kadar olan dış ticaret verileri incelendiğinde ülkenin bir dış ticaret açığı sorunu olduğu gözlemlenmektedir. Bu sorunun hangi sektör ya da sektörlerdeki eksiklikten kaynaklandığının anlaşılması sorunun çözümlenmesi için gereklidir. Ülke ekonomisi için büyük önem taşıyan dış ticaret verilerini oluşturan sektörlerin dağılımı incelendiğinde ise, Türkiye'nin ihracat ve ithalatında etkili olan en önemli sektörün üretim sektörü olduğu görülmektedir. Üretim sektörünün ihracat içindeki payının 1981 yılından itibaren arttığı görülmektedir. Madencilik sektörünün ise çok fazla değişmediği ve 2004 yılından sonra yükselmeye başladığı gözlemlenmiştir. Diğer taraftan tarım sektörü ise geride kalmıştır. Ancak tarım sektöründe ithalat miktarının artması, Türkiye'de bu alanda uygulanan politikaların yetersiz kalmasının ve tarımsal üretimde verimliliğin düştüğünün göstergesidir. Ülke ekonomisinin gelişmesi ve ülkenin dünya ticaretinde yer edinmesi için sanayi sektörüne yapılan yatırımların ve dolayısıyla üretimin daha da artırılması gerekmektedir. İthal ürünlerin ikamesi, gerekli teknolojik altyapı oluşturularak yapılmalıdır. Aynı zamanda ithal ürünler üzerinde vergi ve teşvik düzenlemeleri yapılmalıdır. Bu sayede etkin bir politika ile ülke refahı arttırılabilir ve istihdam yaratılabilir.

Çalışma Türkiye'nin serbestleşme dönemi sonrası benimsemiş olduğu politikanın dış ticaret verileri ve bölgeler üzerindeki etkisini göstermesi, ülkenin ticaretteki yönünün değişiminin ve

ülke potansiyelinin ortaya koyulması bakımından önem taşımaktadır. Diğer taraftan Türkiye'nin dış ticareti için ürün bazında ve işlem hacmi en fazla olan sektörlerin incelenmesi hangi alanda ne kadarlık bir gelişme gösterildiğinin bizlere kanıtını sunmaktadır. Bu bağlamda yapılan değerlendirmelerle çalışmanın literatüre katkısı olacağı ve gelecekte yapılacak benzer çalışmalara yol göstermesi beklenmektedir.

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TÜRKİYE'DE SEÇİMLER İLE VERGİ TEMELLİ VAATLER

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ÖZET
Demokrasi ile yönetilen ülkelerde seçimler oldukça önem arz etmektedir. Türkiye'de de seçimlerin yapılacağı tarihten önce siyasi partiler; başta sosyal, ekonomik, toplumsal ve kültürel konular temelinde pek çok seçim vaadinde bulunmaktadır. Ekonomik vaatler arasında sayılabilecek vergiler ile ilgili pek çok planlamanın siyasi partilerin seçim programlarında yer aldığı görülmektedir. Genel seçimlerde Türk Vergi Sistemi bünyesinde yer alan hem dolaylı hem de dolaysız pek çok vergi türü ile ilgili iktidar partilerinin ve muhalefette yer alan partilerin çalışmaları olduğu görülmüştür. Bununla beraber yerel seçimlerde de buna benzer durumlar ile karşılaşılmıştır. Seçim dönemi öncesi iktidarda bulunan partilerin vergi ile ilgili bir takım düzenlemelere gittikleri karşılaşılan bir diğer önemli durumdur. Bu hususta görülen en belirgin durum vergi oranlarının düşürülmesi ve bazı vergi türlerinin kaldırılması biçiminde olmuştur. Seçim öncesi vergi temelli vaatlerin bir kısmının gerçekleştiği geri kalanların ise sadece vaat olarak kaldığı ve düzenlenmediği sonucuna ulaşılmıştır. Çalışmada Adalet ve Kalkınma Partisi'nin ilk defa iktidara geldiği 01.11.2002 seçimleri ile son yapılan 24.06.2018 tarihli genel seçimler incelenmiştir. Ardından 31.03.2019 tarihinde yapılan ve Millet İttifakı bünyesinde özellikle büyükşehir belediye başkanlıklarında değişikliklerin meydana geldiği seçim ile ilgili vergi temelli vaatler incelenmiştir. Yine çalışma içerisinde tarihsel önemi olan seçimlere ve vergi vaatlerine yer verilmiştir. Vergi özelinde, siyasi partilerin seçim beyannamelerinde bazı eksikliklere ve adaletsizliklere yer verilmiştir. Sonraki süreçte bir takım vergi türleri ile ilgili düzenlemelerin yapıldığı geri kalan vergi türleri ile ilgili ise herhangi bir çalışmanın yapılmadığı sonucuna ulaşılmıştır.

Anahtar Kelimeler: Vergi, Türk Vergi Sistemi, Seçim

ELECTIONS AND TAX-BASED PROMISES IN TURKEY

ABSTRACT
Elections are very important in countries governed by democracy. Political parties before the election date in Turkey; It promises many choices, primarily on the basis of social, economic, societal and cultural issues. It is seen that many plans regarding taxes, which can be counted among economic promises, are included in the election programs of political parties. In the general elections, it has been seen that the ruling parties and the opposition parties have worked on many types of taxes, both directly and indirectly, within the Turkish Tax System. However, similar situations were encountered in local elections. Another important situation encountered is that the parties in power before the election period made some tax regulations. The most obvious situation in this regard was the reduction of tax rates and the abolition of some tax types. It was concluded that some of the pre-election tax-based promises were realized and the rest remained only as promises and were not regulated. In the study, the 01.11.2002 elections in which the Justice and Development Party came to power for the first time and the last general elections held on 24.06.2018 were examined. Then, tax-based promises related to the election held on 31.03.2019 and in which changes took place especially in metropolitan mayorships within the Nation Alliance were examined. Again, historically important elections and tax promises are included in the study. In particular, some deficiencies and injustices have been included in the election declarations of political parties. In the next process, it was concluded that regulations were made regarding some tax types and no study was conducted regarding the remaining tax types.

Keywords: Tax, Turkish Tax System, Election

1. GİRİŞ

Demokrasilerde seçimler son derece önem taşımaktadır. Seçime katılan siyasi partiler belirli bir süreliğine devleti yönetme veya yerel seçimlerde illeri-ilçeleri yönetmeye talip olurlar. Partiler seçilebilmek adına bazen ülkede uzun süredir var olan bazı problemleri çözebilmek adına vaatlerde bulunurken kimi zamanda mevcut güncel konular üzerinde bazı alternatif çözüm planları sunmaktadır. Ekonomik vaatler gelişmekte olan ülkelerde seçim vaatleri arasında en önemli yeri alan vaatler arasında yer almaktadır. Siyasi partiler projeleri dâhilinde bazı ekonomik durumlar üzerinde analiz yapmakta ve bu çerçevede yoğunlaşmaktadır. Vergi temelli vaatler ekonomik vaatler kapsamında değerlendirilmektedir. Bireyler her gün yazılı ve görsel medyada vergi haberleri ile karşılaşmakta bunun neticesinde zihinlerinde vergi özelinde bazı sorunlar şekillenmektedir. Vergi oranlarının görece yüksek oluşu, vergi mevzuatında mevcut olan bazı sorunlar ve vergi türlerinin sayısındaki fazlalıklar temelinde partiler vaatlerde bulunmaktadır. Vergi temelli vaatlerin seçmen davranışlarını nasıl etkilediği bir başka çalışmanın konusudur. Bu çalışmada seçimleri başarı ile tamamlayan partilerin veya ittifakların vergi temelli vaatleri ve ardından bildirgelerdeki vaatler üzerine yapılan çalışmalar incelenmiştir.

2. SEÇİM VAATLERİ VE VERGİ İLİŞKİSİ

İkna kelimesi belirlenen bir hedef kitlede var olan tutumu değiştirmek için yapılan ve şiddete dayalı olmayan durumlar olarak ifade edilmektedir. “İnandırma, kandırma” anlamlarına gelip olumsuz bir durum içeriyormuş gibi olsa bile günlük hayatta ve hayat içerisindeki pratiklerde oldukça önem taşımaktadır. Siyasi partiler iktidara sahip olabilmek adına siyasi iknayı kullanmakta ve bu şekilde başarı kazanmayı hedeflemektedir (Barut, Altundağ, 2005).

Katılımcı demokrasilerde oy verme demokrasi için oldukça önem arz etmektedir. Türkiye’de ilk olarak 1950 yılında çok partili sistemin getirdiği özgürce tercih ile birlikte seçmenleri oy vermeye iten nedenler siyasi partiler için büyük önem kazanmıştır. Seçmenlerin tercihlerini belirleyen faktörler ekonomik, siyasal ve sosyal faktörlere göre değişebilmektedir. Bununla birlikte küresel bir takım faktörler, seçmenin sorgulayıcı ve isteyici özellikleri de önemli belirleyiciler arasında sayılmaktadır (Karagöl, Dama, 2015). Son dönemlerde ise sınıf temelli oy verme, bir siyasi partiye aşırı bağlılık gibi durumlardan ziyade güncel olayların seçmenleri etkilediği görülmektedir. Bu durumdan kaynaklı olarak bir siyasi partiye sadık olmayan seçmenlerin ikna edilebilmesi adına siyasi partilerin güncel olaylara önem verdiği ve seçmenleri böyle ikna etmeye çalıştıkları görülmektedir (Avcı, Hülür, 2016). Partiler tüm

bunları göz önünde bulundurarak seçim bildirgelerini hazırlamakta ve seçmenlerden bu vesile ile oy almaya çalışmaktadır. Seçim bildirgeleri, hükümeti kurmayı ve bir süreliğine devleti yönetmeyi talep eden siyasi partilerin seçildikten sonra planladıkları vaatlerin bulunduğu taahhütleri içermektedir. Seçim vaatleri ile ilgili önemli bir husus oy kaygısıyla oluşturulmamaları gerektiği yönündedir. Olası bir hükümet kurma durumunda devletin geleceği göz önünde bulundurularak kaynakların doğru bir biçimde kullanılması son derece önem teşkil etmektedir. Seçim bildirgelerinde ekonomik vaatler kapsamında oy kaygısı gözetilerek vaatlerin yer aldığı görülmektedir. Burada özellikle yoksulluk ve sosyal yardımlar nezdinde yapılan hedeflerin tutarlı olması son derece önemlidir (Tiyek, 2015).

2.1 Vergi Vaatleri

1982 tarih ve 2820 sayılı siyasi partiler kanunu, Türkiye'de siyasi partilerin kurulması, partilerin teşkilatlanması, yetkileri, görev ve sorumlulukları ve mal edinimleri gibi bir takım hususları belirlemektedir. Siyasi partiler demokrasiler için son derece önemli olmasına rağmen ilgili kanun kapsamında partilere tanınan özgürlükler sınırlıdır (Ertekin, 2015). Siyasi partiler kanun kapsamında belirlenen kriterleri sağladıkları takdirde seçimlere katılmaya hak kazanırlar. Seçimlerin ülke ekonomisi ve maliye politikası arasında oldukça önemli bir yeri bulunmaktadır. Ülkenin içinde bulunduğu duruma göre seçim takviminde değişmeler olabilir. Siyasal istikrarda bir sorun olması durumunda bu durum ekonomik belirleyicilere de yansımaktadır. Seçimlerin ardından kazanan partilerin vaatleri arasında yer alan bir takım popülist vaatler para politikası ve maliye politikası araçlarının etkinlikten uzaklaşmasına sebep verebileceği gibi bu durum ekonomik olarak büyük sorunları da beraberinde getirebilir. Ülke ekonomisine ve mali disipline zarar verme olasılığı bulunan bu popülist vaatler yasal zeminde gerçekleştiğinden dolayı hukuki açıdan herhangi bir suç oluşturmamaktadır. Bu söylemlerin ardından kazanan partiler belirli bir kitleyi olağanüstü bir şekilde memnun etmeye çalışmakta ve söylemlerinin popülist kaygılar taşımadığını ispatlama yoluna gitmektedir (Balyemez, 2018).

Türkiye'de seçimlere giren partilerin genel seçimlerde vergi temelli vaatleri incelendiğinde hem dolaylı hem de dolaysız vergiler ile ilgili düzenlemeler vaat ettikleri görülmektedir. Bununla beraber siyasi partiler bazı vergi türlerinin ihtiyaçlara cevap vermediğini demode kaldığını ifade ederek bu doğrultuda çalışmalar yapmışlardır. Yine verginin tabana yayılması nezdinde çalışmaların yapılacağı belirtilmiş vergi adaletine vurgu yapılmıştır. Vergi adaleti durumu ilginç bir husustur. Siyasi partiler iktidara gelmeden önce vergi adaletsizliği çerçevesinde bazı çözüm önerileri geliştirmekte ardından iktidar olmaları durumunda bu sorunun çözüldüğünü yansıtacak ifadelere yer vermektedirler. Muhalefet partilerinin büyük kısmı ise vergi

adaletsizliğinin üzerine yoğunlaşmakta ve seçilmeleri durumunda adaletsizliğin ortadan kaldırılacağını taahhüt etmektedirler. Yine istisna ve muafiyetler siyasi partilerin vergi vaatleri arasında yer alan bir diğer konudur. İstisna ve muafiyetlerin sınırı ile birlikte uygulamada yaşanan problemlerin çözümüne dair öneriler ile karşılaşılmaktadır.

Yerel seçimler öncesi vaatlere bakıldığında ise farklı hususlar göze çarpmaktadır. Türkiye'de kamu gelirlerinin önemli bir bölümü merkezi yönetimin elindedir. Bununla birlikte belediyeler genel bütçe gelirlerinden ayrılan paylar, vergi, resim, harç ve katılma payları, taşınırların ve taşınmazların değerlendirilmesi neticesinde elde edilen gelirler gibi pek çok gelire sahiptirler. Yine belediyelerde nispi vergiler ve maktu vergiler toplanırken enflasyon karşısında oluşan farklılıklar göze çarpmaktadır (Gencel, 2020). Partiler yerel seçimlerde vergi vaatlerini belirlerken önceden bazı vergi türlerinin olumsuzluklarından bahsederken son dönemde vergilerin kolay ödenebilirliği, vatandaşlara zamandan tasarruf sağlama gibi vaatlere yer vermektedir. Yine vergi ödemelerinde merkezi yönetimin aldığı kararlardan doğrudan etkilenen yerel yönetimlerin daha temkinli vaatlere yer verdikleri görülmektedir.

2.2 Vergi Temelli Seçilmiş Seçim Vaatleri

Çalışmada 01.11.2002 tarihinde yapılan Adalet ve Kalkınma Partisi'nin ilk defa iktidara geldiği genel seçimler ile 31.03.2019 tarihinde yapılan millet ittifakının büyükşehirlerde başarılı olduğu yerel seçimler ile ilgili vergi vaatleri incelenmiştir.

2.2.1. 1 Kasım 2002 Seçimleri

Adalet ve Kalkınma Partisi 2001 yılında kurulduktan sonra ilk defa seçimlere 2002 yılında yapılan genel seçimlerde katılmıştır. Bu seçimde iktidar partisi olma başarısı göstermiş ve o tarihten bu yana iktidar partisi olma özelliğini elinde bulundurmaktadır. Adalet ve Kalkınma Partisinin 2002 genel seçimleri ile ilgili vergi temelli vaatlerine bakıldığında birkaç hususun öne çıktığı görülmektedir.

-Beyannamelerde vergi sayılarının azaltılması
-Vergi oranlarının düşürülmesi
-Kayıt dışılığın önüne geçilmesi
-Bir takım vergilerin kaldırılacağı

Genel olarak bu başlık temelinde yer verilen vaatler ile birlikte vergi barışı projesine de yer verilmiştir. Vergi barışı ile birlikte ihtilaflı dosyaların vergi ve faiz indirimleri uygulanarak tasfiye edileceğine yer verilmiştir. Vergi adaletine değinilmiş özellikle menkul sermaye iradı konusundaki adaletsizliklere çözüm bulunacağı bildirilmiştir. Damga vergisi ve harçların

kaldırılacağı ve bu konuda da çalışmaların yapılacağının üzerinde durulmuştur. Maliye teşkilatının yapısında yapılacak düzenlemeler, gelir ve kurumlar vergisinde entegrasyonun sağlanması da seçim beyannamesi kapsamında yer almaktadır (Ak Parti Seçim Beyannamesi, 2002). Seçim beyannamesi incelendiğinde vergi temelli pek çok konuya değinildiği görülmektedir. Bununla beraber vergi barışı hususuna dikkat çekildiği gözlemlenmiştir. Son yıllarda sıklıkla çıkmakta olan ve bazı tartışmaları beraberinde getiren vergi afları kamuoyunun gündemini oldukça meşgul etmektedir. Vergisini zamanında ve eksiksiz olarak ödeyen mükelleflerin bir nevi cezalandırıldığını düşündüğü ama devlet için bir gelir kaynağı doğuran bu olay neticesinde tartışmalar sürmektedir. Vergi barışına da bu doğrultuda bakmakta fayda vardır. Vergi barışı vergi ödemelerinde hassas davranan mükellefler için sorun teşkil etmektedir. Yapılan seçimin ardından verilen vaatler ile uygulamalara bakıldığında bir kısmı için olumlu adımlar atıldığı ve çalışmalar yapıldığı görülmüştür. Maliye teşkilatında gelir idaresinde bazı görev ve sorumluluk değişiklikleri ve kurumsal yapı üzerine çalışmalar buna örnek olarak gösterilebilir. Bazı hususların ise sadece vaat olarak kaldığı bugün bile çözülmeyi bekleyen sorunlar olarak karşımıza çıktığı görülmektedir. Vergi oranlarının düşülmesi başlığı neredeyse pek çok seçim bildirgesinde siyasi partilerin vaat ettiği durumlar arasında yer almaktadır. Vergi oranlarında değişiklikler olmakla beraber ekonomik konjonktüre bağlı olarak tekrar eski oranına dönen vergiler ile karşılaşılmaktadır.

2.2.2. 31 Mart 2019 Seçimleri

31 Mart 2019 tarihinde yapılan yerel seçimlere Cumhuriyet Halk Partisi, Millet İttifakının bir bileşeni olarak katılmıştır. Özellikle Adana, Ankara, Antalya, Hatay, İstanbul, İzmir ve Mersin gibi büyükşehir belediyelerini kazanma başarısı göstermiştir. (İstanbul seçimleri haziran ayında tekrarlanmıştır). Cumhuriyet Halk Partisinin seçim öncesi bildirisine bakıldığında bazı hususlara yoğunlaştığı söylenebilir.

-Denetlenebilir ve şeffaf olan belediye bütçesi

- Emlak vergisinin ve çevre vergisinin hızlı bir şekilde ödenebileceği

-Vergi borcunu öğrenmek isteyen veya ödemek isteyen mükelleflerin işlemlerini kolaylıkla yapacağı (CHP Seçim Bildirisi, 2018).

Bu gibi belli başlı başlıklar ile birlikte mali temelli seçim bildirisi kısmı şekillenmiştir. İlgili partinin seçimleri kazanmasında bu vaatlerin öneminin veya etkisinin olup olmadığı bilinmemektedir. Fakat yerel yönetim seçimi olması sebebiyle genel seçimlerdeki gibi vergi vaatlerinde bulunulmadığı görülmektedir. Belediye gelirleri kapsamında önemli bir yeri olan vergiler içerisinde sadece emlak ve çevresine değinildiği ve üzerinde durulan noktanında

mevcut verginin hızlı olarak ödeneceğidir.

3. SONUÇ

Seçimler demokrasi ile yönetilen ülkeler için büyük önem taşımaktadır. Seçimlere giren partilerin çok büyük bir kısmı iktidar olmayı hedeflemekte veya bir önceki seçime göre oylarını arttırmayı amaçlamaktadırlar. Seçimlerden önce oylarını arttırmak isteyen partiler hazırladıkları seçim bildirgelerinde pek çok konuya değinmektedirler. Halkın problemlerini tespit etmekte ve bu alanlara yoğunlaşmaktadırlar. Ekonomik vaatler arasında yer alan vergi vaatleri de seçmenler için önem taşımaktadır. Büyük vergi yükü altında ezildiğini düşünen mükelleflerin bir bölümünün bu vaatler karşısında oy verme davranışlarını belirledikleri düşünülmektedir. Sadece vergi vaatlerine bakarak bireylerin oy verdiklerini düşünmek çok doğru olmayacaktır. Fakat çalışmada incelenen örneklerde özellikle 2002 seçiminde Ak Parti'nin ciddi olarak bu konu üzerinde durduğu ve pek çok vaatte bulunduğu görülmüştür. Bu vaatlerin bir kısmı yerine getirilirken bazılarının ise halen problem olarak karşımızda durduğu görülmektedir. Yine çalışmada varılan bir diğer önemli kanı genel seçim vaatlerinin ve yerel seçim vaatlerinin birbirinden ayrı değerlendirilmesi gerektiğidir. Özellikle partili cumhurbaşkanı olmasının ardından vergi oranlarında cumhurbaşkanı kararı ile yapılan değişiklikler iktidarda olan partinin elini güçlendirmektedir. Yerel seçimlerde kazanan partinin vaat edebileceği şeylerin sınırlı olmasından kaynaklı olarak vergi temelli vaatlerinde sınırlı olduğu görülmüştür. Bu hususun seçmen davranışlarına pek fazla etki etmeme ihtimali olasıdır. Yine hem vergi konularında hem de diğer seçim vaatlerinde vaat edilenlerin yerine getirip getirilmemesinin hukuki olarak bir sonucunun olmaması da büyük bir problem olarak karşımıza çıkmaktadır.

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KONAKLAMA VERGİSİ ÜZERİNE BİR DEĞERLENDİRME

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ÖZET
Küresel çapta korona salgınının baş göstermesi ile birlikte pek çok sektörün hizmet üretiminde aksaklıklar yaşanmıştır. Bunun neticesinde alınan bir takım tedbirler ile devamında yasakları beraberinde getirmiştir. Turizm sektörü de bu süreç içerisinde pek çok olumsuzluk ile karşılaşmıştır. Ülkelerin sınırlarını kapatması yabancı turistlerin sayısını azaltmıştır. Bazı ülkelerden ise gelmesi muhtemel yabancı turist sayısı neredeyse sıfıra yakın bir düzeye inmiştir. Yine yerli turistlerin süreç içerisindeki salgın temelli tedirginlikleri, gelirlerinde meydana gelen azalmalar ve kısıtlamalar turizm sektörünü son derece kötü etkilemiştir. Konaklama vergisi 2019 yılında kanunlaşmıştır. Ardından 01.01.2023 tarihine ertelenmiş ve Konaklama Vergisi'nin uygulamasına yönelik Gelir İdaresi Başkanlığı tarafından 'Konaklama Vergisi Tebliği' yayınlanmıştır. Bu doğrultuda %2 oranında konaklama vergisi belirlenmiştir. Bu oranın maktu bir tutar olarak değil nispi bir tutar olarak belirlenmesi beraberinde bazı sorunları getirmiştir. Çalışmada dünyada konaklama vergisi uygulamaları üzerine incelemeler yapılmış olup Türkiye'de ki durum ile karşılaştırılmıştır. Çalışma neticesinde pandemi sonrasında toparlanma sürecine girmekte olan turizm sektörü için ertelemenin en az bir yıl daha uzatılmasının hem konaklama hizmetlerinden faydalananlar için hem de sektör temsilcileri için daha iyi olacağı sonucuna varılmıştır. Yine bununla birlikte bir yılın ardından bir takım makro ekonomik değişkenlerin incelenmesi ve sektörün gelirlerindeki değişmelerin neticesinde bir analiz yapıldıktan sonra tekrar değerlendirilmesinin uygun olacağı kanaati oluşmuştur.

Anahtar Kelimeler: Vergi, Konaklama Vergisi, Kovid-19

AN ASSESSMENT ON ACCOMMODATION TAX

ABSTRACT
With the outbreak of the corona epidemic on a global scale, disruptions have been experienced in the service production of many sectors. As a result of this, with some measures taken, it has brought bans. The tourism sector has also faced many negativities in this process. The closing of the borders of the countries has reduced the number of foreign tourists. The number of foreign tourists likely to come from some countries has decreased to almost zero. Again, the epidemic-based anxieties of domestic tourists in the process, the reductions and restrictions in their incomes have affected the tourism sector extremely badly. Accommodation tax was enacted in 2019. Then, it was postponed to 01.01.2023 and the 'Accommodation Tax Communiqué' was published by the Revenue Administration for the implementation of the Accommodation Tax. Accordingly, a 2% accommodation tax has been determined. The determination of this rate as a relative amount rather than a fixed amount has brought some problems with it. In the study, studies on accommodation tax practices in the world were made and compared with the situation in Turkey. As a result of the study, it was concluded that extending the postponement for at least one more year for the tourism sector, which is in the recovery process after the pandemic, would be better for both those who benefit from accommodation services and the representatives of the sector. However, after one year, it was concluded that it would be appropriate to analyze some macroeconomic variables and to re-evaluate them after an analysis was made as a result of the changes in the income of the sector.

Keywords: Tax, Accommodation Tax, COVİD-19

1.GİRİŞ

Türkiye dünyanın en çok turist çeken ülkeleri arasında yer almaktadır. Gelen turistlerin belirli bölgelerde yoğunlaştı, bazı şehirlerde ise turist sayısının çok az olduğu bilinmektedir. Turist sayısının fazla olmasının bir takım sebepleri bulunmakla birlikte, ucuz tatil yapmayı amaçlayan yabancıların sayısı da her sene artmaktadır. Konaklama vergisi ilk olarak 2004 yılında ele alınan ama uygulamaya konulamayan bir vergi türü olarak karşımıza çıkmaktadır. Zaman içerisinde uygulama biçimi ve pratiği değişikliğe uğramış ve son olarak ilgili kanunun 01.01.2023'te yürürlüğe girmesi kararlaştırılmıştır. Konaklama vergisinin belirli amaçları bulunmakta ve dünyanın pek çok yerinde özellikle de Avrupa'da bu doğrultuda vergi alınmaktadır. Yine ilgili vergi (dünyada pek çok farklı isimlendirmesi mevcuttur) pek çok ülkede kategorize edilmiş ve öylece uygulanmıştır. Türkiye'de kanunun yürürlüğe girmesi birkaç kez ertelenmiştir. Konaklama vergisi, özellikle turizm sektöründe soru işaretleri ile karşılanmış, nispi olmasından ve işletmelerin ödeyecek olmasından kaynaklı olarak turizm işletmecileri için olumsuzluklar barındırmıştır.

2. KONAKLAMA VERGİSİNİN AVRUPA ÜLKELERDEKİ UYGULAMALARI

Turizm sektörü içerisinde barındırdığı faaliyetler ile pek çok vergi ile ilişkilidir. Gelir vergisi, kurumlar vergisi, katma değer vergisi, yurtdışına çıkarken alınan harçlar bunlara örnek olarak gösterilebilir. Konaklama vergisi ise özel olarak turizme odaklanmış bir vergidir. Bu verginin amaçları arasında tatilcilerin meydana getirdikleri zararları karşılama, bazı altyapı faaliyetlerini iyileştirme, şehirlerin çevre düzenlemelerini sağlama gibi amaçlar bulunmaktadır. Müşteriler bu vergi türünde verginin mükellefi olarak bu vergiyi ödemekten sorumlu oldukları gibi, işletme sahipleri de tahsil etmekten dolayı sorumludurlar (European Commission, 2017). Konaklama vergisi için dünya genelinde kullanılan farklı isimlendirmeler bulunmaktadır. Bunlar arasında en yaygın olanları turist vergisi, ziyaretçi vergisi, kültür vergisi, oda vergisi, yatak vergisi, şehir vergisi ve konaklama vergisi biçimindedir (Akıncı, 2020). Konaklama vergisi dünyanın pek çok şehrinde uygulanmakta olan bir vergi türüdür. Roma, Paris, New York, Barcelona, Dubai gibi şehirler konaklama vergisinden kaynaklı olarak ciddi vergi geliri elde edilmesini sağlayan şehirler arasında yer almaktadır (Toman, Türkcan, 2015).

Tablo 1: Seçilmiş Avrupa Ülkelerinde Konaklama Vergisi

Ülke	**Vergi Oranı/ Tutarı**	**Açıklama**
Almanya	0.5 Euro ile 5 Euro arasında değişmekte ya da oda faturasının KDV hariç %5'i olarak alınmaktadır.	Almanya'nın Münih kentinde turist vergisi yoktur.
Avusturya	Farklı oranlar mevcut olmakla birlikte kişi başına otel maliyetinin %3.2'sine kadar ulaşabilmektedir.	15 yaşından küçük çocuklar muaf tutulmuşlardır.
Belçika	Kişi başına 2.97 Euro'luk sabit bir tutar söz konusudur.	12 yaşından küçük çocuklar muaf tutulmuşlardır. Bazı bölgeler için farklı uygulamalarda söz konusudur.
Bulgaristan	0.2 leva ile 3 leva arasında bir tutar gecelik olarak alınmaktadır.	Hem şehir vergisi hem de konaklanan yerden kaynaklı olarak tesis vergisi alınmaktadır.
Fransa	0.2 Euro ile 4 Euro arasında değişmektedir.	18 yaşından küçük çocuklar muaf tutulmuşlardır.
Hollanda	Şehirden şehre veya otelden otele farklılık göstermektedir. Amsterdam'da 3 Euro sabit ücret ile birlikte %7 oranında şehir vergisi alınmaktadır.	Yerel yönetim geliridir.
İspanya	Bölgeler ve şehirler arasında farklı tutarlar söz konudur. Barcelona'da 5 yıldızlı bir otelde 3.5 Euro alınmaktayken Katolonya'nın geri kalanında 3 Euro alınmaktadır.	Belirli süreler aşıldığında bazı aylarda vergi tutarlarının %50 düştüğü durumlar söz konusu olmaktadır.
İtalya	Şehirden şehre farklılık göstermektedir. Başkent Roma'da otellerin yıldızlarına göre 4 ile 7 Euro arasında değişiklik göstermektedir.	10 yaşından küçük çocuklar vergiden muaftır.
Portekiz	Şehirlerde farklı uygulamalar söz konusudur. Porto ve Lizbon'da 2 Euro'dur.	İlk 7 gün ödenmesi zorunludur. 13 yaşından küçük çocuklar muaf tutulmuştur.
Romanya	Konaklamanın toplam değerinin %1 oranı ile sabit tutulmuştur.	18 yaşının küçükler muaf tutulmuştur.
Yunanistan	Otellerin yıldızlarına göre değişiklik göstermektedir. 1 veya 2 yıldızlı otellerde 0.5 Euro, 3 yıldızlı otellerde 1.5 Euro, 4 yıldızlı otellerde 3 Euro, 5 yıldızlı otellerde ise 4 Euro'dur.	Turizm vergisi Yunanistan'da 2018 yılında yürürlüğe girmiştir.

Kaynak: https://www.lovemoney.com/

Avrupa ülkeleri incelendiğinde maktu vergi nispi vergi farklılıkları ile karşılaşılmaktadır. Ülkelerin çok büyük bir bölümü maktu vergi alırken tabloda yer alan ülkeler arasında sadece Romanya'da nispi vergiden söz edilebilir. Hem belirli bir tutar hem de konaklama üzerinden oransal olarak vergi alan ülkelerin olduğu da görülmektedir. Yine incelenen ülkelerde karşılaşılan bir diğer durum ise otellerin yıldız sayılarına göre vergi tutarlarının değiştiği hususudur. Bölgeler arasındaki farklılıklar, bazı şehirlerde vergiden muaf tutulma, özellikle çocuklara pek çok ülkede vergi muafiyeti sağlanması göze çarpmaktadır. Çok fazla turist alan ülkelerin turist sayısı fazla olan şehirler ile diğer şehirlere farklı vergi tarifeleri uygulamaları da diğer şehirler açısından avantaj olabilmektedir.

3. KONAKLAMA VERGİSİNİN TÜRKİYE'DEKİ SÜRECİ

Konaklama vergisi ilk olarak 2004, 2006 ve 2008 yıllarında meclise sunulan "İl Özel İdaresi ve Belediye Gelirleri Kanunu Tasarısı" ile gündeme gelmiştir. O dönemde bu verginin bir yerel yönetim geliri olması amaçlanmıştır (Bozdoğanoğlu, 2013). O dönem konaklama vergisinin oranı günlük konaklama bedelinin %3'ü olarak belirlenmiştir. Yine huzurevi, koruma evleri, öğrenci yurtları ve öğrenci pansiyonları 2006 yılındaki taslakta konaklama vergisinin dışında bırakılmıştır (İl Özel İdaresi Ve Belediye Gelirleri Kanunu Tasarısı, 2006).

Konaklama vergisi 07.12.2019 tarih ve 30971 sayılı Resmî Gazete'de yayımlanan 7194 sayılı Dijital Hizmet Vergisi ile Bazı Kanunlarda ve 375 sayılı Kanun Hükmünde Kararnamede Değişiklik Yapılması Hakkında Kanun ile yürürlüğe girmiştir. Kanun kapsamında otel, motel, tatil köyü, pansiyon, apart otel, misafirhane, kamping, dağ evi, yayla evi vb. konaklama tesislerinde verilen geceleme hizmeti ile bu hizmetle birlikte satılmak suretiyle konaklama tesisi bünyesinde sunulan diğer tüm hizmetler (yeme, içme, aktivite, eğlence hizmetleri ve havuz, spor, termal alanların kullanımı vb.) konaklama vergisine tabi olan yerler arasında sayılmaktadır. Konaklama hizmetinin sağlıklı yaşam tesisi ya da eğlence merkezi gibi alanlarda sunulması vergilendirmeye etki etmemektedir. Bununla birlikte konaklama vergisinden istisna tutulan bir takım yerler mevcuttur. Bu yerler;

-Öğrenci yurtları, pansiyonları ve kamplarındaki öğrencilere verilen geceleme hizmetleri

- Karşılıklı olması şartı ile yabancı ülkelerin Türkiye'de bulunan diplomatik temsilcilikleri, konsoloslukları

-Uluslararası anlaşmalar ile vergi muafiyeti tanınan kuruluşların verdikleri geceleme hizmetleri biçiminde yer almıştır.

Konaklama vergisinin oranı %2 olarak belirlenmiş olup cumhurbaşkanının bunu bir katına kadar arttırmaya ve yarıya indirmeye yetkisi bulunmaktadır (30971 sayılı Resmi Gazete).

İlk olarak konaklama vergisinin 31.12.2020 tarihine kadar %1 olarak uygulanmasına karar verilmiştir. Ardından kanunda yapılan değişiklik ile birlikte 01.01.2022 tarihine ertelenen konaklama vergisi bir defa daha ertelenerek 01.01.2023 tarihinde yürürlüğe girmesi kararlaştırılmıştır. Ertelemelerin sebebi ise korona virüs sebebiyle turizm sektörünün ciddi bir biçimde yara alması ile ilişkilidir

3.1. Konaklama Vergisinin Zamanlaması

Türkiye'de konaklama vergisi turizm faaliyetlerinin yapıldığı yerler bakımından üzerinde fikir birliğine varılamayan ve devletin uygulamak istediği bir kamu politikasıdır. Turizm sektöründe pek çok faaliyetin vergilendirilmesi turizm amacı ile giden kişilerin faaliyetlerini arttırmakta işletmeler arasında rekabetin had safhaya yükselmesine neden olmaktadır. Turizm faaliyetleri ülkelere yabancı para akışını sağladığı için bu konuda oldukça dikkatli olmak gerekmektedir (Serçek, Börütçene, 2022). Konaklama vergisinin örnekleri incelendiğinde amaç olarak turizmden kötü olarak etkilenen yerel yönetimleri desteklemek ve bu duruma kaynak aktarmak için planlanmış olduğu görülmektedir. Yine ekonomik olarak sorunlu bir dönem geçiren Yunanistan'ın yaşamış olduğu mali sorunlar yüzünden vergiyi amacından farklı bir biçimde kanunlaştırdığı görülmektedir (Akçaoğlu, 2020). Buna benzer uygulamalar farklı vergi türlerinde de tarihsel süreç içerisinde karşımıza çıkmaktadır. Vergi türünün amacından farklı bir şekilde kullanıldığı veya zaman içerisinde kapsamının genişletilmesinin önemli bir örneği özel tüketim vergisidir.

Korona virüs salgınıyla birlikte dünyada pek çok sektör olumsuz etkilenmiştir. Turizm sektörü de özellikle ülkelerin sınırlarını kapatmasının ardından yeni yeni toparlanma sürecine girmiştir. Turizm sektörüne ek bir maliyet oluşturacak olan konaklama vergisi işletmeler için sorun yaratmaktadır. Bununla birlikte konaklama vergisinin diğer Avrupa ülkeleri gibi kategorize edilmemesi de özellikle tatil bölgeleri dışında kalan işletmeler için problem olmaktadır.

4. SONUÇ

Konaklama vergisi dünyanın pek çok ülkesinde farklı bir takım isimler ile uygulanmakta olan bir vergi türüdür. Türkiye'de ilk olarak yerel yönetimler için planlanmış ardından uygulamaya geçilmemiştir. Konaklama vergisi Türkiye'de koronavirüs yüzünden iki defa ertelenmiş olup 01.01.2023 tarihinde uygulanmaya başlanacağı bildirilmiştir. Konaklama vergisi özelinde bir takım sorunlar mevcuttur. Verginin nispi olması yerine maktu olması özellikle işletmeler için

daha uygun olacaktır. Bununla birlikte yerli turistlere uygulanıp uygulanmayacağı hakkında kesin bir bilgi yoktur. Diğer Avrupa ülkelerinde olduğu gibi belirli bir yaş grubundan küçük çocuklar için muaflıkların belli olması gerekmektedir. Yine özellikle turizm bölgesi olmayan yerler için uygulanması verginin amacına hizmet etmemektedir.

Öneri olarak son yıllarda önemli gelir kaybına uğrayan turizm işletmeleri için verginin bir yıl daha ertelenmesi olumlu olacaktır. Bununla beraber vergi oranının ilk aşamada %2 yerine daha aşağı bir orana çekilmesi de işletmelerin yararına olacak diğer önemli bir husustur. Konaklama vergisinin amacı doğrultusunda bir yerel yönetim geliri olarak alınması verginin amaçları arasında yer alan turizm faaliyetleri kaynaklı olarak oluşan sorunlara bir nebze de olsa katkı sağlayacaktır.

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VERGİ TAHSİLATINDA SINIR İLLERİNİN DURUMU: KİLİS, ŞIRNAK, VAN VE ARTVİN ÖRNEKLERİ

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ÖZET
Ülkelerin en önemli gelir kaynakları vergilerdir. Vergi gelirlerinin arttırılabilmesi için planlamalar yapılmakta ve bu doğrultuda adımlar atılmaktadır. İller arasında pek çok alanda olduğu gibi vergi ödemeleri konusunda da farklılıklar olmaktadır. Bazen aynı bölgenin komşu iki ili arasında bir dönem benzer vergi tahsilatları görülmekteyken kimi zaman çok farklı vergi tahsilat oranlarına ulaşıldığı sonucu ile karşılaşılmaktadır. Kovid-19 pandemisinin ilk yılında ortaya çıkan vergi gelirlerindeki azalma, sonraki yıllarda artış eğilimine girmesine rağmen bazı illerde tahakkuk eden vergilerin tahsilinde yaşanan sıkıntılar devam etmektedir. Bazı illerde vergi tahsilatı yüksekken diğer şehirlerde neden düşük olduğu ve düşüş eğiliminin sürmesi, üzerinde durulması gereken bir konudur. Suriye'ye sınır olan Kilis, Irak'a sınır olan Şırnak, İran'a sınır olan Van ve Gürcistan'a sınır olan Artvin illerinin vergi tahsilatları çalışmada incelenmiştir. Bu iller arasında karşılaştırmalar yapılmış ve illerin vergi tahsilatlarındaki yıllara göre farklılıklar incelenmiştir. Vergi tahsilatını azaltan sebepler incelendiğinde ise kayıt dışı mallara olan yönelim, vergi oranlarının yüksek oluşu, göçmen sayısındaki artış ve işsizliğin en önemli sorunlar olduğu görülmektedir. Bu sebeplerden hiç biri tek başına vergi tahsilatlarını etkilememekte, ekonomik konjonktür içerisinde birden çok sebep vergi tahsilatlarını belirlemektedir. Yine bununla beraber denetimlerdeki eksikliklerinde olası vergi tahsilatını olumsuz yönde etkilediği görülmektedir.

Anahtar Kelimeler: Vergi, Vergi Tahsili, Sınır İller

THE STATUS OF THE BORDER CITIES IN TAX COLLECTION: EXAMPLES OF KİLİS, ŞIRNAK, VAN AND ARTVİN

ABSTRACT

The most important income sources of countries are taxes. Plans are made to increase tax revenues and steps are taken in this direction. As in many areas, there are also differences in tax payments between provinces. Sometimes, similar tax collections are seen between two neighboring provinces of the same region for a while, but sometimes it is encountered with the result that very different tax collection rates are reached. Although the decrease in tax revenues in the first year of the Covid-19 pandemic has tended to increase in the following years, the problems experienced in the collection of taxes accrued in some provinces continue. Why tax collection is high in some provinces while it is low in other cities and that the downward trend continues is an issue that needs to be emphasized. The tax collections of the provinces of Kilis, bordering Syria, Şırnak bordering Iraq, Van bordering Iran and Artvin bordering Georgia, were examined in the study. Comparisons were made between these provinces and the differences in tax collections of provinces by years were examined. When the reasons that reduce tax collection are examined, it is seen that the tendency to unregistered goods, high tax rates, increase in the number of immigrants and unemployment are the most important problems. None of these reasons alone affect tax collections, but multiple reasons determine tax collections in the economic conjuncture. However, it is seen that the deficiencies in the audits affect the possible tax collection negatively.

Keywords: Tax, tax collection, border cities

1. GİRİŞ

Devletlerin en önemli gelir kaynakları vergilerdir. Tahakkuk eden verginin tahsili de oldukça önem arz etmektedir. Tüm dünyada olduğu gibi Türkiye'de de iller arasında bir takım farklılıklar görülmektedir. Tahakkuk eden verginin tahsili için idareler tarafından alınan önlemler farklılık gösterdiği zaman iller arasında çok farklı bir tablo ile karşılaşmak kaçınılmazdır. Çalışmada Türkiye'ye komşu dört farklı ülke ile sınırı olan şehirler seçilmiştir. Kayıt dışı ekonominin yarattığı tahribatın bir süre sonra mükelleflerin vergi ödeme durumlarına yansıyıp yansımadığı incelenmek istenmiştir. İncelenen şehirlerden hepsinin birbirinden farklı özellikleri bulunmakla birlikte Van şehri pek çok İranlı turiste ev sahipliği yapmakta ve gelen turistler ticareti canlandırmaktadır. Bir diğer şehir Kilis'te ise bu durumun tersi bir süreç yaşanmaktadır. Zorunlu olarak Kilis'e sığınan göçmenlerin ticaret ile ilişkisi farklı biçimde izah edilebilir. Yine son dönemde ekonomik konjonktür dahilinde Türk Lirasının yabancı para birimleri karşısında değer kaybetmesi Artvin'de Gürcistanlı turistlerin sayısının artmasına sebep olmuştur. Ekonomik ilişkilerin fazla olması bazı mükelleflerin vergi ödevini eksiksiz bir biçimde yerine getirmesine engel olurken kimi mükelleflerde ekonomik zorluktan kaynaklı olarak vergi borçlarını ödeyememektedir.

2. SEÇİLEN İLLER VE VERGİ TAHSİLATLARI

Çalışmada dört farklı şehir seçilmiştir. Suriye ile sınır olan Kilis, Irak ve Suriye ile sınır olan Şırnak, İran ile sınır olan Van ve Gürcistan ile sınır olan Artvin illeri farklı vergi tahakkuk ve tahsilatına sahip olan iller olarak karşımıza çıkmaktadır.

2.1 Kilis

Kilis ili Güneydoğu Anadolu Bölgesi'nde yer alan ve Suriye'ye sınır olan bir şehirdir. Yüzölçümü 1521 kilometre kare olan şehrin nüfusu yaklaşık olarak 125.000 civarındadır (https://kilis.ktb.gov.tr/). Kilis 1995 yılında il statüsüne kavuşmuştur. Kilis ilinin merkez ilçe dışında Elbeyli, Musabeyli ve Polateli olmak üzere üç ilçesi bulunmaktadır. Üzüm, zeytin, fıstık ve buğday gibi tarımsal ürünler şehrin tarımsal anlamda üretimin en fazla yapıldığı faaliyet alanlarıdır.

İŞKUR (2021) raporuna göre işsizlik Kilis için önemli bir sorundur. İşsizlik ile beraber bazı alanlarda kalifiye eleman sorunu da yaşanmaktadır. Çalışmada toplam çalışanların %81.5'lik kısmının erkek çalışanlardan geri kalan %18.5'lik kısmın ise kadın çalışanlardan oluştuğu

görülmüştür. Kadınların en fazla iş bulabildikleri sektör imalat sektörüdür. Sektörel olarak

oransal olarak en fazla kadının çalıştığı sektör de eğitim sektörü olmuştur.

Kilis ili TRC1 (Gaziantep, Adıyaman, Kilis) illeri arasında en dezavantajlı il olarak göze çarpmaktadır. Bu durum vergi ödemelerine de yansımıştır.

Tablo 1: Kilis ili Vergi Tahakkuku ve Vergi Tahsili (Bin TL)

Yıl	Tahakkuk	Tahsilat	Oran
2004	16,925	12,724	%78,1
2005	16,692	15,084	%76,6
2006	27,718	21,812	%78,6
2007	31,088	24,161	%77,7
2008	31,387	22,249	%70,9
2009	35,190	23,985	%68,2
2010	45,631	32,587	%71,4
2011	63,113	49,417	%78,3
2012	62,475	45,433	%72,7
2013	75,269	55,813	%74,2
2014	88,482	65,532	%74,1
2015	87,516	57,338	%65,5
2016	107,302	40,289	%37,5
2017	228,138	77,113	%33,8
2018	847,116	182,222	%21,5
2019	1454,018	168,480	%11,6
2020	1629,117	266,220	%16,3
2021	1580,480	297,190	%18,8

Kaynak: https://muhasebat.hmb.gov.tr/

Kilis ilinin vergi tahsilat ve vergi tahakkuklarını gösteren tabloya bakıldığında 2015 yılına kadar vergi tahsilatlarının belirli bir seviyede olduğu görülmüştür. 2016 yılından itibaren vergi tahsilatında çok ciddi bir düşüş görülmektedir. Bu durum orana da yansımaktadır. Tabloda dikkat çeken bir diğer durum 2018 yılında vergi tahakkukunda yaşanan yaklaşık üç katlık bir artış olmuştur. 2017 yılında vergi tahakkuku 228,138 iken 2018 yılında 847,116 olmuştur. Söz konusunu yıllarda vergi tahsilatı bir öneki yıla göre büyük miktarda artmış görünse bile oransal olarak çok ciddi bir sorun gözlemlenmektedir. Bu durum diğer bazı yıllarda da karşımıza çıkmakla birlikte vergi affının bu durumu etkilediği söylenebilir.

Kilis ili, Suriye iç savaşından sonra çok fazla göçmene ev sahipliği yapan bir şehirdir. Vergisini zamanında ödemeyen mükelleflerin hangi sebeplerle ödemediği bir başka araştırmanın konusudur. Tablo 1'de ki veriler göz önünde bulundurulduğunda Kilis ili için çok ciddi bir vergi tahsilat sorunu olduğu söylenebilir.

2.2 Şırnak

Şırnak ili Suriye ve Irak sınırında yer alan bir şehirdir. Daha önce Siirt'in ilçesi olan Şırnak, 1990 yılında il olmuştur. Yüzölçümü 6904 kilometre karedir. Şırnak ilinin nüfusu yaklaşık

olarak 525.000 civarındadır. Beytüşşebap, Cizre, Güçlükonak, İdil, Silopi ve Uludere olmak üzere altı tane ilçesi mevcuttur (https://sirnak.ktb.gov.tr/).

İşkur (2020b)'ye göre Şırnak'ta iş açığı oranı Türkiye ortalamasının altındadır. Açık iş oranının en yüksek olduğu sektör hizmetler sektörüdür. Şehirde en çok inşaat elemanı bulmakta zorluk çekildiği belirtilmiştir. Yine bununla beraber kamyon şoförlüğü mesleğinde de açıklık bulunmaktadır.

Şırnak ilinin Silopi ilçesinde Habur sınır kapısı bulunmaktadır. Bu kapı ile birlikte ticaret artmakta özellikle Türkiye'den pek çok insanın alışveriş yapmak için Irak'a gittiği gözlemlenmektedir. İşsizliğin yüksek olduğu Şırnak ilinde tahakkuk eden vergi tutarının da düşük olduğu görülmektedir.

Tablo 2: Şırnak ili Vergi Tahakkuku ve Vergi Tahsili (Bin TL)

Yıl	**Tahakkuk**	**Tahsilat**	**Oran**
2004	52,649	38,570	%73,2
2005	62,766	40,278	%64,1
2006	86,281	53,943	%62,5
2007	84,324	47,889	%56,8
2008	108,577	61,487	%56,6
2009	124,324	72,644	%58,4
2010	158,498	88,736	%56,0
2011	184,020	102,290	%55,6
2012	232,453	137,782	%59,3
2013	268,643	177,520	%66,1
2014	266,101	162,346	%61,0
2015	258,211	130,176	%50,4
2016	360,770	143,117	%39,7
2017	471,527	183,123	%38,8
2018	681,360	328,436	%48,2
2019	738,832	375,642	%50,8
2020	741,113	253,490	%34,2
2021	1007,920	311,322	%30,9

Kaynak: https://muhasebat.hmb.gov.tr/

Şırnak'ın 2004-2021 yılları arasındaki vergi tahakkuk ve vergi tahsilatı incelendiğinde düşük oranlarda vergi tahsilatının yapıldığı görülmektedir. 2021 yılında en yüksek tahakkuk ve en yüksek tahsil tutarına ulaşıldığı görülmesine rağmen oransal olarak en düşük seviye bu yılda izlenmiştir. Mardin, Batman ve Siirt ile beraber TRC3 bölgesinde yer alan Şırnak'ta bir takım sebeplerden dolayı vergi borçlarını ödemekte sorunların yaşandığı Tablo 2'den anlaşılmaktadır.

2.3 Van

Van ili geçmişten beri büyük medeniyetlere ev sahipliği yapmış bir şehirdir. 19.069 kilometre karelik bir alana sahiptir. Yüzölçümü itibariyle Türkiye'nin en büyük altıncı ili durumundadır. Edremit, İpekyolu ve Tuşba merkez ilçeleri olmak üzere, toplam on üç ilçesi bulunmaktadır. Van'ın nüfusu yaklaşık olarak 1.150.000 civarındadır (https://van.ktb.gov.tr/). Van şehrinin ekonomik olarak en önemli geçim kaynakları tarım, hayvancılık ve hayvancılığa dayalı sanayidir. İşsizlik oranı şehirde yüksek olmakla beraber genç işsizlikte önemli bir sorundur. Van şehrinin İran sınırında olmasından kaynaklı olarak İran'dan şehre büyük bir talep vardır. Bu durum yılın bazı dönemlerinde Van'da otellerin kapasitesinin büyük ölçüde dolmasına sebep vermektedir.

Vergi ödemelerinin ekonomik, sosyal, kültürel pek çok sebebi olabilir. Sınıra yakınlık, kayıtdışı ekonomi, denetimlerin yetersiz oluşu, ekonomik olarak mükelleflerin önceliklerinin değişmesi bu sebeplerden bazılarıdır. Tablo 3'te Van ilinin vergi tahakkuk ve tahsilatları görülmektedir.

Tablo 3: Van ili Vergi Tahakkuku ve Vergi Tahsili (Bin TL)

Yıl	Tahakkuk	Tahsilat	Oran
2004	110,025	96,504	%87,7
2005	142,115	121,375	%85,4
2006	197,518	160,783	%81,4
2007	243,075	202,795	%83,4
2008	278,184	221,355	%79,6
2009	337,668	255,896	%75,8
2010	416,655	311,175	%74,7
2011	504,653	360,101	%71,4
2012	601,577	349,759	%58,1
2013	819,207	406,376	%49,6
2014	956,979	411,329	%43,0
2015	1219,647	411,398	%33,7
2016	1752,184	453,734	%25,9
2017	2536,595	855,675	%33,7
2018	2777,987	1146,955	%41,3
2019	2798,259	1164,715	%41,6
2020	3124,624	1425,965	%45,6
2021	3925,605	2053,264	%52,3

Kaynak:https://muhasebat.hmb.gov.tr/

Van'da özellikle 2012 yılından itibaren vergi tahsilatında çok ciddi problem olduğu görülmektedir. 2015-2016 yıllarında oransal olarak en kötü durumda olan kent sonraki yıllarda toparlanma aşamasına girmiş olsa da neredeyse tahakkuk eden vergi borcunun yarısının ödenmediği görülmektedir.

2.4 Artvin

Artvin ilinin 8 adet ilçesi bulunmaktadır. Karadeniz bölgesinde yer alan şehrin yüzölçümü 7367

kilometre karedir. Şehrin nüfusu yaklaşık 170.000'dir. (http://www.artvin.gov.tr/). Artvin ilinin Kemalpaşa ilçesinin Sarp köyünden adını alan Sarp Sınır Kapısı Gürcistan ile karşılıklı hem turist hem de araç giriş çıkışının yapıldığı yerdir. 2011 yılından beri giriş çıkışlarda pasaporta gerek bulunmamaktadır.

Artvin'in ekonomik potansiyeline bakıldığında tarım ve tarıma dayalı sanayinin fazla olduğu ifade edilebilir.

Tablo 4: Artvin ili Vergi Tahakkuku ve Vergi Tahsili (Bin TL)

Yıl	Tahakkuk	Tahsilat	Oran
2004	57,696	49,939	%86,7
2005	75,399	61,457	%81,5
2006	100,418	81,686	%81,3
2007	109,061	87,492	%80,2
2008	126,437	99,642	%78,8
2009	142,944	110,699	%77,4
2010	173,839	134,555	%77,4
2011	218,235	172,723	%79,1
2012	231,057	179,057	%77,6
2013	251,799	195,227	%77,5
2014	261,590	195,291	%74,7
2015	314,117	232,703	%74,1
2016	365,380	258,529	%70,8
2017	414,676	293,228	%70,7
2018	486,671	340,792	%70,0
2019	557,974	388,200	%69,6
2020	593,035	378,942	%63,9
2021	932,240	681,045	%73,1

Kaynak: https://muhasebat.hmb.gov.tr/

Artvin'de 2020 ve 2021 yılllarında pandemi etkisiyle vergi tahsilat/tahakkuk oranında %70'in altına düşmenin olduğu görülmüştür. Yine bu süreçte vergi temelli alınan tedbirler ve ertelemeler pek çok verginin ödenmesini geciktirmiştir. Diğer şehirler ile mukayese edildiğinde Artvin'in vergi tahsilatında iyi durumda olduğunu söylemek doğru olacaktır. Artvin örneği sınır şehirlerinde vergi tahsilatının sorunlu olduğu düşüncesini yıkmaktadır.

3. SONUÇ

Gönüllü olarak vergi ödememenin pek çok sebebi bulunmaktadır. Tahakkuk eden vergi borcunun ödenmemesi neticesinde bazı idari tedbirler alınmaktadır. Çalışmada dört farklı ülke ile sınırı olan dört ayrı şehir incelenmiştir. Bu şehirler arasında birkaç istisna yıl dışında oranını yaklaşık olarak koruyan şehir Gürcistan sınırındaki Artvin şehridir. Suriyeli mültecilerin yoğun

olarak yaşadığı Kilis'te vergi tahsilatının çok sorunlu olduğu görülmektedir. Van ve Şırnak'ta da benzer durum gözlenmekte olup görece Kilis'e göre daha yüksek oranlar ile karşılaşılmıştır. İşsizliğin yüksek olduğu, çok fazla göç alan ve ekonomik olarak zorlukların bulunduğu kentlerde vergi temelli ayrı önlemlerin alınması elzemdir. Yine kayıt dışı mallara erişebilirliğin kolay olduğu şehirlerde kişilerin vergi ödemeye karşı direnç gösterdikleri bilinmektedir. İncelenen şehirlerde bir dönem tahsilatta çok büyük sorunlar görülmezken son yıllarda ciddi biçimde azalmanın sebeplerinin şehir odaklı araştırılması ve bu doğrultuda kararlar alınması gerekmektedir. Yine diğer sınır şehirlerinden Artvin örneğinde olduğu gibi yüksek oranlar elde eden kentlerde mükelleflerin vergiye bakışları tespit edilerek elde edilen bulguların diğer mükelleflere aktarılması önem arz etmektedir.

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ARKEOLOJİK KAZILARDA DİSİPLİNLER ARASI ÇALIŞMANIN ÖNEMİ

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ÖZET
Bu çalışma ile Kültür ve Turizm Bakanlığının izniyle 2021 yılından bu yana yazarın başkanlığında devam eden Tavşanlı Höyük Kazılarında, çeşitli bilim dallarından kazıya destek olan bilim insanlarının verdiği katkının önemi anlatılmaktadır. Arkeolojik bir kazı, arkeologların gerçekleştirdiği bir çalışmadır. Ancak bunun ötesinde kendi alanında uzmanlaşmış, zooarkeologlar, arkeobotanikçiler, seramikçiler, mimarlar, yontma ve sürtme taş uzmanları ile jeologlar da kazılara belirli sürelerde katılırlar. Burada kazılarda arkeologların gün yüzüne çıkardığı bulguların söz konusu uzmanlar tarafından bilgiye dönüşüm süreci ele alınmaktadır. Tavşanlı Höyük kazıları yeni başlayan bir kazı olmasına karşın, ulusal ve uluslararası 20'ye yakın Üniversite ve Enstitü'den katılım sağlanan bir kazıdır. Bu bildiriyle dünyanın çeşitli yerlerinden gelen söz konusu uzmanların kendi alanlarında verdiği katkı neticesinde, arkeolojik kazılar ile elde edilen sonuçların nasıl geliştirildiği anlatılmaktadır. Bununla birlikte Türkiye'de gerçekleştirilen yaklaşık 600 arkeolojik faaliyet için, modern bilimsel yöntemlerin kullanımı, bunların belgelenmesi ve bilimsel sonuçlara yansıması konusunda bazı yeni öneriler sunulmaya çalışılmaktadır.

Anahtar Kelimeler: Kazı, Tavşanlı Höyük, Disiplinler arası çalışma

THE IMPORTANCE OF INTERDISCIPLINARY STUDIES IN ARCHAEOLOGICAL EXCAVATIONS

ABSTRACT
This paper explains the importance of the contribution of scientists from various disciplines in the Tavşanlı Höyük Excavation, which has been under the chairmanship of the author since 2021 with the permission of the Ministry of Culture and Tourism. An archaeological excavations done by archaeologists. However, beyond that, zooarchaeologists, archaeobotanists, ceramists, architects, chipped and ground stone specialists and geologists, who are experts in their fields, also participate in excavations at certain times. It describes the transformation of the findings unearthed by archaeologists during excavations into knowledge by other experts. Although the Tavsanli Höyük excavations are just beginning, it is an excavation with participation from nearly 20 national and international universities and institutes. In this paper, it is explained how the results were obtained with the help of experts. In addition to this, some new suggestions are made to be presented about the use of modern scientific methods, their documentation, and reflection on scientific results for approximately 600 archaeological activities carried out in Turkey.

Keywords: Excavation, Tavşanlı Höyük, Interdisciplinary Studies

1- GİRİŞ

Günümüzden 2500 sene önce hüküm süren Babil Kralı Nabanidus'un bir tapınağın temelini kazdırıp, kendi döneminden 2200 yıl öncesine (günümüzden 4700 sene öncesi) tarihlenen buluntuları bulup sergilemesi, eskiye merakla başlayan arkeoloji için bilinen ilk örneklerden biridir (Fidan 2022). Rönesans ile birlikte bir kavram haline gelen arkeoloji ve tarih anlayışının ardından eski eser toplama merakının artmasıyla da koleksiyonerlik gelişir. Bununla birlikte eser bulmaya yönelik olarak dünyanın pek çok alanında arkeolojik kazılar başlar. Cumhuriyet Dönemi'ne geldiğimizde Mustafa Kemal Atatürk'ün direktifiyle Ahlatlıbel ve Alacahöyük gibi ilk ulusal Türk kazıları yapılır. Bu süreçte Türk Tarih Kurumu kurularak Anadolu'daki Türk varlığının geçmişinin araştırılması amaçlanır. Ulus devlet inşa sürecinde "Türk Tarih Tezi" ortaya atılarak, bu amaç doğrultusunda arkeolojik çalışmalar gerçekleştirilir. 1960'larla birlikte ülkemizde yapılan ilk organize arkeolojik kazı projesi olan Keban Barajı kurtarma kazılarıyla, başka bilim dallarından da yararlanarak, büyük bir atılım yapar (Özdoğan 2011). Günümüzde Türkiye'de yerli ve yabancı bilim insanlarının başkanlık ettiği yaklaşık 600 arkeolojik faaliyetin önemli bir kısmını kazılar oluşturmaktadır. Artık arkeoloji, antropolojik verileri ve fen bilimlerinin tekniklerini kullanan, disiplinler arası bir bilim durumuna gelir; bilim dalında, jeoarkeoloji, zooarkeoloji, arkeometalürji ve arkeobotanik gibi yan dallar oluşmaya başlar. Bu makale ile Türk arkeolojisinin gelişimi içerisinde günümüzde geldiği noktada, çeşitli bilim dalları ile ortak bir anlayışla çalışan, bu çalışmayı kazı öncesindeki yüzey araştırmaları ile başlatan (Fidan v.d. 2021; Karatak v.d. 2021) Kütahya Tavşanlı Höyük kazıları örnek gösterilerek, arkeolojik kazılarda disiplinler arası çalışmanın önemi vurgulanmaktadır.

2- TAVŞANLI HÖYÜK

Tavşanlı Höyük, Kütahya iline bağlı olan Tavşanlı ilçesinin yaklaşık 1 km kadar güneyinde ve Tavşanlı Ovası'nın ortasında yer alır. Yerleşmenin hemen kenarından geçen Orhaneli Çayı ovanın en büyük akarsuyudur. Höyük, yaklaşık olarak 300 m çapında olmasına rağmen, Tunç Çağı'na ait malzemenin dağılımına göre yerleşme en azından 650 m çapındadır. Höyükte en azından 21 m'lik bir dolgu olduğu da tespit edilmiştir (Res. 1). 2021 yılında bu satırların yazarı başkanlığında Cumhurbaşkanı kararlı kazı olarak başlayan, Tavşanlı Höyük Kazıları, 2022 yılı ile birlikte Türk Tarih Kurumu tarafından desteklenen proje kazısı statüsüne yükseltilmiştir. Henüz çok yeni bir kaz olmasına rağmen, kazıda arkeologlar dışında yaklaşık 20 farklı üniversiteden uzmanlar yer almaktadır. Söz konusu uzmanlar kazının devam ettiği ilkbahar-sonbahar arasındaki dönemde, Tavşanlı ilçe merkezinde oluşturulan Tavşanlı Höyük Kazı ve

Araştırma Evi'ne belirli sürelerde gelerek, uzmanlık alanlarıyla ilgili malzeme gruplarını çeşitli yöntemlerle incelemektedirler. Bu inceleme sonrasında oluşturulan raporlar, bilimsel çalışmaların başlangıcını oluşturur. Daha sonra söz konusu uzmanların bir araya gelip, sonuçlarını tartışmaları ve birbirlerine veri paylaşımı yapmaları neticesinde, disiplinler arası bilimsel yayınlar oluşturulur.



Resim 1: Tavşanlı Höyük hava fotoğrafı

3- TAVŞANLI HÖYÜK'TE DİSİPLİNLER ARASI ÇALIŞMA

Arkeolojik bir kazıya, ilgili mevzuat gereği alanında belli deneyimi olan bir arkeolog başkanlık eder. Kazı ekibi de çoğunlukla arkeologlardan oluşur. Ayrıca kendi alanında uzmanlaşmış, çoğunluğu yine arkeoloji kökenli zooarkeologlar, arkeobotanikçiler, seramikçiler, yontma ve sürtme taş uzmanları yanında başka bilim dallarından gelen jeologlar, sanat tarihçileri ve mimarlar kazılara belirli sürelerde katılırlar. Burada Tavşanlı Höyük kazılarından örnekler verilerek kazılarda arkeologların gün yüzüne çıkardığı bulguların söz konusu uzmanlar tarafından bilgiye dönüşüm süreci anlatılmakta ve bunun önemine değinilmektedir.

Arkeolojik bir kazı çalışmasının, kazı işlemi sonrasındaki en önemli ayağını belgeleme oluşturur. Tavşanlı Höyük Kazı ve Araştırma Evi'nde gerçekleştirilen belgeleme çalışmaları eserlerin çizimi, fotoğraflanması, dijital ortama geçirilmesi, mimari çizimlerin çeşitli programlar aracılığıyla çizimlerinin yapılması, alandan ele geçen çanak çömlek parçalarının yazımı ve sayımı gibi birçok işi kapsamaktadır. Hepsinin detaylı bir şekilde ve her gün düzenli olarak yapıldığı ve belgelendiği bu çalışmalar kazı evinde sezon boyunca devam etmektedir.

Bu çalışmaların alanında uzmanlar tarafından önemlidir. Özellikle fotoğraf çekimleri, fotoğrafçılık eğitimi ya da mimari çizim konuları mimarlık eğitimi almış öğrenci/mezunlar tarafından gerçekleştirilir.

Türkiye'de bir höyük kazısındaki en önemli materyali ise çanak çömlek oluşturur. Hem en çok bulunan obje olmaları hem de tipolojik analiz sayesinde tarihleme yapılabilen çanak çömlek parçaları, bu türden arkeolojik kazıların önemli çalışma alanlarından birini oluşturur. Tavşanlı Höyük'te çanak çömlek uzmanları Doç. Dr. G. Ekmen ve Doç. Dr. H. Ekmen tarafından yapılan çalışmalar neticesinde, çanak çömlek buluntuları, hamur gruplarına göre ayrılmıştır. Ayrıca genel özellikler itibariyle kulplar, tutamaklar ve dipler şekil özelliklerine göre ayrılmış, bezeme unsurları da kayıt altına alınmıştır. Ayrıca profil veren parçaların çizimleri yapılmıştır.



Resim 2: Tavşanlı Höyük pXRF çalışmaları

Çanak çömlek buluntuları dışında özellikle Tunç Çağlarına ilişkin buluntu veren höyüklerde en çok karşılaşılan buluntu grubu metal eserlerdir. Bu konunun uzmanı olan Doç. Dr. H. L. Keskin, metal eserlerin tipolojik tasnifi yanında, diğer bilim dallarının yardımıyla metalurjik analizler

yaparak, eserin kimsayal bileşenlerini de ortaya çıkarmıştır. Bu konuda en çok kullanılan yöntem, tahribatsız bir yöntem olması açısından portable X-Ray Fluorescence (pXRF) olarak tanımlanan ve Türkçe'ye taşınabilir X Işını Floresans olarak çevirebileceğimiz yöntemdir. Bu yöntemde yüzeydeki birkaç mikron derinlikteki kimyasal bileşimler analiz edilebilmektedir. Tavşanlı Höyük'teki analizler de bu yöntem ile gerçekleştirilmiştir (Res. 2).



Resim 3: Belgeleme çalışmaları

Tavşanlı Höyük'te gerçekleştirilen kazı çalışmaları sırasında ele geçen çakmaktaşı, radyolarit, kuvars, opal ve obsidiyenden yapılmış olan yontmataş buluntu grubu, yontma taş uzmanı Doç. Dr. N. Kolankaya-Bostancı tarafından çalışılmıştır. Söz konusu buluntuların hammadde yapıları ile teknolojik ve tipolojik özellikleri belirlenerek, elde edilen veriler bilgisayara girilmiş ve çizimleri yapılmıştır. Bir başka uzman, Doç. Dr. D. Silibolatlaz-Baykara ise hayvan kemiklerini incelemiştir. Bu kemikler boyutlarına göre orta ve büyük boy olarak gruplandırılmışlardır. Tavşanlı Höyük, faunal dağılımında yer alan hayvanların oransal çalışmaları yapılmıştır. Hayvan kemikleri yanında bitki kalıntıları da kazılarda incelenmektedir. Tavşanlı Höyük arkeobotanik örnekleri üzerinde yüzdürme adı verilen işlemin uygulanması yapılmış; elde edilen örnekler uzmanlar tarafından önümüzdeki yıllarda incelenmek üzerine kazı evi deposunda muhafaza edilmeye başlanmıştır (Res. 4).



Resim 4: Botanik örnekler için yüzdürme çalışmaları

Tavşanlı Höyük Kazısı'nda ayrıca dokumacılık- tekstil malzemeleri üzerine yapılan (ağırşak, tezgah ağırlığı, iğ) çalışmalar, öncelikle belgeleme çalışmaları üzerine yoğunlaşmıştır. Malzemelerin çizim ve fotoğraflanmaları ile başlayan kaynak taraması ile devam edilmektedir. Ayrıca bu konu, Bilecik Şeyh Edebali Üniversitesi Arkeoloji Anabilim Dalı Yüksek Lisans Programında, bu makalenin yazarının danışmanlığında Ö. Yalın tarafından yüksek lisans tezi olarak hazırlanmaktadır (Res. 3). Ayrıca kazı evinde yapılan disiplinler arası çalışmalar yanında, arkeolojik kazının devam ettiği arazi çalışmaları sırasında, özellikle mimari unsurların belgelenmesi konusunda mimarlık bölümü öğrencileri aktif rol almıştır.

4. SONUÇ

Arkeolojik bir kazı ile maddi kültür kalıntılarına ulaşılabilir ancak bunlar yorumlanmadan bir anlam taşımazlar (Ünlüsoy v.d. 2018; Renfrew ve Bahn 2017). Bu sebeple ulaşılan bulguların uzmanlar tarafından değerlendirilmesi çok önemlidir. Türk arkeolojisinin geldiği nokta düşünüldüğünde, artık uzmanların sadece tipolojik değerlendirme yaparak, başka arkeolojik alanlarla benzerlik kurması yeterli değildir. Gelişen modern teknikler ve fen bilimlerinin kullanılmasıyla, analize dayalı bir yönelim olmalıdır. Yeni başlayan bir kazı olmasına rağmen Tavşanlı Höyük kazıları için Tavşanlı ilçesinde oluşturulan, kazı ve araştırma evi, söz konusu araştırmaların başlangıcını başka bir anlatımla ön çalışma alt yapısı için yapılmıştır. Çalışmaların daha ilerleyebilmesi için zamanla söz konusu alanın daha donanımlı hale getirilmesi gerekmektedir. Ancak bu aşamada, kazılarda bulunan arkeolojik materyal, uzmanları tarafından tanımlanmaktadır. Böylelikle kazı alanında sadece hayvan kemiği olarak

tanımlanan kemikler, uzmanı tarafından hayvan cinslerine ayrılabilmiştir. Aynı şekilde taş ve çanak çömlek buluntuları işlevlerine göre ayrılmıştır. Botanik örneklerin ise yüzdürme olarak tanımlanan ayrıştırma işlemi gerçekleştirilmiş, örnekler bir sonraki sezon uzmanı tarafından tür tayini için muhafaza edilmeye başlanmıştır. Sonuçta, bu yöntemler sayesinde bulgular bilgiye dönüşmektedir. Söz konusu çalışmalar henüz başlangıç aşamasındadır ve kazıda bulunan pek çok birbirinden farklı arkeolojik bulgunun tamamı uzmanları tarafından çalışıldıktan sonra anlam kazanacaktır.

KATKI BELİRTME

Tavşanlı Höyük kazılarında kendi uzmanlık alanları ile ilgili araştırmalar yapan, seramik uzmanları Doç. Dr. Gülden Ekmen ve Doç. Dr. Hamza Ekmen'e, hayvan kemikleri üzerinde çalışmalar gerçekleştiren Doç. Dr. Derya Silibolatlaz Baykara'ya; kazının yontma taşlarını çalışan Doç. Dr. Neyir Kolankaya Bostancı'ya teşekkür ederiz.

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ARKEOLOJİK YÜZEY ARAŞTIRMALARINA MULTİDİSİPLİNER BİR YAKLAŞIM

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ÖZET
Bu bildiri ile Kültür ve Turizm Bakanlığı'nın izniyle 2017 yılından bu yana yazarın başkanlığında devam eden Eskişehir ve Kütahya İlleri Tarih Öncesi Dönem Arkeolojik Yüzey araştırmaları konu edilmiştir. Araştırmalarda, arkeologların dışında diğer bilim dallarından katılan uzmanlar ile birlikte yapılan multidisipliner bilimsel çalışmalar bildirinin odak noktasını oluşturmaktadır. Bu çalışmada coğrafyacıların katılımıyla, coğrafi bilgi sistemleri ve uzaktan algılama yöntemleri; jeologların katılımıyla jeoradar çalışmaları; jeoarkeologların katılımıyla jearkeolojik çalışmalar ve sediman alma ile TÜBİTAK Marmara Araştırma Merkezi teknisyenlerin katkılarıyla yaş tayini analizleri gerçekleştirilmiştir. Yapılan çalışmalar sonucunda elde edilen veriler birbirleriyle çakıştırılmış ve yeni bilgilere ulaşılmıştır. Böylelikle arkeolojik yüzey araştırmalarında, sadece arkeologların veri toplama yöntemleri yanında, diğer bilim dallarından elde edilen sonuçlar birbirleri ile karşılaştırılarak mutlak sonuçlara ulaşılmıştır. Bunlardan en önemlileri arkeolojik kazı gerçekleştirmeden, yüzey araştırması verileri ile toprağın altındaki arkeolojik bulguların tanımlanması ve tarihlendirilmesi olmuştur. Bu şekilde ileride yapılacak araştırmalara bir altlık oluşturduğunu düşündüğümüz arkeolojik yüzey araştırması yöntemlerinin bu bildiri ile bilim dünyasına tanıtılması hedeflenmektedir.

Anahtar Kelimeler: Eskişehir, Kütahya, Yüzey araştırması

A MULTIDISCIPLINARY APPROACH TO ARCHAEOLOGICAL SURVEYS

ABSTRACT
This paper's subject is Prehistoric Period Archaeological Surveys in Eskişehir and Kütahya Provinces, which have been under the chairmanship of the author since 2017, with the permission of the Ministry of Culture and Tourism. In the research, multidisciplinary scientific studies conducted with experts from other disciplines apart from archaeologists. In this study, with the participation of geographers, geographic information systems and remote sensing methods; georadar studies with the participation of geologists; with the participation of geoarchaeologists, geoarchaeological studies and sediment collection and age determination analyzes were carried out with the contributions of TUBITAK Marmara Research Center technicians. The data obtained as a result of the studies were overlapped with each other and so new informations were obtained. Thus, not only the data collection methods of archaeologists, but also the results obtained from other disciplines were compared with each other and absolute results were reached. The most important of these has been the identification and dating of archaeological finds only through survey data without an excavation.
In this way, it is aimed to announce the archaeological survey methods, which we think will form a basis for future research, to the scientific world with this paper

Keywords: Eskişehir, Kütahya, Survey

1. GİRİŞ

2017 yılında başlayan "Eskişehir ve Kütahya Tarih Öncesi Dönem Yüzey Araştırmasıyla, bölgedeki metalik maden yataklarının tespiti yanında özellikle bölgedeki Tunç Çağı höyüklerinin incelenmesi hedeflerin başındaki unsurdur (Karatak v.d. 2020). Burada esas amaç, MÖ 3. Binyıl ve MÖ 2. Binyıl'a tarihlenen bazı höyüklerde detaylı *yüzey araştırmaları* yaparak, höyükleri ve höyüklerin çevresel özelliklerini çok daha yakından tanımaktır. Bunun gerçekleştirmesi için, arkeologlardan kurulan ekip yanında, çeşitli bilim dallarından uzmanlar çalışmaya dahil edilmiştir. Bu şekliyle yüzey araştırmalarında multidisipliner bir anlayışı benimseyen yüzey araştırmalarındaki yöntem ve ulaşılan sonuçlar bu makale ile anlatılmaktadır. Özellikle Kütahya ilindeki Tavşanlı Höyük ve Hacıkebir Höyük'te yapılan çalışmalarla yerleşmelerin çevresel özellikleri yanında kronolojik gelişimleri de araştırılmıştır (Fidan 2021; Fidan v.d. 2021a.; Fidan v.d. 2021b)

2. YÖNTEM

Arkeolojik yüzey araştırmasının temel yöntemi arkeolojik alanlarda yüzeyde görülen çanak çömlek parçalarının toplanması ve tasnifi üzerine kurulmuştur (Koparal 2018; Renfrew ve Bahn 2017). Ancak bu yöntemle yapılan arkeolojik araştırmalarda höyükler bir bütün olarak incelenmez. Bu yöntemin bir üst modeli olarak tanımlayabileceğimiz yoğunlaştırılmış yüzey araştırmasında ise çalışma yapılacak alan birimlere ayrılır. Böylelikle her birim kendi içinde değerlendirilir ve höyük üzerindeki malzemenin dönem dağılımı anlaşılmaya çalışılır (Res. 1, 5).

Bu yöntemlerin genel bilgiyi vereceği kabul edilmekle birlikte, bazı hatalara yol açacağı düşüncesiyle, bu makaleye konu olan Eskişehir ve Kütahya Tarih Öncesi Dönem Yüzey Araştırmalarında arkeolojik araştırma teknikleri yanında diğer bilim dallarından da yararlanılmıştır. Bunlar istatistik, uzaktan algılama ve coğrafi bilgi sistemleri, jeofizik, jeoarkeolojik sondaj ve yaş tayini analizleridir (Fidan 2021).

3. UYGULAMA

Arkeolojik yüzey araştırmalarında, arkeolojik yöntemlerin dışında en çok kullanılan istatistiktir. Özellikle yoğunlaştırılmış yüzey araştırmaları yapılırken yani alanın belirli karelere bölündüğü çalışma yönteminde, birbirleri ile eşit ölçüdeki alanlarda; aynı sayıda kişinin, aynı süre içerisinde çalışma gerçekleştirilmesi önemlidir. Buradan elde edilen arkeolojik verilerin doğru olması için, istatistiği yapılın her birimdeki çalışma şeklinin birbiri ile aynı olması önemlidir. Özellikle son yıllarda hayatımıza giren insansız hava araçları ve coğrafi bilgi

sistemleri, yüzey araştırmalarında uzaktan algılama yöntemleri ile çalışılan alanların belirlenmesi ve istatistiğin yapılması işlemlerini kolaylaştırmaktadır.



Resim. 1: Tavşanlı Höyük Yoğunlaştırılmış Yüzey Araştırması

Yüzey araştırmalarında, Kültür ve Turizm Bakanlığı, Kültür Varlıkları ve Müzeler Genel Müdürlüğü'nün ilgili mevzuatı gereği sit alanlarında toprak altına fiziki müdahale yasaktır. Ancak toprağın altından görüntü elde etmek için jeofizik yöntemleri kullanılabilir. Yer altının hız, iletkenlik, yoğunluk, mıknatıslanma, sıcaklık gibi fiziksel özellik değişimleri, yeraltına sinyal yollanarak veya yerin doğal sinyalleri algılanarak saptanır. En önemli yöntemler şunlardır:

- Jeoradar GPR (yeraltı radarı)
- Elektrik Özdirenç
- Jeomanyetik
- Elektromanyetik
- Sismik detektörler



Resim 2: Tavşanlı Höyük Yüzey Araştırmalarında jeoradar çalışmaları

Yeraltı radarı olarak da tanımlanan jeoradar, en çok kullanılan jeofizik yöntemidir (Res. 2). Bu yöntem, yüksek frekanslı elektromanyetik dalgaların yeraltına gönderilmesi ve yeraltındaki herhangi bir yüzey veya nesneyle karşılaştığında yansıyarak veya kırılarak geri gelen bu dalgaların kaydedilmesi esasına dayanır. Ölçümler, radargram adı verilen kayıtlar şeklinde öncelikle ham veri haline gelir. Sonrasında ise söz konusu veriler, bilgisayar programları vasıtasıyla işlenmekte ve yorumlanmaktadır.



Resim 3. Jeoarkeolojik sondaj.

Araştırmalarda kullanılan bir diğer yöntem ise jeoarkeolojik çalışmalardır (Res. 3-4). Eskişehir

ve Kütahya İlleri Tarih Öncesi Dönem Yüzey Araştırmaları'nda arkeolojik yerleşmelerin sit alanı dışında kalan ve akarsu ya da göl gibi sulak alanlara yakın kısımlarında, yerleşmenin kuruluş yerinin seçiminde rol oynayan faktörleri ve çevresel özellikleri anlamak amacıyla, 1 metrelik uzunlukta ve dokusu bozulmadan sediman almanın mümkün olduğu kompresörler kullanılarak örnekler alınmıştır. 5-6 cm çapında 1 m uzunluğundaki yarı kapalı uçlar ile alınan sediman örneklerinin laboratuvar ortamında analizleri yapılıp, araştırma yapılan alandaki doğal ortam şartları belirlenebilmektedir.



Resim 4. Jeoarkeolojik sondajlardan elde edilen sediman örnekleri

Bilindiği gibi günümüzde yaş tayin analizi yaparak, mutlak tarihleme çok önemli bir konuma gelmiştir. Arkeoloji'de kullanılan bazı yaş tayini analizleri şöyledir:

Radyoaktif Yaş Tayini

Karbon 14 (C^{14})

Potasyum-argon,

Termolüminesans,

Elektron spin rezonans vb.)

Radyoaktif olmayan Yaş Tayini

Arkeomanyetizma

Obsidyen Hidrasyonu,

Dendrokronoloji

Palinoloji

Bunlar arasında yüzey araştırmasında Karbon 14 (C^{14}) analizi kullanılmıştır. Jeoarkeolojik sondajlarla alınan sediman örnekleri içerisinde laboratuvar ortamında ayrılan yanmış odun parçaları, TÜBİTAK Marmara Araştırma Merkezi'nde analiz edilmiştir. Kütahya'daki Tavşanlı Höyük ve Hacıkebir Höyük yüzey araştırmalarında uygulanan bu yöntem sayesinde, kazı yapılmadan önce söz konusu höyüklerin dönemleri ile mutlak tarihlendirmeler yapılmıştır (Fidan v.d. 2021a; Fidan v.d. 2021b). Böylelikle bu alanlarda ileride kazı yapmak isteyecek olan arkeologlara önemli bir bilgi paketi bırakılmıştır.

4. SONUÇ

Sonuç olarak, Eskişehir ve Kütahya İlleri Tarih Öncesi Dönem Yüzey Araştırması sayesinde sistematik olarak diğer bilim dallarından elde edilen veriler birbiri ile çakıştırılarak daha kesin sonuçlara ulaşılmıştır. Özellikle Kütahya'nın Tavşanlı ilçesinde yer alan Tavşanlı Höyük'te yapılan araştırmalardan önemli bulgular ortaya çıkmıştır. Söz konusu alanda yapılan çalışmalarla, Batı Anadolu'da tarih öncesi döneme tarihlenen bir yerleşmede kesit temizliği ya da kazı yapılmadan yerleşmenin büyük oranda tabakalanması belirlenmiştir. En altta günümüzden 8000 yıl önceye tarihlenen Neolitik Dönem olduğu anlaşılmıştır. Üzeri bataklıkla kaplanan bu yerleşimden sonra uzun bir süre arkeolojik dolgu yoktur. Günümüzden 5000 sene önce İlk Tunç Çağı'nda yeniden kurulan yerleşmede Orta Tunç Çağı ve Son Tunç Çağı'na ait yerleşim izleri de saptanmıştır.

Yüzey araştırmalarında disiplinler arası çalışmanın önemi yanında, farklı yöntemlerin beraber kullanılması ve bu yöntemlere ait verilerin beraber değerlendirilmesi, daha doğru sonuçlara ulaşılmasını sağlamıştır. Ayrıca söz konusu yüzey araştırmaları, Tavşanlı Höyük'ün Tunç Çağları açısından oldukça önemli bir merkez olduğunu göstermiştir. Yüzey Araştırmaları verileri sayesinde, 2021 yılında yazarın başkanlığında arkeolojik kazılar da başlatılmıştır.



Resim 5. Tavşanlı Höyük'te yoğun yüzey araştırması karelajı

KATKI BELİRTME

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ADDITIONAL NAMENODE'S EXTENDED CACHING FOR IMPROVING AVAILABILITY FOR READ-ONLY TRANSACTIONS IN CAP THEOREM

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ABSTRACT
According to the CAP (consistency, availability and partition tolerance.) theorem, only two of these characteristics—consistency, availability, and network partition tolerance—can be ensured at once in a distributed service. Atomic consistency is situated at the strongest end of the range, although there are other consistency models as well. Cloud platforms should support a large number of distributed services that are highly available and scalable. In certain implementations, network partitions may occur; they should be accepted. Relaxing consistency is one strategy for addressing CAP restrictions. Consequently, it is intriguing to investigate the range of consistency models that a readily available and partition-tolerant service does not provide (CAP-constrained models). When scalable services are implemented, other, weaker consistency models might still be preserved. In this proposal, we propose an introduction of additional Name-Node for extended Cache Mechanism for Fast Read Operations in HDFS which will store frequent requested records for ease access instead of performing Lookup across DataNodes. This will drastically reduce the latency in accessing records in HDFS.

Keywords*:* HDFS, NameNode, DataNode, CAP

1. INTRODUCTION

1.1 Hadoop Distributed File System (HDFS)

HDFS is a distributed file system that stores data over a network of commodity machines. HDFS works on the streaming data access pattern means it supports write-ones and read-many features. Read operation on HDFS is very important and also very much necessary for us to know while working on HDFS that how actually reading is done on HDFS (Hadoop Distributed File System). Let's understand how HDFS data read works. Reading on HDFS seems to be simple but it is not. Whenever a client sends a request to HDFS to read something from HDFS the access to the data or DataNode where actual data is stored is not directly granted to the client because the client does not have the information about the data i.e., on which DataNode data is stored or where the replica of data is made on DataNodes. Without knowing information about the DataNodes the client can never access or read data from HDFS.

1.2 NameNode*:* The primary purpose of Namenode is to manage all the MetaData. As we know the data is stored in the form of blocks in a Hadoop cluster. So, on which DataNode or on which location that block of the file is stored is mentioned in MetaData.

1.3 DataNode: Datanode is a program run on the slave system that serves the read/write request from the client and used to store data in form of blocks.

1.4 HDFS Client: HDFS Client is an intermediate component between HDFS and the user. It communicates with the Datanode or Namenode and fetches the essential output that the user requests.

1.5 CAP theorem:

This theorem originally introduced as the CAP principle, can be used to explain some of the competing requirements in a distributed system with replication. It is a tool used to make system designers aware of the trade-offs while designing networked shared-data systems.

The theorem states that networked shared-data systems can only strongly support two of the following three properties:

1.5.1 Consistency:

Consistency means all the data node must have the same data from the all the data nodes, even after all transaction. Even in the replicated data which is are present in the other data node. It means, A guarantee that every node in distributed cluster returns he same data, most recent and a successful write. Consistency refers to every client get the same data from the data node.

1.5.2 Availability:

Availability means for each read or write request for the data in the Data Node it must be processed with successfully or by sending the message about the operation incomplete. Every Data Node must be response within a reasonable amount of time.

1.5.3 Partition tolerance:

Partition tolerance means, suppose one of the Data Node is fail or link is failed with connected Data Node, other Data Node must be work accordingly, it not effects to other data nodes. those all the Data Nodes they are not dependent each other they must be independent with each other.

1.6 READ OPERATION WITH CACHE MEMORY MECHANISM

To overcomes the latency in HDFS has recently added support for caching files into the nodes local memory for improving read I/O performance and reducing read latencies. However, caching requests can only be made through an API. To maintaining the high availability for the fast read only operation in the cap theorem, The caching stores frequently results in its memory.

2

Whenever the user read some file in HDFS. The read request comes it first check in the cache memory blocks. If the request hits to the cache block, then the cache memory sends the fast response with the address of the block. Then the user can do the read operation. If the request is miss in the cache, then the request go to the main memory and check the file then the main memory send the address of the block and user can done the read operation and also the cache stores those transaction which is from the main memory in its memory for the future. Any related request comes in the future they get fast response and maintain the high availability and also having some methodology to improve the cache mechanism for the fast read only transaction and maintaining the high availability using the CAP theorem in the HDFS.

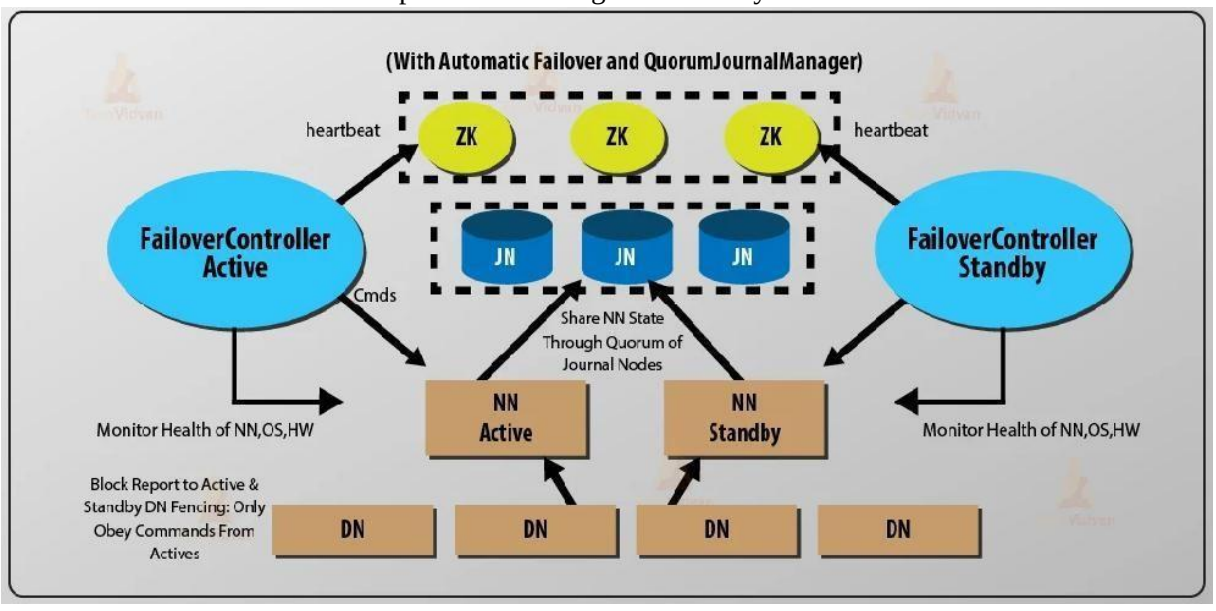
2.Literature Survey

Sl.no	Reference Paper	Contributions	Limitations	Future Enhancements
01	**Ms. Archana Kakade, Dr. Suhas Raut**	Cache mechanism which stored frequently accessed data in main memory and hence processes it much more quickly	HDFS Cache shows the performance increase for small files up to 53%. However, there decrease in performance once the file exceeds 1MB	To improve the cache system to support files more than 1000KB with multiple NameNode.
02	**Deepth devika akkoorath, Alejandro tomsic, Manuel bravo**	Cure, providing the high availability and performance cure supports: casual consistency, secure transactions, high level replicated data type	Weaker semantics under workload	It gives high performance and low latency and tolerance
03	**Martin Kleppman**	Several problems facing with in the CAP theorem, giving proper definition off consistency, availability and partition tolerance	CAP-Certain level of consistency cannot be achieved without making operation latency proportional network delay	The probability distribution off latencies for the different concurrency control and replication algorithms

3

	Dr. Chandrakanth naikodi	Big data analytics examines large and varied data sets. we use advanced analytics techniques against the large data to uncover the hidden patterns, unknown correlations, market trends, customer preferences and other useful information.	Code is very lengthy and more development efforts are required but the code efficiency is high as compared to hive.	Describe all advances, methods and techniques, leading research areas, research motivational areas of big data analytics.
05	**Debajyothi Mukhopadhya Etal.**	Presented a way to reduce the namenode memory consumption thus increasing the capacity of a Hadoop cluster.	This way the Hadoop cluster will not reach the stage where the namenode because irresponsive due to excessive jvm garbage collection as the HDFS will not be heavily loaded.	Namenode will only store relatively more frequently used data the operations carried on the cluster will be faster and more efficient.

3. Hadoop NameNode High Availability Architecture



HDFS NameNode High Availability Architecture

4

HDFS NameNode High Availability architecture provides the option of running two redundant NameNodes in the same cluster in an active/passive configuration with a hot standby.

- **Active NameNode** – It handles all client operations in the cluster.
- **Passive NameNode** – It is a standby namenode, which has similar data as active NameNode. It acts as a slave, maintains enough state to provide a fast failover, if necessary.

If Active NameNode fails, then passive NameNode takes all the responsibility of active node and cluster continues to work.

After Hadoop High availability architecture let us have a look at the implementation of Hadoop NameNode high availability.

3.1 Implementation of NameNode High Availability Architecture

In HDFS NameNode High Availability Architecture, two NameNodes run at the same time. We can Implement the Active and Standby NameNode configuration in following two ways:

Using Quorum Journal Nodes

Using Shared Storage

3.1.1 Using Quorum Journal Nodes (QJN)

It is designed to provide edit logs. It allows sharing these edit logs between the active namenode and standby namenode.

[**Note:** i) fsimage -> it contains the complete state of the file system namespace since the start of the namenode

ii) edit logs -> it contains all the recent modification made to the file system with respect to the most recent fsimage]

For High Availability standby namenode communicates and synchronizes with the active namenode.

The QJM runs as a group of journal nodes. There should be at least three journal nodes.

For N journal nodes, the system can tolerate at most (N-1)/2 failures and continue to function.

So, for three journal nodes, the system can tolerate the failure of one {(3-1)/2} of them.

Fencing of NameNode

In the High Availability cluster, only one of the namenodes should active at a time.

- The journal nodes perform this fencing by allowing only one namenode to be the writer at a time.

- The standby namenode takes the responsibility of writing to the journal nodes and prohibit any other namenode to remain active.
- Finally, the new active namenode can perform its activities.

3.1.2 Using Shared Storage

Standby and active namenode are synchronized by using "shared storage device". In this implementation, both active namenode and standby namenode must have access to the particular directory on the shared storage device like network file system.

When active namenode perform any namespace modification, it logs a record of the modification to an edit log file stored in the shared directory. The standby namenode watches this directory for edits, and when edits occur, the standby namenode applies them to its own namespace.

In the case of failure, the standby namenode will ensure that it has read all the edits from the shared storage before promoting itself to the Active state. This ensures that the namespace state is completely synchronized before failover occurs.

4. CONCLUSİON

In this NameNode High availability, it will say that Hadoop 2.0 HDFS High Availability provide for single active namenode and single standby namenode. But some operations need a high degree of fault tolerance. Hadoop new version 3.0, allows the user to run many standby namenodes. It can be achieved by using the CAP theorem (consistency, availability, partition tolerance) properties is much more effective in the namenode high availability

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BAZI SEBZELERDE TOHUM SERTLİĞİ

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ÖZET
Tarımsal faaliyetlerin ilk aşaması olan tohumlarda sertlik testadan kaynaklanmaktadır. Tohumluklardaki kabuk sertliği aynı zamanda pişirme kalitesini de etkilemektedir. Tohumun çimlenme oran ve hızını büyük ölçüde depolama koşulları etkilemekle beraber, türlere has tohum kabuk sertliği daha etkili olmaktadır. Aynı tür içinde farklı çeşit/genotiplere ait tohumların kabuk sertlikleri tohumun yapısından dolayı farklılık göstermektedir. Aynı türün farklı genotip/çeşidine ait tohumlar, çevresel faktörlere bağlı olmaksızın farklı sertlikler gösterebilmektedirler. Farklı renklere sahip olan tohum kabuklarının farklı sertliklere sahip olması da kapsamı ile ilgilidir. Farklı renklilik besin içeriği hakkında bilgi yansıtırken, farklı sertlikler başta çimlenme hızı ve yüzdesini etkilemekle birlikte mevcut fenol bileşikler sayesinde beslenme açsından değerlendirile bilinir. Bu derleme makalesinde tohum sertliğini oluşturan faktörler, tohum sertliği ile tohum rengi arasındaki ilişki ve tohum sertliğinde etkili olan kromozonlar araştırılmıştır.

Anahtar Kelimeler: Tohum Kabuk Kalınlığı, Sebze, Tohum Kabuk Rengi.

HARDNESS OF SEED COAT IN SOME VEGETABLES

ABSTRACT
The hardness of seeds, which is the first stage of agricultural activities, originates from testa. Coat hardness in seeds also affects cooking quality. While storage conditions greatly affect the germination rate and speed of the seed, the seed coat hardness specific to the species is more effective. The hardness of seeds coat belonging to different varieties/genotypes within the same species differ due to the structure of the seed. Seeds of different genotypes/varieties of the same species can show different hardness regardless of environmental factors. The fact that the seed coat with different colors have different hardness is also related to its content. While different colors reflect information about the nutrient content, different hardnesses affect the germination rate and percentage, but it can be evaluated in terms of nutrition because of the phenol compounds available. In this review article, the factors forming seed firmness, the relationship between hardness of seed coat and seed coat color, and the chromosomes that affect seed coat hardness were investigated.

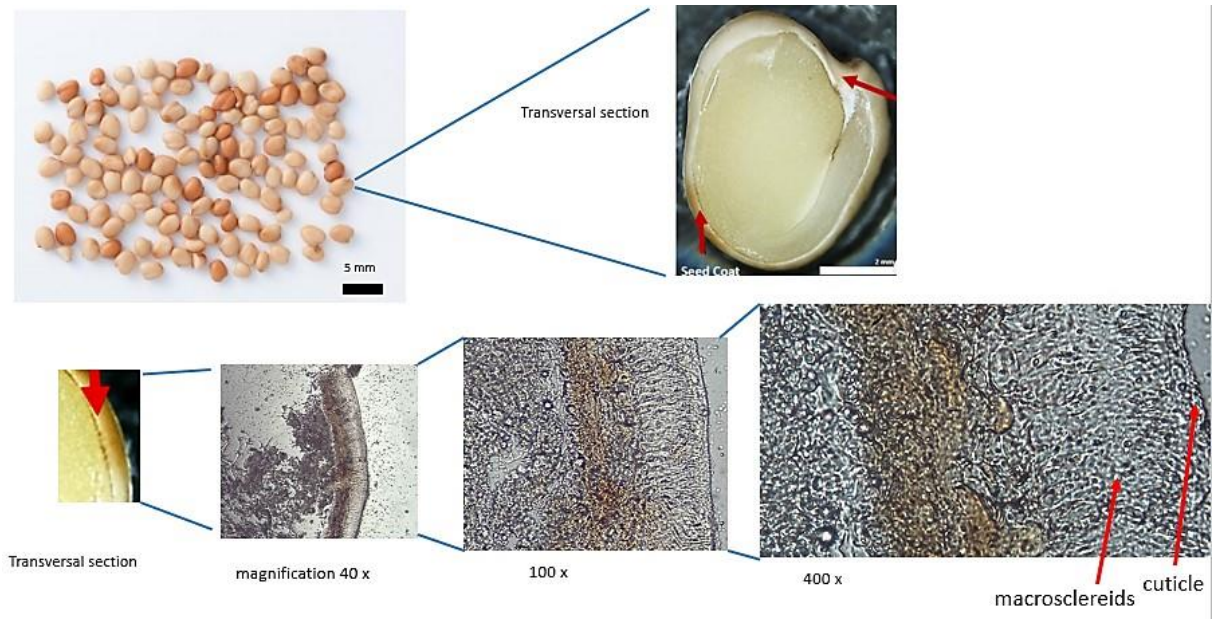
Keywords: Hardness of Seed Coat, Vegetable, Seed Coat Color.

GİRİŞ

Tohum, bitki yaşamının başlangıç ve bitiş noktasını teşkil etmektedir ve bitkinin vejetasyon süresini belirlemektedir. En az bir embriyo ve depolanmış besin kaynağı içeren yapıya tohum denir (Mauseth, 1988). Bitki üretiminde kullanılmasının yanında, besin maddesi olmaları ile de tohumlar, insanoğlunun yaşantısında önemli yere sahiptir. Tohumlar, besin içeriği bakımından da zengindirler. Örneğin karpuz tohumu % 15-50 arasında albümin, globülin, prolamin ve glutelin gibi proteinlere sahiptir (Zia ve ark., 2021). Tohum sertliği, tohum kabuğundan kaynaklanmaktadır.

Tohumun dış koşullara karşı ilk savunma basamağını tohum kabuğu (Şekil 1) oluşturmaktadır. Tohum kabuğunun sertliği bu savunmanın niteliğini belirlemektedir. Tohum bileşenlerinden en önemlisi olan embriyonun ve diğer tamamlayıcı bileşenlerin korunması testa olarak adlandırılan tohum kabuğu sayesinde gerçekleşmektedir. Tohum testasının sertliği o tohumun yaşam süresini de belirlemekle beraber mikroorganizmalara karşı direncini de belirlemektedir. Sert kabuk, sadece mekanik etkilerden değil aynı zamanda stabil olmayan nem ve sıcaklık faktörlerinden tohumu korumakta hatta mikroorganizmaların tohuma zararını da geciktirmektedir. Söz konusu kabuk, çimlenme aşamasında tohumun su stresinden ve oluşabilecek iyon sızıntılarından da korumaktadır (Yasseen ve ark., 1994).

Tohumun sahip olduğu en mükemmel koruyucu sert kabuğudur. Zira tohum kabuğundaki çatlamalar ile tohum sertliği arasında ters korelasyon saptanmıştır. Büzüşmüş bezelye ve buruşuk soğan tohumlarında bozulmalar daha hızlı gerçekleşmektedir (Adamova, 1964; Halloin, 1986a; Yasseen, 1991). Selülazlar, pektinazlar, amilazlar, lipazlar, proteazlar ve nükleazlar gibi hücre dışı enzimlerin ve toksinlerin üretimi neticesinde mikroorganizmalar tohumlara zarar vermektedirler. *Aspergillus* mantarlarının ürettiği aflatoksinler ve mikotoksinler, fidelerin kısa kalmasına sebep olurken, klorofil sentezini ve çeşitli enzimleri inhibe etmekte ve endoplazmik retikulum bozulmaktadır (Halloin, 1986b). Yasseen ve ark. (1994)'e göre ise bu tür enfeksiyonlar, tohum intergümentlerin ve hücre zarının hasarından dolayı oluşan iyon sızıntılarından kaynaklanmaktadır. Sert olmayan tohum kabuğuna sahip tohumlarda mikroorganizmalar direkt tohum içine enfekte olurken, sert kabuklu tohumlarda ise doğal açıklıklardan (mikropil) veya çatlaklardan içeriye giriş yapabilmektedirler.



Şekil 1. Tohum Kabuğu (URL.1)

Her ne kadar sert tohum kabuğu mekanik aşınmalar ve mikroorganizmalara karşı direnç sağlıyorsa da pek istenmeyen bir özellik olarak karşımızda durmaktadır. Çünkü sert tohum kabuğuna sahip tohumlarda çimlenme geç ve zor olmaktadır ayrıca gıda (pişirme, çerezlik vb.) olarak tüketiminde de bu tür tohumlar az tercih edilmektedirler. Lima fasulyesi örneğinde olduğu gibi, kabuğu alınmış veya çatlamış tohumlar, düşük toprak sıcaklıklarında bile hızlıca su emerek şişmekte ve iyon sızıntısında artış görülmektedir (Pollock & Toole, 1966). Tohum kabuğundaki renklilik de depolama süresinde ipucu verebilmektedir. Birçok bitkiye ait renkli tohumların daha uzun raf ömrüne sahip oldukları kaydedilmiştir. Dikson (1971)'in denemesinde düşük toprak sıcaklıklarında renkli fasulye tohumları, beyaz renkli fasulye tohumlarından daha iyi performans gösterdiği belirlenmiştir. Tully ve ark. (1981)'in denemelerinde ise siyah renkli soya tohumları, pigmentsiz soya tohumlarından düşük toprak sıcaklığında bile daha az suyu emdiği, dolayısıyla daha az üşüme belirtileri gösterdiği tespit edilmiştir. Roos (1984)'un çalışmalarında fasulye (*Phaseolus vulgaris* L.) sebzesinin beyaz tohumları depolama aşamasında renkli tohumlardan daha fazla olumsuz etkilenerek bozulduğunu saptamıştır. Tohum kabuklarındaki renkliliğin bozulmaya karşı dirençli olması, kalın tohum kabuğunun oluşum aşamasından kaynaklandığı söylenebilir. Zira kalın tohum kabuğu polifenoloksidaz veya peroksidaz enzimlerinin oksidasyonu sonucu oluşmaktadır. Soya fasulyesinde yapılan bir araştırma (Gillikin ve Graham, 1991), peroksidaz aktivitesinin yoğun olarak sert tohum kabuğunda bulunduğu, dolayısıyla peroksidazın sert tohum oluşumunda

önemli rol oynadığı sonucuna varılmıştır. Renkli bezelye tohumlarının kök çürüklük hastalığına karşı açık renkli olanlardan daha dirençli olduğu ve bu dirençliliğin antosiyaninlerden kaynaklandığı belirlenmiştir (Clauss, 1961).

Tohum kabuğunda hasat süresinde veya sonrasında meydana gelen hasar, tohumun depolama süresini olumsuz etkilemektedir. Mekanik zararın şiddeti tohum kabuğunun sertliği ile ters orantılıdır. Daha geniş tohumların depolama ömrü daha fazladır, tohumlarda genişlik ise tohum sertliği ile alakalıdır (Corner, 1976). Tohum sertliğinin bir şekilde azalması (mekanik aşınma vb.) soğan (*Allium cepa* L.) tohumlarının yaşam süresini düşürdüğü gibi elektrolit sızıntılara (iyon sızıntılarına) sebep olmuş ve fungal hastalıklara bulaşma riskini de yükseltmiştir (Splittstoesser ve Yasseen, 1991).

Tohum kabuğu geçirimsizliğini, tanenlerin tohum kabuğundaki dağılımı, renginde koyulaşma ve elbette sertleşme olarak beliren fiziksel değişikliklerle beraber çeşitli asitlerin (flavonoidler, hidroksibenzoik ve hidroksisinnamik) yoğunluğuna bağlı olarak artmaktadır. Hatta pişirme zorluğu deyimi bile tohumun hatalı depolamadan kaynaklı yapısal değişikliklerden kaynaklanmaktadır. Fasulye sebzesinin sağlıksız depolama koşullarında tohum rengi ve dokusundaki mikro yapı ve hatta değişikliklere bağlı olarak pişirme süresi bile değişmektedir. Tüm tohumun yapısal açıdan %10'nunu kapsayan tohum kabuğu, endospermi, depolama aşaması dâhil olmak üzere çevresel faktörlerden korumaktadır. Nicolás-García ve ark. (2021)'in belirlediği gibi tohum kabuğunda tanenler gibi fenol bileşikler bulunmaktadır. Hasadı geciken fasulye tohumları, yüksek sıcaklık ve oransal nem koşullarının etkisiyle pişirme süresi artan tohumların oluşmasına sebep olmaktadır. Tohum kabuğundaki fenol bileşikler kabuk sertliğine neden olurken aynı zamanda mikroorganizmaların artmasını da önlemektedirler (Yasseen ve ark., 1994; Nicolás-García ve ark., 2022). Fenolik bileşiklerin konsantrasyonu ve kompozisyonuna göre tohum kabuk rengi meydana gelmektedir (Bento ve ark., 2021). Karpuz sebzesinde, amaca uygun olarak tohum seçilirken tohum rengi dikkate alınması gereken bir durumdur. Yani tohum fenotibi önemli bir karekterizasyon özelliği olup fenotipik bir ayrım unsurudur. Tohum kabuk kalınlığı hemiselüloz ve selüloz kapsamıyla yakın ilişkide olduğu halde, kalsiyum konsantrasyonuna paralel olarak kahverengi (Mg içerikleri yüksektir) ve kırmızı (potasyumca zengindir) renkli tohumların daha koyu renkli tohumlardan daha az sürede kavrularak tohum çatlamasının gerçekleştiği kaydedilmiştir (Mandizvo ve ark., 2022).

Bazı türlerde doğal olarak odunsu tabakadan dolayı tohum sertliği fazladır. Su kabağı [*Lagenaria siceraria* (Molina) Standley] doğal olarak sert tohum kabuğuna sahiptir. Su kabağı

tohumlarında mevcut tohum kalınlığı diğer su kabağı tohumlarında (Egusi-beslenmede kullanılan su kabakları) olan kalınlıktan daha fazladır. Çünkü su kabaklarının tohumlarında hem mezofil hem de iç epidermis diğerlerinde mevcut olmayan şekilde odunlaşmıştır (Konan ve ark., 2018). Egusi tohum kabuğunda, sadece iç epidermis odunlaşmışken, su kabaklarında hem mezofil hem de iç epidermis odunlanmıştır. Konan ve ark. (2018)'ı araştırmalarında beslenmede kullanılan su kabaklarında odun dokusunun daha az olduğunu, Li ve ark. (2013) ise hem bal kabağında hem de yazlık kabaklarda odun dokusu ile tohum sertliğinin arasında korelasyon olduğunu belirlemişlerdir. Zarei ve ark. (2016)'nın nar meyvesindeki araştırmasında da benzer olarak nar çekirdeklerindeki sertliğin lignin (odun dokusu) ile paralel olduğunu saptamışlardır. Su kabağında olduğu gibi tohum kabuğundaki sertlik, hücre duvarının kalınlık derecesinden ziyade odunsu hücrelerin sayısı ile ilişkilidir (Konan ve ark., 2018).

Tohum kabuğunda mevcut fenol bileşiklerin polimerleşmesi, protein ve tanen etkileşimi, tanenlerin oksidasyona uğraması halinde görülen biyokimyasal değişiklikler ve elbette su emiliminin azalması tohum sertleşmesine yol açmaktadır. Tohum sertleşme süreçlerinden biri olan lignifikasyon, fenollerin özellikle hücre duvarı yapısal bileşenlerden olan selüloz, hemiselüloz, lignin ve pektinlerle kovalent bağlı yine fenol asitlerle çapraz bağlanmasıyla oluşmaktadır (Alvares ve ark., 2020). Giwa ve Akanbi (2020)'e göre kavun tohumundaki nem içeriğine bağlı olarak tohum kabuğunda sertlik değişmektedir. Nem içeriği düştükçe tohum kabuk sertliği artmaktadır. Orta seviyede tohum kabuk sertliğine sahip kahverengi, kırmızı-beyaz ve kırmızı karpuz tohumlarının daha kolay çiğnenebilmelerinden dolayı kavurmalık olarak tercih edilirken, beyaz renkli tohumlar yumuşakken, siyah ve kestane renkli tohumlar, sert kabuklu oldukları ve çiğnenmelerinin kolay olmamasından dolayı çerezlik olarak tercih edilmemektedirler (Ngwepe ve ark., 2019).

Tohum sertliği, Tablet Sertlik Test Cihazı (Şekil 2) kullanılarak kilogram kuvveti (kgf) olarak ölçülmektedir. Tohum kabuğunun kırılma noktası tohum sertliğinin belirlemektedir.



Şekil 2. Tablet Sertlik Test Cihazı (URL.2.)

Tohum sertliği üzerine yapılan genetik araştırmalar da mevcuttur. Tohum sertliğinden dolayı çimlenme de büyük sorun yaşayan *Momordica charantia* tohumlarının sertliğinden sorumlu altı lokus 3, 9, 10 ve 11. kromozonlar üzerinde haritalanmıştır (Kaur ve ark., 2021).

SONUÇ

Tarımsal faaliyetin başlangıcı olan tohum, bitkilerin vejetasyon süresini belirlemektedir. Tohum ekiminde en önemli gözlemlerden ve aşamalardan biri, tohum çimlenme ve çıkış olayıdır. Çimlenme ve çıkışların hızını belirleyen en önemli faktörlerden biri de tohum kabuk sertliğidir. Ekim öncesi yapılan ön işlemlerin yapısını ve süresini tohum kabuk sertliği belirlemektedir. Tohum sertliğinin fenol bileşklerden kaynaklandığı ve farklı renkte tohumların farklı besinleri içerdiği anlaşılmaktadır. Her mekanizmanın arkasında yer alan genetik ilişkinin kabuk sertliği konusunda da mevcut olduğu saptanmıştır.

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OKUL ÖNCESİ EĞİTİM KURUM YÖNETİCİLERİNİN KAYNAŞTIRMA EĞİTİMİ İLE İLGİLİ GÖRÜŞLERİ

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ÖZET
Bu araştırmanın amacı, kaynaştırma uygulaması yapılmakta olan on okulöncesi eğitim kurumu yöneticisinin kaynaştırmaya ilişkin görüşlerini ve önerilerini belirlemektir. Araştırmada nitel araştırma yöntemi kullanılmış ve kurumunda kaynaştırma öğrencisi bulunan 10 yönetici ile yarı-yapılandırılmış bireysel görüşmeler yapılmıştır. Görüşmeler sonucunda elde edilen veriler, tümevarımsal veri analizi tekniği ile analiz edilmiştir. Tümevarımsal veri analizi sonucunda veriler temalar haline dönüştürülmüş ve araştırmanın bulgularına ulaşılmıştır. Bu araştırmanın bulgularına dayalı olarak, kurum yöneticilerinin kaynaştırma eğitimine yönelik görüşleri belirlenmiştir.

Anahtar Kelimeler: Kaynaştırma eğitimi, yönetici, özel gereksinimli çocuk, okulöncesi eğitim.

OPINIONS OF PRE-SCHOOL EDUCATION INSTITUTION ADMINISTRATORS ON INCLUSIVE EDUCATION

ABSTRACT
The aim of this research is to determine the opinions and suggestions of ten preschool education institution administrators about inclusion. Qualitative research method was used in the research and semi-structured individual interviews were conducted with 10 administrators who have inclusion students in their institution. The data obtained as a result of the interviews were analyzed with the inductive data analysis technique. As a result of inductive data analysis, the data were transformed into themes and the findings of the research were reached. Based on the findings of this research, the opinions of institution managers on inclusive education were determined.

Keywords: Inclusive education, administrator, child with special needs, preschool education.

1. GİRİŞ

Özel eğitim hizmetleri yönetmeliği (2020).nde kaynaştırma, "Özel eğitim ihtiyacı olan bireylerin her tür ve kademede diğer bireylerle karşılıklı etkileşim içinde bulunmalarını ve eğitim amaçlarını en üst düzeyde gerçekleştirmelerini sağlamak amacıyla bu bireylere destek eğitim hizmetleri de sunularak akranlarıyla birlikte tam zamanlı ya da özel eğitim sınıflarında yarı zamanlı olarak verilen eğitim" olarak ifade edilmiştir. Okul öncesi eğitim insan yaşamının temelini oluşturmaktadır. Özel gereksinimli çocukla normal gelişim gösteren çocuğun yaşamla ilgili birtakım becerileri birbirleriyle kuracakları olumlu ilişkiler neticesinde daha kolay geliştirebilecekleri varsayılmaktadır. Bu nedenle çocukların temel becerileri kazandıkları okulöncesi dönem çok önemli bir dönemdir. (Aral, 2011).

Kaynaştırma eğitimi; özel eğitime ihtiyacı olan bireylerin, eğitimlerine yetersizliği olmayan akranları ile birlikte aynı kurumda devam etmeleridir. Kaynaştırma eğitiminin amacı çocuğu normal hale getirmek değil, çocuğun ilgi ve yeteneklerini en iyi şekilde kullanmasını sağlamak ve toplum içinde yaşayabilmesini kolaylaştırmaktır. Her çocuğun kendine özgü bireysel farklılıkları vardır, bu yüzden bireysel farklılıklar dikkate alınmalıdır. Bu bağlamda sadece normal gelişim gösteren çocuklar için değil, aynı zamanda özel gereksinim ihtiyacı olan küçük çocuklar için de düzenlemeler yapılmalıdır. Bu amaca yönelik olarak; okul yöneticilerinin, öğretmenlerin ve okuldaki diğer personelin de özel gereksinimli çocukların eğitimi için gerekli önlemleri almaları gerekmektedir. Kaynaştırma eğitimi, üzerinde önemle durulması gereken bir eğitimdir. Kaynaştırma eğitiminde özel gereksinimli bireye sadece öğretmen değil ailenin, akranların, eğitim ortamının, uzmanların, okul yöneticisinin de etkisi bulunmaktadır. Bu yüzden ekip çalışması ile özel gereksinimli bireye en üst düzeyde destek sağlanması amaçlanmalıdır. Çocuğun eğitiminden sorumlu öncelikli kişi öğretmen olmakla beraber kurum yöneticisinin de çocuk eğitiminde önemli rolü olduğu düşünülmektedir. Kurum yöneticilerinin de kaynaştırma eğitiminde çok önemli rolleri olduğu düşünüldüğünden bu çalışmada, nitel araştırma yöntemleri kullanılarak Marmara bölgesinde bulunan bir şehirdeki okulöncesi eğitim kurumu yöneticilerinin görüşlerinin incelenmesi amaçlanmıştır.

Bu araştırmanın genel amacı, kaynaştırma eğitimi alan çocuk bulunan okulöncesi eğitim kurum yöneticilerinin kaynaştırma eğitiminin gerekliliğine, karşılaşılan sorunlara yönelik görüşlerinin ve bu sorunlara ilişkin çözüm önerilerinin belirlenmesidir. Bu amaç doğrultusunda aşağıdaki sorulara cevap aranmıştır:

Okulöncesi eğitim kurumu yöneticilerinin;

1. Okulöncesi eğitim kurum yöneticilerinin kaynaştırma eğitiminin gerekliliği ile ilgili görüşleri

nelerdir?

2. Okulöncesi eğitim kurum yöneticilerinin kaynaştırma eğitiminde karşılaşılan sorunlara ilişkin görüşleri nelerdir?

3. Okulöncesi eğitim kurum yöneticilerinin kaynaştırma eğitiminde karşılaşılan sorunlara ilişkin çözüm önerileri nelerdir?

2.YÖNTEM

2.1.Araştırma Modeli

Bu araştırmada, kaynaştırma eğitimi alan çocuk bulunan okulöncesi eğitim kurum yöneticilerinin kaynaştırma eğitiminin gerekliliğine, karşılaşılan sorunlara ilişkin görüşlerinin ve bu sorunlara ilişkin çözüm önerilerinin belirlenmesi amaçlandığı için, nitel araştırma yöntemlerinden fenomenolojik desen kullanılmıştır. Fenomenolojik desen, bireylerin belirli olaylar ile olguları nasıl algıladıklarını ve anlamlandırdıklarını, olgularla ilgili ortak deneyimlerini derinlemesine anlamaya çalışan, bireyin bakış açısından inceleyen ve fenomenle ilgili deneyimlerini evrensel nitelikte açıklayan araştırma yöntemidir (Creswell, 2013; Creswell, Hanson, Clark Plano ve Morales, 2007; Smith, Flowers ve Larkin, 2009; Yıldırım & Şimşek, 2018).

2.2.Katılımcılar

Araştırmaya Marmara Bölgesinde bulunan bir şehirdeki MEB'e bağlı anaokullarında yöneticilik yapan ve kurumunda kaynaştırma eğitimi alan çocuk bulunan 10 kurum müdürü katılmıştır. Katılımcıların belirlenmesinde amaçlı örneklem yöntemlerinden maksimum çeşitlilik ve kartopu örnekleme yöntemleri kullanılmıştır. (Yıldırım ve Şimşek, 2005). Araştırmaya katılacak kurum müdürleri ile ilk olarak ön görüşmeler yapılmış, araştırmanın amacı ve verilerin nasıl toplanacağı hakkında bilgi verilmiştir. Araştırma gönüllü olarak katılmayı kabul eden kurum müdürleri ile yarı yapılandırılmış görüşmeler şeklinde yürütülmüştür. Görüşmeye alınan kurum müdürlerinin MEB'ne bağlı bağımsız anaokullarında görev yapıyor olmalarına ve kurumlarında kaynaştırma eğitimi alan çocuk bulunmasına dikkat edilmiştir. Araştırmaya katılan kurum müdürlerinin 9'u kadın, biri erkek ve tamamı lisans mezunudur. Kurum müdürlerinin 4'ü 6-10 yıl, 4'ü 11-15 yıl ve 2'si 16-20 yıl kıdeme sahiptir. Kurum müdürlerinin 3'ü 1-5 yıl, 3'ü 12-15 yıl, 2'si 1-18 yıl, 2'si de 20 yıl ve üzeri süre yöneticilik yapmışlardır. Araştırmaya katılan kurum müdürlerinin tamamı özel eğitime yönelik bir ders aldıklarını, okul öncesi eğitimde kaynaştırma konusunda herhangi bir hizmet içi eğitime katılmadıklarını belirtmişlerdir. Bu kurumlarda bulunan özel gereksinimli çocukların 37'sinin

hafif düzeyde zihinsel yetersizliği, 19'unun otizm spektrum bozukluğu, 15'inin dil ve konuşma yetersizliği, 11'inin yaygın gelişimsel bozukluğu olduğu, 4'ünün orta düzeyde zihinsel yetersizliği, 4'ünün işitme yetersizliği, 3'ünün konuşma ve davranış bozukluğu, 3'ünün down sendromu, 3 çocuğun serebral palsisi, 1'inin orta düzeyde görme bozukluğu, 1'inin ileri düzeyde görme bozukluğu ve 1'inin Hiperaktif davranış bozukluğu olduğu görülmektedir.

2.3.Veri toplama araçları

Araştırmanın verileri, yarı yapılandırılmış görüşmeler yoluyla toplanmıştır. Yarı-yapılandırılmış görüşme, yapılandırılmış görüşmeler ile yapılandırılmamış görüşmeler arasında yer alan görüşme türüdür. Yarı yapılandırılmış görüşmeler için, tüm görüşmelerde kullanılmak üzere bir dizi soru hazırlanır. Kendileriyle görüşülen kişilerin hepsine sorular aynı sırayla sorulur; ancak görüşülen kişinin görüşme sırasında soruları istediği genişlikte yanıtlamasına izin verilir. Bu tür görüşmelerde, görüşmeci soruları sorarken kendisiyle görüşme yapılan kişiye, gerektikçe sorularla ilgili ek açıklamalar yapabilir. Yarı yapılandırılmış görüşme sorularıyla, hem bir objektiflik hem de derinlik sağlanmış olur (Berg, 1998; Gay, 1987). Bu görüşme türünde görüşmeci hazırladığı sorular ile derinliğine bilgi alma ya da anlaşılmayan soruları katılımcılara açıklama şansına sahiptir (Altunışık, Coşkun, Yıldırım ve Bayraktaroğlu, 2007). Görüşme soruları hazırlanmadan önce alan yazın incelenmiştir. Okul öncesi kaynaştırma uygulamaları hakkındaki çalışmalar ışığında görüşme soruları oluşturulmuştur. Belirlenen sorular üç alan uzmanına gönderilmiş, soruların içeriğine ve ifadesine ilişkin gelen öneriler doğrultusunda bazı sorular yeniden düzenlenmiş ve yeni sorular eklenmiştir. Uzman görüşleri doğrultusunda hazırlanan görüşme soruları, üç okul öncesi kurum müdürüne uygulanarak ön çalışma yapılmıştır. Ön uygulama ile görüşme sorularının rahat bir şekilde anlaşılıp cevaplandırıldığı ve soruların içeriği dışında hiçbir konuya değinmediği tespit edilmiştir. Veri toplama araçlarının denenmesi araştırmanın geçerlik ve güvenirliği ile doğrudan ilintilidir (Yıldırım ve Şimşek, 2005). Ön uygulama sonucunda son şekli verilen görüşme formu iki bölümden oluşmaktadır. Birinci bölümde okul öncesi kurum yöneticilerinin ve kaynaştırma eğitimi alan çocukların demografik bilgilerine ilişkin sorular yer almaktadır. Formun ikinci bölümü ise kurum yöneticilerinin kaynaştırma eğitimi ile ilgili görüşlerini betimlemeyi amaçlamaktadır. Bu doğrultuda kaynaştırma eğitimi ile ilgili düşünceleri, kaynaştırma eğitimi ile ilgili sorunlar, öğretmen boyutunda, veli boyutunda ve çocuk boyutunda yaşadıkları sorunlar yönetici gözüyle belirlenmeye çalışılmış ve kurum yöneticilerinin bu sorunlara ilişkin çözüm önerilerine yer verilmeye çalışılmıştır. Ayrıca her soruya ilişkin ek sorular oluşturularak öğretmenlerden daha ayrıntılı bilgi almaya çalışılmıştır.

2.4.Veri toplama süreci

Araştırmada ilk olarak, 2018-2019 eğitim-öğretim yılında kaynaştırma eğitimi verilen Marmara bölgesinde bulunan bir şehirdeki bağımsız anaokulları belirlenmiştir. Öncelikle okul müdürlerinin ön görüşme için uygun gördükleri zamanlarda okullara giderek, araştırmaya katılacak kurum yöneticilerine araştırmanın amacı ve nasıl yürütüleceği hakkında bilgiler verilmiş ve araştırmanın amacı açıklanmıştır. Araştırmaya dâhil olmayı kabul eden gönüllü kurum müdürleriyle çalışma gerçekleştirilmiştir. Görüşmelerin tamamı, kurum yöneticilerinin odasında ve bireysel olarak gerçekleştirilmiştir. Çalışmanın güvenirliğini sağlamak için, araştırmaya katılan yöneticilere görüşme öncesinde, verilerin kayıt edilmesi sırasında bir eksiklik olmaması ve görüşmenin akışının bozulmaması için, görüşmenin ses kayıt cihazına kayıt edileceği ve bu kayıtların sadece araştırmacı tarafından dinleneceği yani gizli olacağı bir kez daha ifade edilmiştir. Görüşmeler öncesinde katılımcılara görüşmelerde kendilerinin belirledikleri kod ismi kullanacakları tekrar hatırlatılmıştır. Görüşmeler sırasında, ses kayıt cihazı ile kayıt yapılmıştır. Görüşmeler esnasında 25 soru sırasıyla sorulmuş ve her görüşme yaklaşık 20-30 dakika arasında sürmüştür.

2.5. Verilerin analizi

Bu çalışmada, okulöncesi eğitim kurum yöneticilerinin kaynaştırma eğitimine ilişkin görüşleri, yaşanılan sorunlar ve bu sorunlara ilişkin çözüm önerilerini belirlemek üzere yarı yapılandırılmış görüşmeler yapılmış ve verilerin çözümlenmesinde içerik analizi kullanılmış ve tümevarımsal bir yol izlenmiştir.

Verilerin analizinden önce ses kayıtları yazılı metne dönüştürülmüştür. Kayıtların dökümünde her konuşma aynen, hiç düzeltme yapılmadan ve sıraya uygun olarak bilgisayara aktarılmıştır. Tüm verilerin dökümlerinin ardından alandan bir uzman rastgele seçilen iki kaseti dinleyerek, dökümlerinin doğru olup olmadığının kontrolünü yapmış ve veri dökümlerinin eksiksiz olduğuna karar verilmiştir.

Araştırmacı verilerin tümevarım yöntemiyle analizini gerçekleştirmek için, elde edilen verilerden kategoriler oluşturmuştur. Var olan bilgiler azaltılma amaçlı organize edilerek kategorilere ayrılmış ve kodlanmıştır. Araştırmacı yöneticilerin görüşme sırasında kullandıkları ifadelerle, verilerde yer alan bilgilere dayanarak temalar oluşturmuştur. Araştırmacılar belirledikleri temaları karşılaştırmış, görüş birliği olan temalar aynen bırakılmış, görüş ayrılığı olan temalar araştırmacı ve uzman tarafından birlikte okunmuş ve üzerinde tartışılıp uzlaşma sağlanacak şekilde yeniden düzenlenmiştir. Metinler tekrar tekrar okunmuş, benzer görüşler gruplandırılarak temalar oluşturulmuştur. Ayrıca araştırmanın güvenirliğini sağlamak için, okul

öncesi eğitim kurumu yöneticilerinin, okul öncesi dönemde kaynaştırma uygulamalarına ilişkin düşüncelerinden örneklere doğrudan alıntılarla yer verilmiştir.

Bu araştırmanın inandırıcılığını ve aktarılabilirliğini sağlamak için derinlik odaklı veri toplama (yarı yapılandırılmış görüşmelerle derinlik odaklı veriler), ayrıntılı betimleme, katılımcı teyidi, kodlayıcılararası uyum oranı hesaplaması ve uzman görüşü alma teknikleri kullanılmıştır (Creswell, 1998; Yıldırım ve Şimşek, 2013). Bu araştırmanın aktarılabilirliği için araştırma süreci ayrıntılı bir şekilde tanımlanmaya çalışılmış, veri toplama süreci, verilerin çözümlenmesi ile yorumlanması okuyucuların anlayacağı şekilde açıklanmış ve tutarlılığı arttırmak için katılımcıların görüşlerinden doğrudan alıntılar yapılmıştır. Çalışmaya katılan tüm katılımcılara araştırma hakkında bilgi verilmiş ve onamları alınmıştır. Katılımcılar gönüllülük esasına dayalı olarak araştırmaya dahil edilmiş ve görüşlerini olabildiğince detaylandırmaları istenmiştir. Görüşmeler sırasında araştırmacılar, katılımcıların deneyimlerini, duygularını ve düşüncelerini onaylamak ya da reddetmek gibi bir tutum içerisine girmeden tarafsız bir şekilde dinlemişlerdir. Böylelikle katılımcılar, görüşlerini özgürce belirtmişlerdir. Araştırmada elde edilen verilerin katılımcılar tarafından teyit edilmesi için her bir bireysel görüşme tamamlandıktan sonra kelimesi kelimesine yazıya dökülen görüşmeler seçilen iki yöneticiye geri gönderilmiş, ifadelerin doğruluğunu ve anlaşılırlığını kontrol etmeleri istenmiştir. İfadelerin doğruluğu ve anlaşılırlığı için onay verildikten sonra verilerin analizi yapılmıştır. Araştırmanın güvenirliğini artırmak için araştırmacılar tematik analiz sürecini birbirinden bağımsız şekilde gerçekleştirmişlerdir. Araştırma verilerinden elde edilen kodlar ve kodlara ilişkin temalar iki farklı araştırmacı tarafından ayrı ayrı kodlanarak elde edilen verilerin karşılaştırılması yapılmıştır. Miles ve Huberman (1994)'ın önerdiği kodlayıcılar arası uyum oranı %89,00 olarak bulunmuştur. Katılımcıların kimlikleri gizli tutulmuş ve kod isimler (Y1, Y2, …,Y10) kullanılmıştır.

3.BULGULAR VE TARTIŞMA

3.1.Yöneticilerin Kaynaştırma Eğitiminin Gerekliliğine İlişkin Görüşlerine İlişkin Bulgular

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitiminin gerekliliğine ilişkin görüşleri Tablo 1'de verilmiştir.

Tablo 1. Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitiminin gerekliliğine ilişkin görüşleri

Kategori	Üst Tema	Tema	Kodlar	Katılımcılar
Kaynaştırma eğitiminin gerekli olduğunu düşünme	Normal gelişim gösteren çocuklar için gerekli	Farkındalık oluşturmayı sağlar	Farkındalık oluşturması, olumlu bakış açısını kazandırması	Y1, Y2, Y3
		Topluma uyum sağlamasını destekler	Yardımseverliğine destek olması	Y1
		Psikolojik destek sağlar	Mutlu olması	Y3, Y4, Y5, Y8
		Farklılıklara saygı bilinci kazandırır	Farklılıklara saygı duymayı öğrenmesi (merhamet-sevgi, ötekileştirmeme)	Y3
	Kaynaştırma eğitimi alan çocuklar için gerekli	Toplumsal adaleti sağlamaya yardımcı olur	Toplumsal adaleti sağlamak	Y1
		Eğitimsel destek sağlar	Gelecek eğitim-öğretim yılına hazırlamak, Eğitimsel gelişimine destek, İlkokula hazırlamak ve zorlukları en aza indirmek, Daha başarılı oluyorlar	Y2, Y4, Y6, Y9
		Topluma uyum sağlamaya yardımcı olur	Topluma kazandırılması Topluma uyum Sosyalleşme	Y3, Y4, Y5, Y8, Y9
		Gelişimsel destek sağlar	Tüm gelişim alanlarının desteklenmesi (sosyal, duygusal, psikomotor vb, tedavisini destekleme)	Y3, Y5, Y9
		Psikolojik destek sağlar	Normal gelişim gösteren çocuklar tarafından kabul görmelerinin sağlanması, Mutlu olması	Y3
Kaynaştırma eğitimine yönelik kararsız/olumsuz olma	Normal gelişim gösteren çocuklar için	Eğitim etkinliklerinin aksamasına neden olur	Öğretmenin eğitim etkinlikleri aksıyor	Y7
		Normal gelişim gösteren çocuklar zarar görebilir	Kaynaştırma eğitimi alan çocuklar olumsuz örnek oluyorlar Normal gelişim gösteren çocukların zarar görmesi	Y10
	Kaynaştırma eğitimi alan çocukları için	Yararsız	Kaynaştırma eğitimi alan çocuklara fayda sağlamıyor	Y7

Yöneticilerin kaynaştırma eğitiminin gerekliliğine ilişkin görüşleri incelediğinde, genel olarak hem normal gelişim gösteren hem de kaynaştırma eğitimi alan çocuklar için gerekli olduğunu düşündükleri, sadece iki yöneticinin kararsız/olumsuz görüşe sahip olduğu belirlenmiştir.

Yöneticilerin, normal gelişim gösteren çocukların mutlu olmasını, yardımseverliğine katkı sağladığını, farkındalık oluşturduğunu, olumlu bakış açısını kazandırdığını ve farklılıklara saygı duymayı öğrenmesine (merhamet-sevgi, ötekileştirmeme) yardımcı olduğunu ifade ettikleri için kaynaştırma eğitiminin gerekli olduğunu düşündükleri anlaşılmaktadır. Ayrıca, kaynaştırma eğitiminin bu eğitimi alan çocuklara eğitimsel ve gelişimsel destek sağladığı, gelecek eğitim-öğretim yılına veya ilkokula hazırlamaya yardımcı olduğu, sosyalleşmesini ve topluma uyum sağlamasını kolaylaştırdığı, tüm gelişim alanlarını desteklediği ve bu çocuklar için toplumsal adaletin sağlanması bakımından gerekli olduğunu düşündükleri görülmektedir. İki yöneticinin ise kararsız/olumsuz bakış açısına sahip olduğu görülmektedir. Kaynaştırma eğitimi alan çocukların, normal gelişim gösteren çocuklar için olumsuz örnek olabileceği, zarar verebilecekleri ve kaynaştırma eğitimi alan çocuklara fayda sağlamadığı düşüncesinden dolayı kararsız kaldıkları anlaşılmaktadır. Bu temalarla ilgili yöneticilerle yapılan görüşmelerden yapılan atıflara aşağıda yer verilmiştir:

Y1: "Kaynaştırma eğitiminin daha da yaygınlaştırılması diğer öğrencilerin farkındalık sahibi olması, dışlamadan ötekileştirmeden toplumda okul ortamında aynı hak ve özgürlüğe sahip olması açısından gereklidir. Özel öğrencilere, normal öğrencilerin bakış açısı desteği ve yardımının temeli bu şekilde sağlanmış olacağına inanıyorum."

Y2: "okulumuzdaki öğrencilerin farkındalık kazanması için. Ve kaynaştırma öğrencilerimizi gelecek eğitim-öğretim yılına engellerini biraz daha aşmış ve alışmış olarak hazırlamak için gerekli olduğunu düşünüyorum"

Y4: "bu çocukların toplumsal uyum için eğitim almaları ve yaşıtları ile bir arada olmaları gerekli. Akranları ile birlikte olduklarında daha hızlı eğitimde yol alabilirler"

3.2.Yöneticilerin Kaynaştırma Eğitimi Sürecinde Karşılaştıkları Problemlere İlişkin Görüşleri ve Çözüm Önerilerine Yönelik Bulgular

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi ile ilgili yaşadıkları genel problemlere ilişkin bulgular Tablo 2'de verilmiştir.

Tablo 2. Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi ile ilgili yaşadıkları genel problemlere ilişkin görüşleri

Tema	**Kodlar**	**Katılımcılar**
Kaynaştırma eğitimi alan çocuklardan kaynaklanan genel problemler	Engel grubundan kaynaklı sorunlar, sınıfta birden fazla engele sahip öğrenci grubu olması	Y1, Y4, Y5, Y6, Y7, Y9
	Tam zamanlı kalmadan kaynaklı problemler	Y5, Y7
Öğretmenlerden kaynaklanan genel problemler	Öğretmenlerin ne yapacaklarını bilememeleri	Y4
	Öğretmenlerin isteksizliği, Öğretmenin sınıfta kaynaştırma öğrencisi istememesi	Y9
	Sınıfta yardımcı öğretmen olmaması	Y10
Velilerden kaynaklanan genel problemler	Velilerin ne yapacaklarını bilememeleri	Y4
	Velilerin olumsuz bakması	Y8
	Kaynaştırma çocuklarının velilerinin çocuklarının durumlarını kabullenemeyişleri	Y10
	Normal gelişim gösteren ve kaynaştırma eğitimi alan çocukların velilerinin çatışmaları	Y9
Okulun fiziki yapısından kaynaklanan genel problemler	Okulun fiziki yapısının uygun olmaması, fiziki olarak yeterli donanıma sahip olmaması (asansör, engelli rampası vb.), okulun fiziki şartlarının engel gruplarına uygun olmaması, okulun çok katlı olması	Y2, Y6, Y9
Normal gelişim gösteren çocuklar ile ilgili genel problemler	Normal gelişim gösteren çocukların zarar görmesi	Y7

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi ile ilgili yaşadıkları genel problemlere ilişkin olarak içerik analizi sonucunda 13 kod ve bu kodlardan yola çıkarak 5 tema oluşturulmuştur. Bu temalar kaynaştırma eğitimi alan çocuklardan, öğretmenlerden, velilerden, okulun fiziki yapısından kaynaklanan ve normal gelişim gösteren çocuklar ile ilgili genel problemler olarak belirlenmiştir.

Kaynaştırma eğitimi alan çocuklardan kaynaklanan genel problemlere bakıldığında; bu çocukların engel gruplarının özelliklerine (otizm, hiperaktivite gibi) ve birden fazla engele sahip olmadan kaynaklı problemler yaşandığı ve bu çocukların tam zamanlı okulda kalmalarından kaynaklı sorunlar yaşandığı belirtilmiştir. Otizmin en çok zorlanılan grup olduğu ve hiperaktivitenin komut almada yaşadıkları sıkıntılar nedeniyle sınıf düzenini bozmalarından şikayet edildiği ifade edilmiştir. Bu temalarla ilgili yöneticilerle yapılan görüşmelerden yapılan atıflara aşağıda yer verilmiştir:

Y5: "Otizm en çok zorlandığımız gruptur. "

Y7: "...En çok problem yaşadığımız engel grubu otizm."

Y4: "...En çok yaşanılan problem hiperaktif olan, komut almayan ve sınıf düzenini bozan

çocuklar. "

Y5: "Tam zamanlı kaynaştırma bazı engel durumlarında zor olmaktadır."

Normal gelişim gösteren çocuklar ile ilgili genel problemlere bakıldığında; bu çocukların zarar görebildikleri ifade edilmiştir.

Öğretmenlerden kaynaklanan genel problemlere bakıldığında; öğretmenlerin kaynaştırma eğitimi konusunda ne yapacaklarını bilemedikleri, isteksiz oldukları, sınıfta kaynaştırma öğrencisi istemedikleri ve yardımcı öğretmen olmamasından kaynaklanan sorunlar yaşadıkları belirlenmiştir.

Y4: "En çok karşılaşılan problem öğretmenin sınıfında istememesi …"

Velilerden kaynaklanan genel problemlere bakıldığında; velilerin ne yapacaklarını bilemedikleri, normal gelişim gösteren çocukların velilerinin kaynaştırma eğitimine olumsuz baktıkları, kaynaştırma eğitimi alan çocukların velilerinin çocuklarının durumlarını kabullenemedikleri, normal gelişim gösteren çocukların velileri ile ~~ve~~ kaynaştırma eğitimi alan çocukların velilerinin çatışma yaşadıkları belirlenmiştir.

Okulun fiziki yapısından kaynaklanan genel problemlere bakıldığında; okulların fiziki yapısının engel gruplarına uygun olmamasından ve yeterli donanıma sahip olmamasından (çok katlı olması, asansör ve engelli rampası olmaması vb.) sorunlar yaşadıkları ifade edilmiştir.

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi ile ilgili yaşadıkları genel problemlere ilişkin önerileri Tablo 3'te verilmiştir.

Tablo 3. Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi ile ilgili yaşadıkları genel problemlere ilişkin önerileri

Tema	**Kodlar**	**Katılımcılar**
Okulun fiziki olanaklarının iyileştirilmesi	Okulun tek katlı olması-fiziki olarak yeterli donanıma sahip hale getirilmesi (asansör, engelli rampası vb), okulun fiziki şartlarının engel gruplarına uygun olarak iyileştirilmesi	Y2,Y6,Y9
Bilgilendirmeler yapılması	Veli ve öğretmenlerin bilgilendirilmesi	Y4, Y9
Destek personel görevlendirilmesi	Bu kurumlara özel eğitim öğretmeni ve destek personel atanması	Y4, Y10
Kaynaştırma eğitimi alan çocuklara yardım edilmesi	Normal gelişim gösteren çocukların ve öğretmenlerin bilinçli davranması, kaynaştırma eğitimi alan çocuklara yardım etmesi, sahiplenmesi	Y1
Zamanlamada ayarlama yapılması	Yarı zamanlı veya saatlik okulda kalmaları	Y5, Y7

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi ile ilgili yaşadıkları genel problemlere önerdikleri çözümlere ilişkin olarak yapılan içerik analizi sonucunda 10 kod ve bu

kodlardan yola çıkarak 5 tema oluşturulmuştur. Bu temalar, okulun fiziki olanaklarının iyileştirilmesi, bilgilendirmeler yapılması, destek personel görevlendirilmesi, kaynaştırma eğitimi alan çocuklara yardım edilmesi ve okulda bulunma zamanlamasını ayarlama olarak belirlenmiştir.

Yöneticilerin, kaynaştırma eğitimi ile ilgili yaşadıkları genel problemlere önerdikleri çözümlere bakıldığında, okulun tek katlı olması, okulun fiziki şartlarının engel gruplarına uygun olarak iyileştirilmesi ve yeterli donanıma sahip hale getirilmesi (asansör, engelli rampası vb), veli ve öğretmenlerin bilgilendirilmesi, bu kurumlara özel eğitim öğretmeni ve destek personel atanması, normal gelişim gösteren çocukların ve öğretmenlerin bilinçli davranması, kaynaştırma eğitimi alan çocuklara yardım edilmesi/ sahiplenilmesi ve kaynaştırma eğitimi alan çocukların okulda yarı zamanlı veya saatlik okulda kalmaları gerektiğini önermişlerdir. Bu tema ile ilgili yöneticilerle yapılan görüşmelerden yapılan atıflara aşağıda yer verilmiştir:

Y4: "...Bu problemin çözümü öğretmenin ve velinin bilinçli olmaması ve gideceği ve izleyeceği yolu bilmemesi."

Y4: ".. Ayrıca bu grup çocukların olduğu kurumlara sadece bu çocuklarla ilgilenecek resmi yolla özel eğitim öğretmeni ve destek personelin verilmesi."

Y5: " Yarı zamanlı ve saatlik kaynaştırma sağlanır ve yönetmelik böyle düzenlenirse problem çözülebilir."

Y7: "Kaynaştırma eğitiminde sınırlı süreli kalınmalı, tam zamanlı değil."

3.3.Yöneticilerin Kaynaştırma Eğitimi Alan Çocukların Aileleri İle Yaşadıkları Problemlere İlişkin Görüşleri ve Çözüm Önerilerine Yönelik Bulgular

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocukların aileleri ile yaşadıkları problemlere ilişkin görüşleri Tablo 4'te verilmiştir.

Tablo 4. Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocukların aileleri ile yaşadıkları problemlere ilişkin görüşleri

Tema	**Kodlar**	**Katılımcılar**
Psikolojik durumları	Durumu kabullenemeyişleri	Y3, Y5
	RAM'a karşı önyargılı olmaları (RAM yönlendirmesine izin vermemeleri, RAM'a gidenlerin damgalandıklarına inanma)	Y3
	Çocuklarıyla ilgilenilmediğini düşünmeleri	Y3
	Duygusal ve hassas olmaları	Y3, Y9
	Özel ilgi beklemeleri	Y8, Y9
Okuldan beklentileri	Okuldan beklentilerinin yüksek olması, özel rehabilitasyon merkezlerinin çok şey vadetmesi nedeniyle beklentilerinin yüksek olması	Y3,Y4, Y6,Y7,Y8
Okula gitme zamanına yönelik istekleri	Öğleden sonra eğitim almak istemeleri	Y1
	Tam zamanlı kalmalarını istemeleri	Y4, Y5, Y7
İletişim sorunları	Özel rehabilitasyon merkezlerinin okullarla iletişim kurmaması	Y3
	çocuklarına yönelik konularda öğretmenleri yanlış anlamaları ve çatışmaları	Y9

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocukların aileleri ile ilgili yaşadıkları problemlere ilişkin olarak yapılan içerik analizi sonucunda 13 kod ve bu kodlardan yola çıkarak 4 tema oluşturulmuştur. Bu temalar okula gitme zamanı, psikolojik nedenler, okuldan beklentiler ve iletişim sorunlarından kaynaklanan problemler olarak belirlenmiştir.

Kaynaştırma eğitimi alan çocukların aileleri ile ilgili yaşadıkları problemlere bakıldığında en çok velilerin psikolojik durumlarından (Duygusal ve hassa olmaları, özel ilgi beklemeleri, durumu kabul edememeleri, RAM'a karşı önyargılı davranmaları, çocuklarıyla ilgilenilmediğini ve çocuklarının damgalanacaklarını düşünmeleri) kaynaklı problemler yaşandığı belirlenmiştir. Ayrıca, okuldan beklentilerden (özel rehabilitasyon merkezlerinin çok şey vadetmesi nedeniyle anaokullarından beklentilerinin yüksek olması), okula gitme zamanı (öğleden sonra veya tam zamanlı eğitim almak istemeleri) ve iletişim bozukluğundan (özel rehabilitasyon merkezlerinin anaokullarıyla iletişim kurmaması ve çocuklarına yönelik konularda öğretmenleri yanlış anlamaları ve çatışmaları) kaynaklı sorunlar yaşadıkları belirtilmiştir. Bu temalarla ilgili yöneticilerle yapılan görüşmelerden yapılan atıflara aşağıda yer verilmiştir:

Y1:"İkili eğitim yapıyoruz. Velilerin çoğu öğlen grubunda olmak istiyor."

Y4: "...tam zamanlı kalmalarını istemeleri..."

Y3: "Çocuğunun durumunu kabul etmeme…"

Y3: "... çocuğunu RAM'a yönlendirmek istediğimizde izin vermemesi, RAM'a giden çocukların

ömür boyu damgalandıklarını düşünmeleri"

Y3: "...çocuklarıyla ilgilenilmediğini düşünmeleri. Çok duygusal ve hassas olmaları ve bu durumdan dolayı kendilerini suçlama psikolojileri"

Y8: "Çocuklarının durumlarını kabul etmekte zorlanan ve beklentileri çok yüksek olan veliler sıkıntı yaratıyor. Çocukların yapabilecekleri göz önüne alınmadan her şeyi yapsın ve tam gün okulda kalsın istiyorlar. Her zaman beklentilerini karşılamak mümkün değil, olması gerekenler RAM raporu kapsamında yapılıyor."

Y9:"Çocuklarının engel durumundan dolayı hassas olan velilerin çocuklarına diğer öğrencilerden çok daha fazla ilgi beklemeleri."

Y4: "Okuldan çok şey beklemeleri, ...,okula geldiğinde sanki öğretmenin elinde bir sihirli değnek varmış gibi çok fazla beklentinin olması… eğer öğretmen bilinçli ve kurum amiri ve rehber öğretmen de destekliyor, veli de uyumlu ise daha hızlı gelişim gözleniyor."

Y3: "Bence en büyük sorun çocukların gittikleri özel rehabilitasyon merkezlerinin çok şey vadetmesi ve kurumlarla iletişim kurmamalarıdır."

Y9:"....Bunun dışında hassasiyetlerinden dolayı kurumun iyi niyetle öğrencinin faydası için verdiği tavsiyeleri yanlış anlamaları ve negatif geri dönüt vermeleri. Kurumumuz rehber öğretmen eşliğinde kaynaştırma öğrencileri için oldukça hassasiyet göstermektedir. Elinden gelen tüm imkanları bu öğrencilerin gelişimi için kullanmaktadır."

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocukların aileleri ile yaşadıkları problemlere yönelik çözüm önerileri Tablo 5'te verilmiştir.

Tablo 5. Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocukların aileleri ile yaşadıkları problemlere yönelik çözüm önerileri

Tema	**Kodlar**	**Katılımcılar**
Kurum-veli işbirliği yapılması	Kaynaştırma eğitimi alan çocukların sabahçı-öğlenci grubu olma durumlarını dengelemeye çalışma	Y1
	Öğretmen-kurum yöneticisi-rehber öğretmen ve veli işbirliği yapılması	Y4
	Okulun imkanlarının sonuna kadar kullanılması	Y9
Bilgilendirmeler yapılması	Velileri bilgilendirmek	Y5,Y6
Veliye destek olunması	Rehber öğretmenlerin veliye destek olması	Y9

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocukların aileleri ile ilgili yaşadıkları problemlere önerdikleri çözümlere ilişkin olarak yapılan içerik analizi sonucunda 5 kod ve bu kodlardan yola çıkarak 3 tema oluşturulmuştur. Bu temalar, kurum-veli işbirliği yapılması, bilgilendirmeler yapılması ve veliye destek olunması olarak belirlenmiştir.

Yöneticilerin, kaynaştırma eğitimi alan çocukların aileleri ile ilgili yaşadıkları problemlere önerdikleri çözümlere bakıldığında, kaynaştırma eğitimi alan çocukların sabahçı-öğlenci grubu olma durumlarını dengelemeye çalışmak, öğretmen-kurum yöneticisi-rehber öğretmen ve veli işbirliği yapılması, okulun imkanlarının sonuna kadar kullanılması ve rehber öğretmenlerin veliye destek olması gerektiğini belirtmişlerdir. Bu temalarla ilgili yöneticilerle yapılan görüşmelerden yapılan atıflara aşağıda yer verilmiştir:

Y1:"Velilerin çoğu öğlen grubunda olmak istiyor. Bunu dengelemeye çalışıyoruz."

Y4: "Okuldan çok şey beklemeleri, ...,okula geldiğinde sanki öğretmenin elinde bir sihirli değnek varmış gibi çok fazla beklentinin olması… eğer öğretmen bilinçli ve kurum amiri ve rehber öğretmen de destekliyor, veli de uyumlu ise daha hızlı gelişim gözleniyor."

Y5: "Bu husus eğitim ve seminerlerle bilgilendirme yolu, bireysel görüşme ile çözülmektedir."

Y6: "Bu durumla ilgili rehber öğretmen velileri bilgilendiriyor."

Y9: "Kurumumuz rehber öğretmen eşliğinde kaynaştırma öğrencileri için oldukça hassasiyet göstermektedir. Elinden gelen tüm imkanları bu öğrencilerin gelişimi için kullanmaktadır."

3.4.Yöneticilerin Normal Gelişim Gösteren Çocukların Aileleri İle Yaşadıkları Problemlere İlişkin Görüşleri Ve Çözüm Önerilerine Yönelik Bulgular

Okul öncesi eğitim kurumu yöneticilerinin normal gelişim gösteren çocukların aileleri ile yaşadıkları problemlere ilişkin görüşleri Tablo 6'da verilmiştir.

Tablo 6. Okul öncesi eğitim kurumu yöneticilerinin normal gelişim gösteren çocukların aileleri ile yaşadıkları problemlere ilişkin görüşleri

Tema	**Kodlar**	**Katılımcılar**
Çocuklarına yönelik endişe ve korkular	Kendi çocuklarının psikolojilerinin bozulacağını düşünmeleri	Y3
	Kendi çocuklarının zarar görmesinden şikayet etmeleri	Y4, Y5, Y10
	Kendi çocuklarının olumsuz örnek almalarından endişelenmeleri	Y4
	Kendi çocuklarının sınıfta engellendiklerini düşünmeleri	Y10
Kaynaştırma eğitimine yönelik olumsuz bakış açısı	Velilerin olumsuz bakması	Y4
	Sınıfta kaynaştırma çocuğu olmasını istememeleri ve şikayet etmeleri	Y7
	Kaynaştırma çocuğuna yönelik ayrı okullara gidilmesi gerektiğini düşünmeleri	Y7
Kaynaştırma eğitimine yönelik bilgi eksikliği	Kaynaştırma eğitimi konusunda yeterli bilgi sahibi olmamaları	Y9

Okul öncesi eğitim kurumu yöneticilerinin normal gelişim gösteren çocukların aileleri ile ilgili

yaşadıkları problemlere ilişkin olarak yapılan içerik analizi sonucunda 8 kod ve bu kodlardan yola çıkarak 3 tema oluşturulmuştur. Bu temalar, çocuklarına yönelik endişe ve korkular, kaynaştırma eğitimine yönelik olumsuz bakış açısı ve kaynaştırma eğitimine yönelik bilgi eksikliğinden kaynaklanan problemler olarak belirlenmiştir.

Yöneticilerin, normal gelişim gösteren çocukların aileleri ile ilgili yaşadıkları problemlere bakıldığında en çok yaşanılan sorunun, velilerin çocuklarına yönelik endişe ve korkulardan kaynaklı problemler olduğu belirlenmiştir. Ayrıca, kaynaştırma eğitimine yönelik olumsuz bakış açısı ve kaynaştırma eğitimine yönelik bilgi eksikliğinden kaynaklı sorunlar yaşanıldığı da anlaşılmaktadır. Bu temalarla ilgili yöneticilerle yapılan görüşmelerden yapılan atıflara aşağıda yer verilmiştir:

Y3: "Kaynaştırma çocuklarını sınıfında istemeyen veliler kendi çocuklarının psikolojilerinin bozulacağını düşünmekteler."

Y4: " ...zarar verme veya çocuğun hareketleri model alıp uygulaması durumunda sıkıntı yaşanıyor."

Y5: "Genellikle çocuğumu rahatsız ediyor, vuruyor gibi şikayetler gelir."

Y4: "Aşırı olmamakla birlikte olumsuz bakılıyor. Niye bizim sınıfımızda diye."

Okul öncesi eğitim kurumu yöneticilerinin normal gelişim gösteren çocukların aileleri ile yaşadıkları problemlere ilişkin çözüm önerileri Tablo 7'de verilmiştir.

Tablo 7. Okul öncesi eğitim kurumu yöneticilerinin normal gelişim gösteren çocukların aileleri ile yaşadıkları problemlere ilişkin çözüm önerileri

Tema	**Kodlar**	**Katılımcılar**
Bilgilendirmeler yapılması	Sene başında bilgilendirme toplantısı yapılması	Y1, Y2, Y3, Y5, Y6, Y10
	Empati yapmalarını isteme	Y5
	Değerler eğitimi verilmesi	Y5
	Kaynaştırma çocuğunun değerli olduğunu hissettirmek	Y3

Okul öncesi eğitim kurumu yöneticilerinin normal gelişim gösteren çocukların aileleri ile ilgili yaşadıkları problemlere önerdikleri çözümlere ilişkin olarak yapılan içerik analizi sonucunda 4 kod ve bu kodlardan yola çıkarak 1 tema oluşturulmuştur. Bu temalar, normal gelişim gösteren çocukların ailelerine bilgilendirmeler yapılması olarak belirlenmiştir.

Yöneticilerin, normal gelişim gösteren çocukların aileleri ile ilgili yaşadıkları problemlere önerdikleri çözümlere bakıldığında, bu ailelere empati/değerler eğitimi verilmesi ve kaynaştırma çocuğunun değerli olduğunu hissettirmeye yönelik sene başında bilgilendirme

toplantıları yapılması gerektiğini önermişlerdir. Bu tema ile ilgili yöneticilerle yapılan görüşmelerden yapılan atıflara aşağıda yer verilmiştir:

Y1: "Velilerimiz ve öğrencilerimizle öğretmenlerimiz bilgilendirme toplantısı yapıyor."

Y2: "Velilerimize vermiş olduğumuz seminer ve eğitimler oluyor. Bu eğitim ve seminerler velilerimizde farkındalık oluşturduğu için problem yaşamıyoruz."

Y3: "Bu velilerle etkili bir sohbetle fikirlerini değiştirebiliyoruz. Ciddi bir sorun yaşamadım. Velilere kaynaştırma öğrencilerinin çok değerli oldukları ile ilgili açıklama yapılıyor."

Y5: "Sene başında yapılan toplantıda veliler bilgilendirilip, eğitime alınıyorlar. Empati yapmaları isteniyor."

Y5: "Kabullenmeleri, insani değerler anlatılması, hatırlatılması suretiyle kabullenmeleri sağlanıyor."

3.5. Yöneticilerin Öğretmenler İle Yaşadıkları Problemlere İlişkin Görüşleri Ve Çözüm Önerilerine Yönelik Bulgular

Okul öncesi eğitim kurumu yöneticilerinin öğretmenler ile yaşadıkları problemlere ilişkin görüşleri Tablo 8'de verilmiştir.

Tablo 8. Okul öncesi eğitim kurumu yöneticilerinin öğretmenler ile yaşadıkları problemlere ilişkin görüşleri

Tema	**Kodlar**	**Katılımcılar**
Yetersizlik duygusu yaşamaları	Öğretmenin kaynaştırma eğitimi alan çocuğa yeterince vakit ayıramaması	Y1, Y9
	Normal gelişim gösteren çocuklara haksızlık yaptıklarını düşünmeleri	Y10
Sınıftaki çocuk sayısının fazlalığı	Sınıftaki çocuk sayısının fazla olması	Y1, Y9
	Sınıfta birden fazla kaynaştırma eğitimi alan çocuğun olması	Y1
Sınıf yönetimi ve eğitimin aksaması ile ilgili sorunlar	Sınıf yönetiminde başarısız olmaları	Y4, Y7
Kaynaştırma eğitimi ile ilgili bilgi eksikliği	Kaynaştırma eğitimi alan çocuğa nasıl davranacaklarını bilememeleri,	Y4
	Kaynaştırma eğitimi konusunda yeterli bilgi sahibi olmamaları	Y5
Veliler ile ilgili sorunlar	Normal gelişim gösteren çocukların zarar görmesi nedeniyle veliyle sorun yaşaması	Y7, Y8
	Kaynaştırma eğitimi alan çocuğun velilerinin özel ilgi beklemesi	Y8

Okul öncesi eğitim kurumu yöneticilerinin öğretmenler ile ilgili yaşadıkları problemlere ilişkin olarak yapılan içerik analizi sonucunda 9 kod ve bu kodlardan yola çıkarak 5 tema oluşturulmuştur. Bu temalar, yetersizlik duygusu yaşamaları, sınıftaki çocuk sayısının fazlalığı,

sınıf yönetimi ve eğitimin aksaması, kaynaştırma eğitimi ile ilgili bilgi eksikliği ve veliler ile ilgili sorunlardan kaynaklanan problemler olarak belirlenmiştir.

Yöneticilerin, öğretmenlere yönelik yaşadıkları problemlere bakıldığında en çok yaşanılan sorunun, öğretmenlerin yetersizlik duygusu yaşamaları olduğu belirlenmiştir. Ayrıca, sınıftaki çocuk sayısının fazlalığı, sınıf yönetimi ve eğitimin aksaması ile ilgili sorunlar, kaynaştırma eğitimine yönelik bilgi eksikliği ve veliler ile ilgili sorunlardan kaynaklı problemler yaşanıldığı da anlaşılmaktadır. Bu temalarla ilgili yöneticilerle yapılan görüşmelerden yapılan atıflara aşağıda yer verilmiştir:

Y1: "... Öğretmen yeteri kadar vakit ayıramadığından şikayetçi."

Y9: "Öğrenci sayılarının fazlalığı nedeniyle kaynaştırma öğrencisine ayrılması gerektiği kadar zaman ayıramama düşüncesiyle sınıflarında istemiyorlar."

Y1: "Sınıflar kalabalık ve kaynaştırma öğrencisi bazen 2 öğrenci vermek zorunda kalıyoruz..."

Y4: "Öğretmen sınıfın düzeni bozulması durumunda kızabiliyor."

Y4: "... Ayrıca özel çocuklara nasıl davranacağını bilmediğinden zorlanınca çaresiz kalabiliyor."

Y5: "Öğretmenler daha bilgili olmak istiyorlar."

Y7: "Öğretmen planını uygulayamamaktan şikayetçi."

Y7: "Diğer çocukların zarar görmesinden dolayı veliyle karşı karşıya geliyor."

Y8: "Bazı çocukların arkadaşlarına zarar vermeye çalışması en büyük problem, bu konuda sıkıntılarını dile getiriyorlar ..."

Y8: "...velilerin özel ilgi beklemesi."

Y10: "Öğretmenler öğrenciye yetemediklerini, yorulduklarını, diğer öğrencilere haksızlık olduğunu düşünebiliyorlar."

Okul öncesi eğitim kurumu yöneticilerinin öğretmenler ile yaşadıkları problemlere ilişkin çözüm önerileri Tablo 9'da verilmiştir.

Tablo 9. Okul öncesi eğitim kurumu yöneticilerinin öğretmenler ile yaşadıkları problemlere ilişkin çözüm önerileri

Tema	**Kodlar**	**Katılımcılar**
Destek personel görevlendirilmesi	Sınıfta destek personel ve yardımcı öğretmen olması	Y1, Y2, Y9, Y10
	Kurumdaki diğer personelden destek almaları	Y4
	Okulda rehber öğretmen olması ve öğretmeni desteklemesi	Y5
	Özel eğitim uzmanlarının haftada en az iki saat gözlemlemesi ve öğretmenlere rehberlik etmesi	Y6
Bilgilendirme yapılması	Ön toplantılar yaparak okuldaki öğretmenleri bilgilendirme	Y3
	Velileri bilgilendirmek	Y8
Zamanlamada ayarlama	Kaynaştırma eğitimi alan çocukların yarı zamanlı okulda kalmaları	Y7
Motivasyon yapılması	Öğretmeni motive etmek	Y8

Okul öncesi eğitim kurumu yöneticilerinin öğretmenler ile ilgili yaşadıkları problemlere önerdikleri çözümlere ilişkin olarak yapılan içerik analizi sonucunda 8 kod ve bu kodlardan yola çıkarak 4 tema oluşturulmuştur. Bu temalar, destek personel görevlendirilmesi, bilgilendirme yapılması, zamanlamada ayarlama ve motivasyon yapılması olarak belirlenmiştir.

Yöneticilerin, öğretmenler ile ilgili yaşadıkları problemlere önerdikleri çözümlere bakıldığında, sınıfta destek personel ve yardımcı öğretmen olması, kurumdaki diğer personel ile rehber öğretmenden destek almaları ve özel eğitim uzmanlarının haftada en az iki saat sınıfta gözlem yapması ve öğretmenlere rehberlik etmesi gerektiğini belirtmişlerdir. Ayrıca, ön toplantılar yaparak okuldaki öğretmenleri ve velileri bilgilendirmek gerektiğini; kaynaştırma eğitimi alan çocukların okulda tam zamanlı değil yarı zamanlı kalmaları gerektiğini ve öğretmenleri motive etmek gerektiğini önermişlerdir. Bu temalarla ilgili yöneticilerle yapılan görüşmelerden yapılan atıflara aşağıda yer verilmiştir:

Y1: "Gölge öğretmen bu konuda imdadımıza yetişebilir. Keşke hayata geçirilebilse"

Y3: "Kurul toplantısında kaynaştırma çocuklarımız ile ilgili neler yapabiliriz anlatırım. Kendi evladımız gibi sahiplenemezsek bunun hem iş anlamında sorumluluk hem de hak ve vebal anlamında önemli olmanın bilincini anlatırım."

Y4: "... Öğretmen kurumundan ve amirinden yalnız olmadığını bilmek için destek bekliyor. İmkanlar ve yönetmelikler çerçevesinde destek veriliyor."

Y5: "... Rehber öğretmen desteği istiyorlar. Talepleri karşılanıyor."

Y7: "Veliyle konuşup süre azaltımına gidilmesi. Veliyle görüşüyoruz ancak ikna olursa, olmazsa aynen devam ediyor."

Y8: "Biz de velileri bu yönde uyarıp öğretmene destek olmaları konusunda ikna etmeye çalışıyoruz. "

Y8: "... Öğretmeni her konuda rahatlatmaya çalışıyoruz."

Y9: "... Beklentileri yardımcı personel oluyor genelde. Yönetim ve üst makamlar imkanlar dahilinde beklentileri karşılamaya çalışıyor."

Y10: "Yardımcı personel istiyorlar. Kurum karşılıyor."

3.6. Yöneticilerin Kaynaştırma Eğitimi Alan Çocuklar İle İlgili Yaşadıkları Problemlere İlişkin Görüşleri ve Çözüm Önerilerine Yönelik Bulgular

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocuklar ile ilgili yaşadıkları problemlere ilişkin görüşleri Tablo 10'da verilmiştir.

Tablo 10. Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocuklar ile ilgili yaşadıkları problemlere ilişkin görüşleri

Tema	**Kodlar**	**Katılımcılar**
Sınıftaki eğitim süreçlerine katılmada sorunlar	Sınıf kurallarına uymada zorluk çekme	Y1, Y4
	Etkinliklere katılmada zorluk	Y1
	Özbakım becerilerinin ve sosyal uyumlarının yetersiz olması	Y4
Normal gelişim gösteren çocuklar ile yaşanılan sorunlar	Normal gelişim gösteren çocuklar tarafından dışlanmaları	Y7
	Normal gelişim gösteren çocuklar ile iletişim kurma sorunları	Y9

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocuklar ile ilgili yaşadıkları problemlere ilişkin olarak yapılan içerik analizi sonucunda 5 kod ve bu kodlardan yola çıkarak 2 tema oluşturulmuştur. Bu temalar, kaynaştırma eğitimi alan çocukların sınıftaki eğitim süreçlerine katılmada sorunlar ve normal gelişim gösteren çocuklar ile yaşanılan problemler olarak belirlenmiştir.

Yöneticilerin, kaynaştırma eğitimi alan çocuklara yönelik yaşadıkları problemlere bakıldığında, kaynaştırma eğitimi alan çocukların sınıftaki eğitim süreçlerine katılmada sorunlar (sınıf kurallarına uymakta, etkinliklere katılmada ve özbakım becerilerinin ve sosyal uyumlarının

yetersiz olması sorunları) ve normal gelişim gösteren çocuklar ile yaşanılan sorunlar (normal gelişim gösteren çocuklar tarafından dışlanmaları ve iletişim kuramamaları) olarak belirlenmiştir. Bu temalarla ilgili yöneticilerle yapılan görüşmelerden yapılan atıflara aşağıda yer verilmiştir:

Y1: "Sınıf kurallarına uymada zorluk yaşanıyor."

Y1: "Öğretmen diğer öğrencilerle aktivitelerini yaparken kaynaştırma öğrencisini gruba dahil etmede zorluk yaşıyor. Öğrenci kısa zaman da olsa gruba dahil oluyor."

Y4: "Bu çocukların ev ortamında her istedikleri yapıldığından sosyal yaşam ve özbakım becerilerinde geriden geliyorlar. Disipline girmekte ve kurallara uyumda zorlanıyorlar. Bu çocuklar için birey olmada kendi başına iş yapabilme, kurallara uyumda destek veriliyor."

Y7: "Diğer çocuklar tarafından kabul görmeme...Çoğunlukla olumsuz etki bırakıyor"

Y9: "Diğer çocuklarla iletişim kurmakta zorluk çekebiliyorlar. Bu konuda bizden yardım talep ettikleri oluyor."

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocuklar ile ilgili yaşadıkları problemlere ilişkin çözüm önerileri Tablo 11'de verilmiştir.

Tablo 11. Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocuklar ile ilgili yaşadıkları problemlere ilişkin çözüm önerileri

Tema	**Kodlar**	**Katılımcılar**
Bilgilendirme yapılması	Normal gelişim gösteren çocuklara farklılıklara saygı konusunda önceden eğitim verilmesi-bilgilendirilmesi- rehber öğretmenin etkinlikler düzenlemesi	Y2, Y6, Y7, Y9
	Sene başında veli bilgilendirme toplantısı yapılması	Y7
BEP uygulanması ve etkinliklerin uyarlanması	Bireyselleştirilmiş eğitime ağırlık verilmesi	Y1, Y9
	Uyarlama yapılarak etkinliklerin çeşitlendirilmesi	Y5
Öğretmene destek olunması	Normal gelişim gösteren çocukların öğretmene destek olması	Y3
	Destek personel olması	Y3
Kurum-veli işbirliği yapılması	Kurum ve veli işbirliği yapması	Y6

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocuklar ile ilgili yaşadıkları problemlere önerdikleri çözümlere ilişkin olarak yapılan içerik analizi sonucunda 8 kod ve bu kodlardan yola çıkarak 4 tema oluşturulmuştur. Bu temalar, bireyselleştirilmiş eğitim programı hazırlanması/etkinlikleri uyarlama, bilgilendirmeler yapma, öğretmene destek olma ve kurum-veli işbirliği yapılması olarak belirlenmiştir.

Yöneticilerin, kaynaştırma eğitimi alan çocuklar ile ilgili yaşadıkları problemlere önerdikleri

çözümlere bakıldığında, normal gelişim gösteren çocuklara ve velilere bilgilendirme yapılmasını, kaynaştırma eğitimi alan çocuklara yönelik olarak Bireyselleştirilmiş eğitim programı uygulanması veya etkinliklerin uyarlanmasını, normal gelişim gösteren çocuklarının ve yardımcı personelin öğretmene destek olmasını ve kurum ile velinin işbirliği yapması gerektiğini önerdikleri belirlenmiştir. Bu temalarla ilgili yöneticilerle yapılan görüşmelerden yapılan atıflara aşağıda yer verilmiştir:

Y1: "Bireysel eğitimde öğretmen veli öğrenci arasında bir köprü kuruluyor."

Y2: "Öğretmenlerimiz öğrencilerimizdeki farklılıklarla ilgili video ve görseller hazırlayarak özel arkadaşları olabileceği konusunda bilinçlendirdikleri için problem yaşamıyoruz."

Y3: "Çocuklarımız o kadar değerli ki biz onların yaptıklarını problem olarak görmüyoruz. Diğer çocuklarımız da öğretmenimizin desteği ile sınıf ortamını yönetmeye çalışıyorlar."

Y3: "Öğretmenlerimizin zorlandıkları zamanlar oluyor. Destek personel olursa daha etkili olabiliriz diye düşünüyorum."

Y5: "Bu çocuklar için programda uyarlama bölümünde engel durumlarına göre etkinlikleri düzenliyoruz. Diğer çocuklar verilen eğitim ile empati, sevgi, saygı, sorumluluk, yardımlaşma duygularını geliştiriyorlar."

Y6: "Velilerimizle işbirliği içinde olarak farklılıklar konusunda öğrencilerimizi bilgilendiriyoruz."

Y7: "Sene başında veli toplantılarında velilere bilgilendirme yapılıyor. Öğretmenler de çocuklara bilgilendirme yapıyor. Rehber öğretmen etkinlikler düzenliyor."

Y9: "BEP hazırlanarak rehber öğretmen eşliğinde gelişimlerini destekleyici eğitimler sunmaya çalışıyoruz."

Y9: "Yardımlaşma, farklılıklara saygı duyma, karşılıksız sevgi gibi kavramları uygulamalı olarak öğrendikleri için bundan sonraki hayatlarında da benimsemiş olmalarına yardımcı oluyor."

4.SONUÇ VE ÖNERİLER

Bu araştırmada kaynaştırma eğitimi alan çocuk bulunan okul öncesi eğitim kurum yöneticilerinin kaynaştırma eğitiminin gerekliliği, karşılaşılan sorunlara ilişkin görüşlerinin ve bu sorunlara ilişkin çözüm önerilerinin belirlemesi amaçlanmıştır. Araştırmadan elde edilen bulgular ışığında, yöneticilerin kaynaştırma eğitiminin gerekli olduğunu düşündükleri, sadece iki yöneticinin kararsız kaldığı/olumsuz baktığı görülmüştür.

Okul öncesi eğitim kurum yöneticilerinin kaynaştırma eğitimi sürecinde, kaynaştırma eğitimi

alan çocuklardan, öğretmenlerden, velilerden, okulun fiziki yapısından, normal gelişim gösteren çocuklardan kaynaklanan genel problemler yaşadıkları belirlenmiştir. Bu problemlere yönelik çözüm önerilerinin ise; okulun fiziki olanaklarının iyileştirilmesi, bilgilendirmeler yapılması, destek personel görevlendirilmesi, kaynaştırma eğitimi alan çocuklara yardım edilmesi ve okulda bulunma zamanlamasını ayarlama olduğu görülmüştür.

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocukların aileleri ile ilgili olarak, okula gitme zamanı, psikolojik nedenler, okuldan beklentiler ve iletişim sorunlarından kaynaklanan problemler yaşadıkları belirlenmiştir. Bu problemlere yönelik çözüm önerilerinin ise; kurum-veli işbirliği yapılması, bilgilendirmeler yapılması ve veliye destek olunması olduğu görülmüştür.

Okul öncesi eğitim kurumu yöneticilerinin normal gelişim gösteren çocukların aileleri ile çocuklarına yönelik endişe ve korkular, kaynaştırma eğitimine yönelik olumsuz bakış açısı ve kaynaştırma eğitimine yönelik bilgi eksikliğinden kaynaklanan problemler yaşadıkları belirlenmiştir. Bu problemlere yönelik çözüm önerilerinin ise; normal gelişim gösteren çocukların ailelerine bilgilendirmeler yapılması olduğu görülmüştür.

Okul öncesi eğitim kurumu yöneticilerinin öğretmenler ile yetersizlik duygusu yaşamaları, sınıftaki çocuk sayısının fazlalığı, sınıf yönetimi ve eğitimin aksaması, kaynaştırma eğitimi ile ilgili bilgi eksikliği ve veliler ile ilgili sorunlardan kaynaklanan problemler yaşadıkları belirlenmiştir. Bu problemlere yönelik çözüm önerilerinin ise; destek personel görevlendirilmesi, bilgilendirme yapılması, zamanlamada ayarlama ve motivasyon yapılması olduğu görülmüştür. Literatürde, öğretmenlerin bilgi eksikliği yaşadıklarına dair bulgular da mevcuttur. Akkaya ve Güçlü (2018)'nün yaptığı bir araştırmada, araştırma verilerine göre muallimlerin en fazla mesele yaşadıkları konunun bilgi eksikliği olduğu belirtilmiştir.

Okul öncesi eğitim kurumu yöneticilerinin kaynaştırma eğitimi alan çocuklar ile sınıftaki eğitim süreçlerine katılmada sorun ve normal gelişim gösteren çocuklar ile problem yaşamadan kaynaklı problemler yaşadıkları belirlenmiştir. Bu problemlere yönelik çözüm önerilerinin ise bireyselleştirilmiş eğitim programı hazırlanması/etkinliklerin uyarlanması, bilgilendirmeler yapılması, öğretmene destek olunması ve kurum-veli işbirliği yapılması olduğu görülmüştür.

Bu araştırma, okul öncesi eğitim kurumu yöneticileri ile yürütülmüştür. Araştırma, yöneticilere ek olarak, öğretmenler, veliler ve kaynaştırma eğitimi alan çocuklar da dahil edilerek genişletilebilir.

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ANALYSIS OF THE WOODY PLANTATIONS STATE WITH THE PARTICIPATION OF THE MAIN FOREST-FORMING SPECIES IN THE KRYVYI RIH MINING AND METALLURGICAL DISTRICT, UKRAINE

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ABSTRACT
Now the role of forests in maintaining ecological stability is generally recognized in Ukraine and the world. Artificial tree plantations provide people with a softened microclimate in their places of residence and other positive changes in urban areas. Only forest ecosystems among other natural ecosystems have the maximum environmental protection property in industrial areas. They are considered as one of the decisive factors for ensuring the livelihood of mankind, as well as an important link in the system of sustainable development of iron ore mining and metallurgical regions, such as Kryvorizhia in Ukraine. Local communities are slowing the pace of global warming and generally reducing its negative impact on the microclimate by using artificial forest plantations in areas of industrial mineral extraction. We studied natural forest ecosystems and artificial forest plantations located in contrasting ecological conditions during 2015-2021. They represent the main types of tree and shrub plantations, in particular garden and park structures, sanitary, water protection and urban forest protection tracts. The State Forestry Agency, which owns 73% of the forests, should be the main driver of environmental

initiatives. According to the decision of the board of the Dnipropetrovsk Regional Department of Forestry and Hunting, in 2022 it is planned to create new forest plantations from more than 70 hectares to 332 hectares. By the end of 2024, foresters will plant more than 166,000 hectares. trees. Forest crops will be dominated by Robinia pseudoacacia L., Quercus robur L., Pinus nigra, Juglans nigra Hulls. An important element among the concepts of balanced nature management is the preservation of artificial tree plantations in the Kryvorizka district. In this territory, the state of the forest ecosystem depends on the development trend of the mining and industrial region and a complex of social, ecological and economic problems.

Keywords: forest urban phytocenoses, environmental safety, artificial woody plantation, forest cover.

INTRODUCTION

Now the role of forests in maintaining ecological stability is generally recognized in Ukraine and the world [1, 2, 3, 4]. Among other natural ecosystems, only forests have the maximum property for environmental protection in industrial areas [5, 6, 7, 8]. They are considered as one of the decisive factors in ensuring mankind's activities and also an essential part of the system of sustainable development of the Kryvyi Rih Iron Ore Mining and Metallurgical District. In addition, artificial woody plantation stands to provide people with a softened microclimate in their residential areas and other positive changes in urbanized areas [9, 10, 11]. Local communities are slowing down the pace of global warming and generally reducing their negative impact on the microclimate by using artificial forest stands in mining districts [12, 13, 14, 15].

Among the concepts of sustainable nature management, forest conservation is considered as an important element. Forest stands make up 36 % of European territory. In different natural areas it cover has significant differences and doesn't reach the optimal level at which forests most positively effect the climate, soil, water resources, mitigate erosion processes consequences, and also provide a greater amount of wood growth [20, 21, 22].

The forests of Ukraine are a national treasure and belong to the Ukrainian people. Therefore, every citizen has the right to receive full information on the state of forests, as well as on the advantages and disadvantages of the implemented forest policy. The forest industry of Ukraine in its functioning plays an important role in the development of rural areas. This is especially reflected in the creation of small forestry enterprises in the territory of villages, employment of the rural population, development of rural infrastructure and filling local (rural) budgets from the activities of enterprises.

Today, the trend towards intensive use of forest resources is increasing, which is due to the aspirations of forest industry enterprises to obtain high profits dictated by the market. On the other hand, a significant period of reproduction of forest resources limits the possibility of their use. This requires appropriate changes in forestry management, improvement of the forest management system, creation of market infrastructure for targeted financing of the forest sector, and development of the financial and economic system.

The forest industry is of particular importance both for increasing the level of provision of the state and the population with its products, providing the population with work, and improving the economic situation by increasing the volume of forest stands. In addition, increasing the level of satisfaction with forest production needs at the expense of local resources requires a

review of existing logging technologies.

The object of this study was to assess the artificial woody plantations as a promising factor for ecological hybrid threat reduction in industrial areas in the example of the Kryvyi Rih Iron Ore Mining and Metallurgical District from the standpoint of an ecosystem approach.

METHODS OF RESEARCH

Kryvyi Rih Iron Ore Mining and Metallurgical District, Central Ukraine, was chosen for the present study. It is situated between 47°53′54″ and 48°8′52″ north latitude and 33°19′52″ and 33°33′38″ west longitude (Figure 1). During 2015-2020, we studied the natural forest ecosystems and the artificial forest plantations located in contrast environmental conditions. They represent the main types of tree-shrub stands, in particular garden and park facilities, sanitary, water protection and urban forest protection tracts. Natural phytocenoses from the Gurovsky forest (Dolinsky district, Kirovograd region), located in the floodplain of the Bokova River and 30 km away from industrial enterprises, were used as conditional control.



Figure 1. Sketch of the study area

The test plot study was designed to evaluate all factors controlling the natural phytocenoses and artificial woody plantation state, i.e. air pollution, soil properties, topography, local microclimate conditions and time. The 35 sample plots (20*20 m) were selected by this information base. The sampled locations are shown in Figure. All data were submitted to descriptive statistics and analysis of variance (ANOVA). The statistical analysis was performed

using the program SPSS for Windows. The statistical *significance was considered* at P<0,05 [28, 29].

RESULTS AND DISCUSSION

The main product of production in Kryvyi Rih is iron ore. This ore is extracted from both open pits and underground mines. Open-pit mining is more common and is carried out by Southern mining combine. The open pit mining process involves drilling blasting wells, blasting operations, and excavating large volumes of displaced ore. As a result of the long-term and intensive extraction of iron ores and their processing in Kryvyi Rih, almost all components of the environment are subjected to a huge man-made load. First of all, it is atmospheric air. The volume of emissions of harmful substances from enterprises last year amounted to almost 395 thousand tons, which is more than 42% of the volume of emissions in the Dnipropetrovsk region. As a result of production activities for underground ore mining, the balance of hydrochemical, hydrogeofiltration and engineering-geological processes changes, which leads to subsidence, landslides and collapses of the soil surface, which is especially dangerous in the area of the negative influence of former mines, whose activities were discontinued, including at the beginning of the last century. The city generates annually more than 200 million tons of industrial waste and 400 thousand tons of household waste.

The contribution of different types of ecosystems to the sustainability of the biosphere and the natural environment is not the same. Forest ecosystems are very important for the life of the biosphere: they enrich the atmosphere with oxygen and maintain the level of carbon dioxide in it. Forests play an important role in the water cycle: the litter-covered surface of forest soils absorbs precipitation and snow water, replenishing underground water reserves. Forest soils filter water flowing from fields and industrial sites and purify them of many harmful impurities. Forest ecosystems evaporate moisture into the atmosphere and have a positive effect on the climate, increasing humidity.

One of the most important characteristics of any ecosystem is its sustainability. The main parameters of a stable ecosystem are the constancy of the species composition, closed cycles of substances and relatively constant bio-productivity. The State Forestry Agency, which owns 73 % of the forests, should be the main driver of environmental initiatives. According to the decision of the Dnipropetrovsk Regional Forestry and Hunting Department the board, it plans to create new forest stands of more than 70 hectares up to 332 hectares planned in 2022. By the end of 2024, foresters will land more than 166 thousand hectares of trees. *Robinia pseudoacacia* L., *Quercus robur* L., *Pinus nigra*, *Juglans nigra* Hulls will be dominated in Forest crops [7].

An important element among the concepts of sustainable nature management is the preservation of artificial woody plantations in the Kryvyi Rih District. In this area the state of the forest ecosystem in depends on the development trend of the mining and industrial region and the complex social, ecological and economic problems [10, 11].

Simultaneously with the creation of new artificial woody plantations research and systematization of existing artificial forest ecosystems remains extremely important in Kryvyi Rih District. As we noted above, in the region artificial woody plantations have an impoverished floral composition; a simplified vertical structure; a certain imbalance in the ratio of dendrometric indicators between the first, second and third tiers of plantings, and sometimes a weakened state of life. In most cases, their trees are under stress due to the constant influence of adverse environmental factors (table 1). However, forest ecosystems have already formed a tree cover in the region. Trees are young and relatively mature. They have accumulated a significant amount of phytomass and potency to form a cenotic phytogenic environment. In addition, trees already perform important environmental, sanitary, and protective phytomeliorative and other functions.

Therefore, for the present, their systematization/ordering is extremely relevant and important. The first stage for the depth study of artificial tree ecosystems can be a scientific justification for the possibility of using the biogeochemical characteristics of the "leaf litter-soil system" as markers and predictors of the state of trees in forest ecosystems. Thus, according to the results of our research [10, 11], in leaf sediments concentrations of alkaline earth metals (Ca, Mg, K, and Na) should be considered as an accurate ecological and biogeochemical marker. This marker informatively reflects the vital state of woody plant species in the forest ecosystems in industrial areas.

In the Kryvyi Rih District, the forest ecosystems are located in contrasting ecological conditions. The main types of artificial urban green areas are presented, such as landscape gardening and protective forest stands (sanitary protection, protection of rivers and lakes, protection of cities). In the arid steppe conditions of this district, the ratio of woody plant species to the level of moisture is the most important indicator that determines the future state of these natural and artificial plantings [30, 31]. Therefore, it is extremely advisable to analyze the hygromorphic spectrum of woody plant species. Comparison of ecomorphs of woody plant species in forest ecosystems in Kryvyi Rih District using tree species analysis and analysis of dendrometric characteristics gave clearer results.

In order to protect and preserve forests, quasi-forests and natural forests, all types of logging

are prohibited in them, including sanitary logging, logging of forming and improving forests, construction of structures, laying paths, linear and other transport and communication facilities, grazing, industrial harvesting of non-wood forest products, and the passage of vehicles. The age of ripeness of stands is determined based on the main purpose of forests, the functions they perform, productivity, biological characteristics of tree species, forest conditions, natural zones, as well as methods of forest restoration. It is justified when conducting forest management based on the results of special scientific research and approved by the Central Executive Authority implementing state policy in the field of Forestry, in coordination with the Central Executive Authority implementing state policy in the field of Environmental Protection.

CONCLUSIONS

Thus, in the Kryvyi Rih Iron Ore Mining and Metallurgical District, the current state of artificial woody plantations can be assessed as conditionally satisfactory, depending on soil conditions and levels of air pollution. A systematic approach to the application of environmental forest management policy will allow significantly reduce the ecological hybrid threat in this region and in the industrial areas of the world. For woody plant species, soil moisture deficiency and atmospheric repetition pollution are significant environmental factors. In some cases, negative phenomena in artificial woody plantations are observed At the same time, these plantations can become a "green framework" for the future sustainable development Kryvyi Rih mining and metallurgical district. The artificial woody plantations of Kryvyi Rih should acquire the status of one of the key environmental factors that determine environmental safety and counteraction to hybrid threats in the region. To do this, it is necessary to achieve optimal indicators of forest cover in the region by creating new plantings.

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GREEN SYNTHESİS, CHARACTERİZATİON AND ANTİBACTERİAL ACTİVİTY OF SİLVER NANOPARTİCLES OF ASPERGİLLUS TERREUS

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ABSTRACT
Silver nanoparticles (AgNPs),chemical stability, catalytic and anti-bacterial activities as well as cancer cells have also been shown to exhibit cytotoxic effects on Plants, bacteria, fungi, and with the biosynthesis of silver nanoparticles in which yeast is used, silver ions are released into both cells. It is determined that it is converted into silver nanoparticles both extracellularly and intracellularly. It is also known that Especially fungi secrete high amounts of bioactive substances.İn the study ,Antimicrobial activities of synthesized AgNPs AgNP ,solutions characterization of synthesized nanoparticles Characterization using UV-VIS spectrophotometery , Fourier transform infrared spectroscopy (FTIR) spectra , X-ray diffraction analysis(XRD) and Transmission electron microscopy (TEM) were performed. The current research opens a new avenue for the green synthesis of nano-materials.

Keywords: Silver nanoparticles (AgNP), Aspergillus terreus, Candida albicans, Antibacterial –Antifungal activit, biosynthesis

1.INTRODUCTİON

The science and technology of nanomaterial research is the most interesting and hopeful for development in this modern era is one of the areas. In general, nanoparticles (NP), nanocrystals, nanofibers, nanotubes and terms such as nanocomposites are used in the field of nanoscience and technology. Nanotechnology is a science that allows studies such as processing, measurement, design, modeling and editing carried out on materials in 1-100 nanometer sizes, and nanostructured materials exhibit different properties collectively compared to other materials. In recent years, the synthesis of metal oxide nanoparticles has gained momentum due to its ability to produce materials at nanoscale and its applications in various fields. One of the main advantages of preparing metal oxide nanoparticles is that they are extremely small in size and have high surface ratios. Exceptionally due to its refined dimensions; Metal nanoparticles Compared with nano metals, unique physical and chemical properties emerge. 1,4Due to very small size, nanoparticles acquire new physiochemical properties like catalytic activity, electric and thermal conductivity etc. as compared to their bulk. These physiochemical properties of nanoparticles are responsible for rapidly increase in their application in various fields like medical, textile, drug delivery, catalysis, environmental remediation, biological labeling, electronics, mechanics, chemical industries, and optics [4,6]. Nanoparticles can be synthesized using various methods: physical, chemical, and biological. There are a wide variety of physical and chemical methods. These require a long time, have a high risk of toxicity and are economically costly methods.

In recent years, the development of the green chemistry approach has led researchers to he led to the emergence of a non-toxic method for the synthesis of nanoparticles. Metal oxide nanoparticles, plant tissue plant extracts and like other parts of living plants, it can be synthesized using environmentally friendly materials Silver and Iron oxide nanoparticles are large due to their unique physiochemical properties it has been intriguing. Introduction of iron oxide nanoparticles by plants with green chemistry approach its synthesis is a new technique to overcome the limitations of other traditional methods. This is green in the synthesis method, biomolecules in the plant act as reducing and limiting substances.6-8 Biological synthesis approach offers various advantages over other physical and chemical methods in terms of rapid synthesis, cost, eco-friendly, and less toxicity. Synthesis of metallic nanoparticles by using biological materials is a bio-redox reaction mainly carried out by secondary metabolites, cellular enzymes, and other cellular constituents. The biological materials for synthesis of nanoparticles include algae, fungi, yeast, bacteria, actinomycetes and plants. 9

Recently, Silver nanoparticles (AgNPs) are being investigated for their potential applications in different fields such as antimicrobial agents and antitumor AgNPs have been synthesized from different biological sources such as plants, bacteria, and mushrooms. Biosynthesis of AgNPs using fugal sources was reported as: productive yields for fungal biosynthesis ability AgNPs have been reported in several species such as Aspergillus foetidus.MTCC8876 Aspergillus terreus, Alternaria chlamydospora Aspergillus niger, Aspergillus fumigatus DSM819.(10-12)

Herein, we investigated the biosynthesis of AgNPs using Aspergillus terreus and its underlying mechanism.

2. MATERİALS AND METHODS

Potato Dextrose Broth (PDB) were purchased from Merck, Germany.AgNO3 was obtained from Merck Co. Staphylococcus aureus (ATCC 25923) C. albicans (ATCC10231) A.terreus(ATCC10029), American Type Culture Collection, Streptomicin and Fluconazole for control purposes were purchased from Sigma-Aldrich (St. Louis, MO, USA).Synthesis of silver nanoparticles Pulmonary Aspergilloma Caused by an stock Atypical Isolate of Aspergillus terreus from BAL samples patient material was inoculated with spores. To prepare biomass for biosynthesis, stock A. Terreus was grown in potato dextrose broth liquid medium (PDB). The flasks were incubated at 28 ± 2°C on a rotary shaker (120 rpm) an incubator for 7 days. Fungal biomass was harvested by filtration through filter paper (Whatman filter paper no.1) and washed again and again. 20 g of fungal biomass taken into a flask of 500 ml containing 100 ml of distilled water and boiled for 15-20 min. Biomass was filtered using Whatman filter paper no.1 and filtrate was used further for synthesis of AgNPs. 20 ml of fungal extract was mixed with watery solution of silver nitrate (80 ml; 2mM). The mixture was incubated at room temperature.

2.1. Preparation of silver nanoparticles solution

0.0170 gr AgNO3 was weighed on a precision balance and dissolved in 100 ml of deionized water. AgNO3 of 0.05 mM, 0.1 mM, 0.15 mM and 0.2 mM used in optimization studies solutions were prepared by diluting from a 2.5 mM AgNO3 solution and stored in an Erlenmeyer flask. A. terreus extract (10 mL) was added slowly. Mixing was achieved using a magnetic stirrer and continued this process until the solution turns brown .The ratio of aqueous extract and silver nitrate solution was maintained at 1:10 ratio and the size and shape of thenanoparticles were maintained appropriately AgNPs were synthesized using a reduction of

aqueous Ag+ with the culture supernatants of Aspergillus terreus at room temperature.



Figure 1. The cell filtrate of Aspergillus terreus mixed without AgNO3 (A) and with AgNO3 (B) after24h

2.2. Characterization of synthesized nanoparticles

All these reactions were monitored by ultraviolet-visible spectroscopy of the colloidal AgNPs Solutions characterization of synthesized nanoparticles Characterization using UV-VIS (Perkin Elmer) spectrophotometry, Fourier transform infrared spectroscopy (FTIR) spectra, X- ray diffraction analysis(XRD) and Transmission electron microscopy (TEM) were performed.

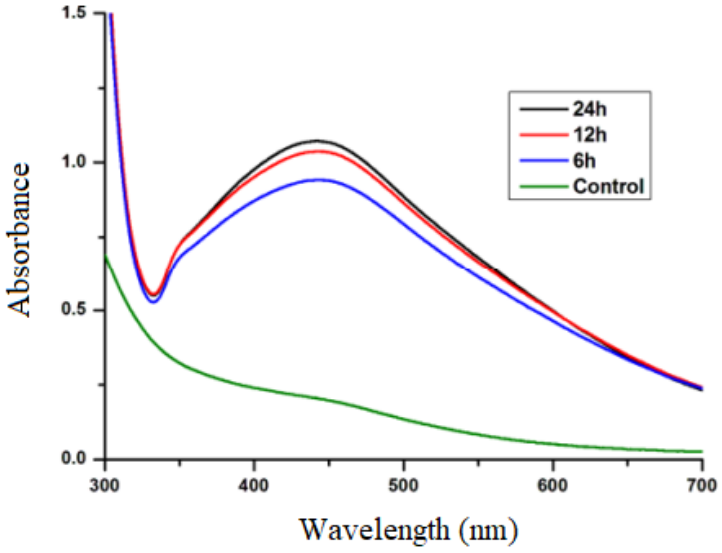


Figure 2. The UV-Vis spectra recorded for the reaction of fungal cell filtrate with AgNO3 solution

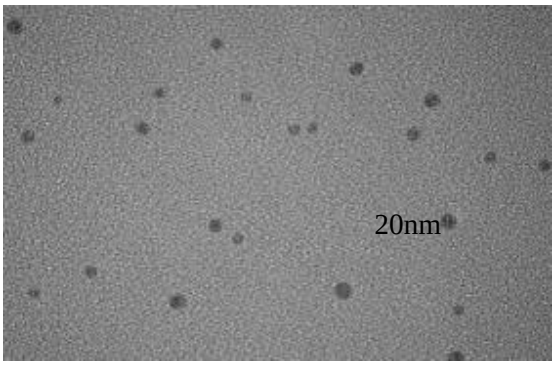


Figure 3. Images of transmission electron microscopy (TEM) of AgNPs of fungus A. terreus

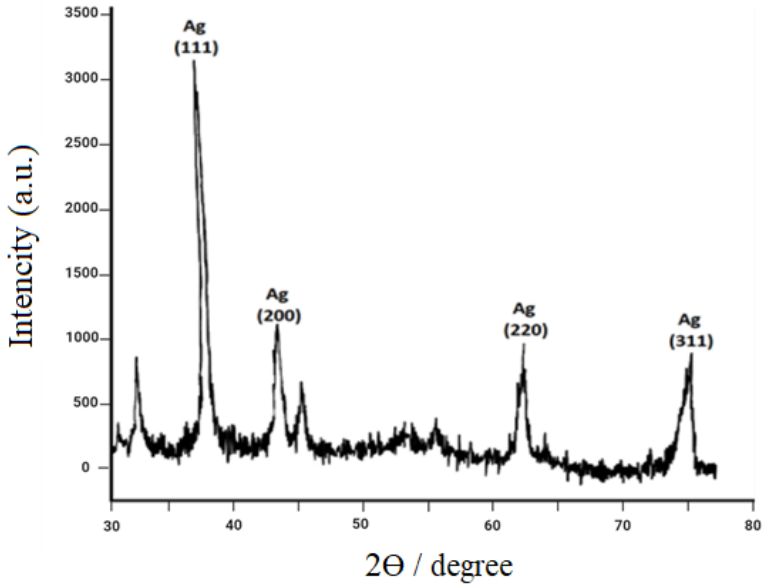


Figure 4. X-ray diffraction patterns of AgNPs synthesized by Aspergillus terreus (a.u. = arbitrary units)

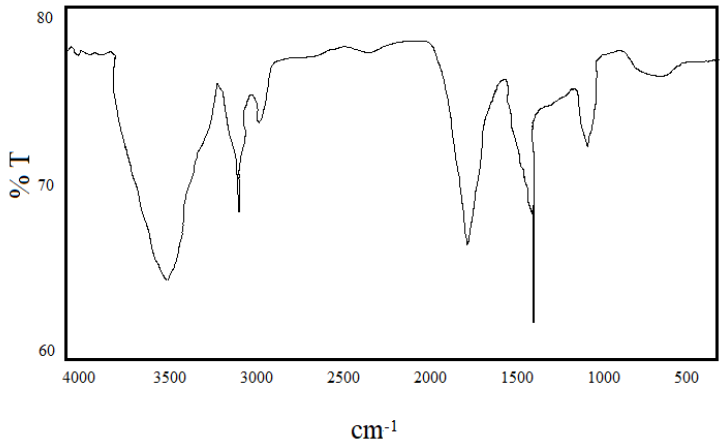


Figure 5. FTIR analysis of AgNPs

2.3. Antimicrobial Activity Analysis of AgNPs

The antimicrobial efficiency of AgNPs against different pathogenic organisms including bacteria and fungi was researched using a disk diffusion assay. Compared with the control, the diameters of inhibition zones increased for all the test pathogens. The AgNPs cultured could inhibit pathogenic bacteria and fungus, including Staphylococcus aureus, Candida albicans.



Figure 6. Aspergillus terreus colonies on PDA plate showing cinnamon brown color

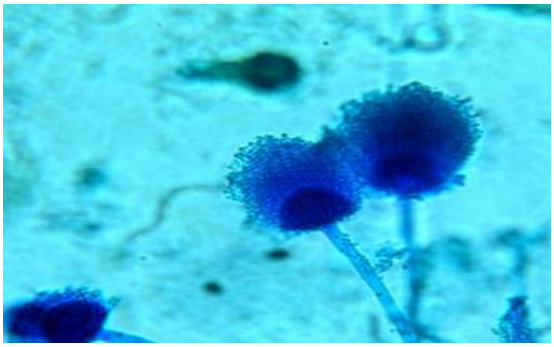


Figure 7. Biseriate conidiophores of Aspergillus terreus (100X). Lactofenol cotton blue

Table 1. Size of the inhibition zone for AgNPs synthesized by Aspergillus terreus against the tested microorganisms.

		Mean Size of Inhibition Zone (mm)	
Pathogenic Organisms		Control	Test
Candida albicans (ATCC 10231)		9	16 ± 1
Staphylococcus aureus (ATCC 25923)		9	16 ± 1

Control: AgNO3; Test: AgNPs. ATCC: American Type Culture Collection,

3. RESULTS AND DİSCUSSİON

In present research the chosen fungal strain i.e. A. terreus represented Figure 6-7 the capability to synthesize AgNPs extracellularly. The cell filtrate of Aspergillus terreus mixed without AgNO3 and with AgNO3, after 24 h (Figure 1). After synthesis, characterization of AgNPs is required to predict their physicochemical property that could have an important, effect on their biological efficiency A strong peak specific for the production of AgNPs was observed at 410-425 nm as shown in Figure 2. Characterization techniques provide information like size, shape, charge, solubility, collection, and function group involved in the reduction and covering of nanoparticles. Therefore, we used dissimilar characterization technique i.e. UV-Vis spectrophotometer, FTIR, and TEM for the analysis of synthesis of nanoparticles.13-15 The AgNPs obtained were systematically characterized using TEM and XRD analysis the AgNPs obtained were defined using TEM and XRD analysis. Through the TEM analysis, the particles were globular and with a medium size of 4.1 nm (1–20 nm), and the bulk of the particles were smaller than 10 nm (Figure 3). For the crystal character of the AgNPs, intense XRD peaks were conformed parallel, to the (111), (200), (220), (311) planes at 2θ angles of 37.01°, 43.38°,63.44°, and 76.10°, respectively (Figure 4). This was in good agreement with the unit cell of the face centered cubiform (fcc) structure (JCPDS File No. 04-0783) with a lattice parameter of a = 4.075 Å. Some dense diffraction peaks at 2θ angles of 30.05°, 43.05°, 52.3° and 54.3°, might be concerned to AgCl which was thanks to the chloride ions related, during preparation of the cell filtrate. Because of the biomass sediment, other crystallographic impurities were also conformed in the XRD profile. The size of AgNPs with respect to the XRD was approximately 5.2 nm. This result was appropriate with the TEM research. The FTIR analysis of AgNPs (Figure5) showed intensive peaks at 3322.1, 2900.10, 1550.06, 1304.12, 1050.30, and 601.05 cm^{-1}. Those peaks were, respectively, corresponding to N-H stretching of the basic amine of the protein, alkane C-H stretching, the stretching of combined alkane C=C, methylene end of the protein (CH3-R), C-N of aliphatic amines of polyphenols, and O-H elongation. Antibacterial and antifungal potential of synthesized AgNPs was evaluate at concentrations i.e using a disk diffusion assay (Table 1). Remarkable antibacterial activity of AgNPs was showed against tested bacterial strain. Increase in zone of inhibition was documented with the increase in concentration of AgNPs. The antibacterial efficiency of synthesized AgNPs may be attributed to their small size and high surface zone which make possible them to, diffuse inside the bacterial cells.

4. CONCLUSİON

The mycosynthesized AgNPs possess significant antimicrobial activity against various reference pathogens.The current study used A. terreus as an effective biofactory for AgNP biosynthesis.Silver nanoparticles were synthesized from these silver nanoparticles were characterized with sophisticated instruments, UV-Vis, FT-IR, TEM and their size and shapes were confirmed. The synthesized silver nanoparticles exhibited an excellent antibacterial property on multidrug resistance gram positive bacteria and fungus strains.

In forthcoming, it would be important to study the cytotoxicity of A. terreus nano-silver against other malignant cell lines as well as its antiviral activity against putative and emergent viruses.

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BIOLOGICAL SYNTHESIS OF SILVER@GRAPHENE OXIDE NANOCOMPOSITE AND ANTIMICROBIAL DETERMINATION OF ACTIVITY

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ABSTRACT

Recently, graphene oxide (GO) based nanocomposites have raised significant interests in many different areas. However, to our best knowledge, factors affecting its antibacterial activity as well as the underlying mechanism remain unclear. In this study, Rosemary (Rosmarinus officinalis Linn.) leaf extracts silver graphene oxide nanocomposites (Ag@GO NK) were synthesized and their characterization was evaluated. The antimicrobial activity of the obtained Ag@GO NK against Staphylococcus aureus and Candida albicans strain were tested. We discover that, compared to AgNPs, GO−Ag nanocomposite with an optimal ratio of AgNPs to GO is much more effective and shows synergistically enhanced, strong antifungal activities at rather low dose (2.5 μg/mL). The GO−Ag nanocomposite is more toxic to C. albicans than that to S. Aureus. The crystal structure of NPs and the presence of functional groups in NP synthesis were demonstrated by X-Ray Powder Diffraction (XRD) and Fourier Transform Infrared Spectroscopy (FT-IR) analysis, respectively. The morphologies of Ag@GO NKs were investigated by Scanning Electron Microscopy (SEM). It has been reported that Ag@GO NPs have antimicrobial properties against C albicans strain. The study is unique and innovative in terms of biosynthesis and determination of antimicrobial activities of Rosemary (Rosmarinus officinalis Linn.) leaf extracts and Ag@GO NPs. It is thought that the data obtained in the study will shed light on biomedical studies by modifying NPs.

Keywords: Antimicrobial activity, biological synthesis, silver@graphene oxide, graphene oxid Rosmarinus officinalis Linn

1. INTRODUCTİON

Drug resistance of pathogenic microorganisms has become a global public health problem which has prompted the development of new materials with antimicrobial properties 1

Microbial pathogens causing disease are an alarming medical situation to human health and cause infections in various organs. 2-3 To handle these pathogenic infections, certain steps should be required to manage an approach and to make some necessary strategies for these public health issues. In the recent era, the commonness of antibiotic-resistant bacteria and higher medical costs are threats to global health.4 Microorganisms, including fungi and bacteria, are possible reasons for contamination and colonization process over the surface of the surgical apparatus. These highly contaminated apparatuses with various pathogens are a continuous threat to human health, thus following severe economic losses .Therefore, it has become mandatory to synthesize and make possible utilization of new material to seize these health-related threats. The structures of many types of NPs are suitable for carrying antimicrobial agents .Nanoparticles (NPs), which are widely used in the industry, can be modified with materials such as graphene and chitosan to gain new properties in terms of their hydrophilicity and oxidation capacity the structures of many types of NPs are suitable for carrying antimicrobial agents. 5 The strong antibacterial activity of GO has been reported. 6-8 Recently, graphene, a new allotrope of carbon, has been shown to have antimicrobial activity. Graphene is a material made of carbon atoms bonded together in a repeating hexagonal pattern. At the same time, Ag-GO extracts the biological synthesis of Rosmarinus officinalis and NPs and is synthesized by a cheap, effective and environmentally friendly method.

In this context, antimicrobial nanohybrids are an alternative due to their synergistic properties.

2. MATERİAL AND METHODS

2.1 Chemicals, reagents and plant source

AgNO3 99.9% was purchased from Sigma-Aldrich, and plant source takes (commercial) Rosemary (Rosmarinus officinalis Linn.) Staphylococcus aureus (ATCC 25923) C. albicans (ATCC 10231) American Type Culture Collection standards and Streptomicin and Fluconazole for control purposes were purchased from Sigma-Aldrich (St. Louis, MO, USA).

2.2. Synthesis of AgNPs

Freshly leave of Rosemary (Rosmarinus officinalis Linn.) which is used as a reducing and coating material in NP synthesis, is available from commercial herbalists has been done.

İt was washed with distilled water, then in the oven at 70C samples were dried, 10 g taken and

infused in 100 ml of distilled water for one hour. Samples were washed with distilled water, then in the oven at 700C samples dried 10 g taken and infused in 100 ml of distilled water for one hour. Then Whatman No1 filter paper 10 ml of extract filtered with 90 ml of AgNO3 solution (5x10-3 M) magnetic until a color change is observed. Ag NPs were obtained by mixing in a mixer and the supernatant was filtered and kept at 4°C for further analysis.



Figure 1. Rosmarinus officinalis Linn

2.3. Ag-GO NP synthesis

For Ag-GO NP synthesis, 2 ml of 5 mM Ag NP solution and 2 ml of Rosmarinus officinalis extract, 0.1 mg/mL (2 ml GO) was added to the solution and mixed with the help of a magnetic stirrer in the beaker. Two different NaCl solutions for GO binding have been prepared. During mixing, 2,4 ml of NaCl (0.09 M) was added to the solution, and then 5 ml of NaCl (0.29 M) solution was added and mixed. The process took about 30 minutes. After mixing, the solution was centrifuged (5 min, 3000 rpm) Ag-GO composites were obtained. Synthesized NPs were mixed with distilled water under the same centrifugation conditions washed and stored for use in characterization studies.



Figure 2. C.albicans micr oscobic and culture

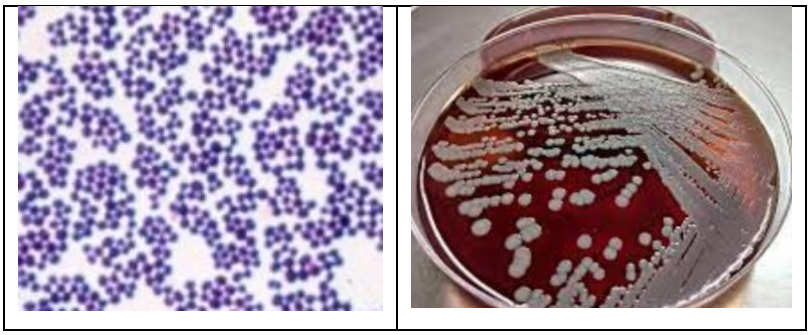


Figure 3. C.albicans microscobic and culture

2.4. Antimicrobial Activity of Green Prepared AgNPs

The bacteria and yeast were then grown on media (brain heart agar for S. aureus, Sabouraud's agar for C. albicans (Merck Millipore, Darmstadt, Germany).

Briefly, bacterial and yeast suspensions were prepared from overnight cultures and adjusted to 10^6 CFU/ml.Figure2.3 .The antibacterial activity of GO and GO-Ag was evaluated by microdilution assays, as described by the Clinical and Laboratory Standards Institute (CLSI). 9, 10

The pure cultures of each strain were swabbed uniformly on the individual plates using sterile cotton. Disks were made in each plate, and 25 µL of the sample of nanoparticle solution were poured using micropipettes onto the disks on all plates. The zones of inhibition around the discs were measured after 24 hours of incubation period.

3. RESULTS AND DİSCUSSİON

The XRD analysis was used to study the crystalline nature of green synthesized Ag-NP's. The 200 XRD pattern of Ag-NP's as shown in Fig.4 shows four characteristic diffraction peaks of 2θ at 201 39.0°(111), 44.7°(200), 63.9°(220) and 77.9° (311).

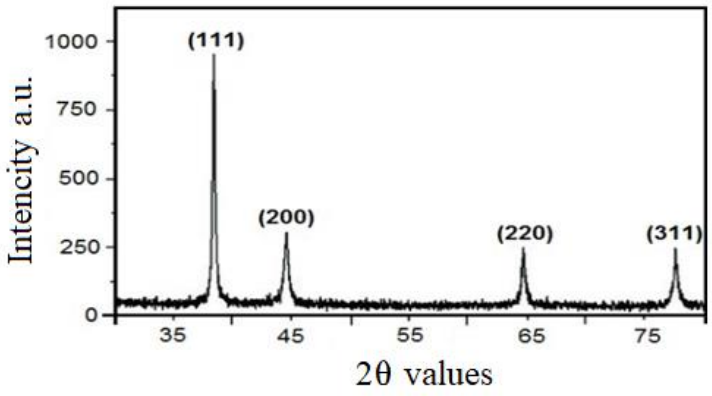


Figure 4. XRD pattern of Ag-NP's, face-centered cubic (FCC) crystal structure

The presence of functional groups participating in the structure of NPs was determined by FT-IR analysis at 3490, 2953,845, 1628 and 1404 cm-$^{1.}$It was determined by the peaks recorded in (Figure 5).

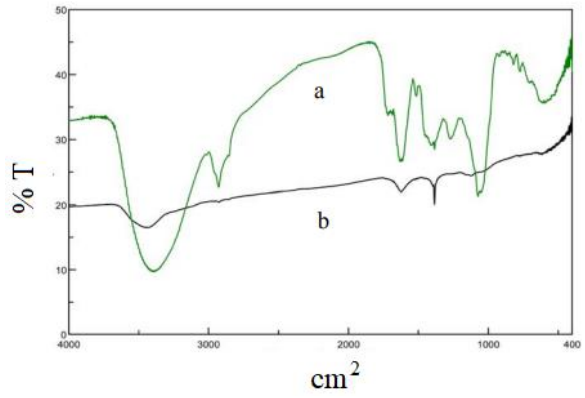


Figure 5. FT-IR analysis of (a) Rosmarinus officinalis leaf extracts and (b) synthesized Ag NP's

TEM analyzes of Ag NP and Ag-GO NK biosynthesized are given in Figure 6, respectively. As can be seen from Figure 4, NPs morphologies are round. GO-AgNPs exhibited a flat, smooth surface due to the presence of nanoparticles, and the structure of GO-AgNPs has a thin and smooth surface. 10,11

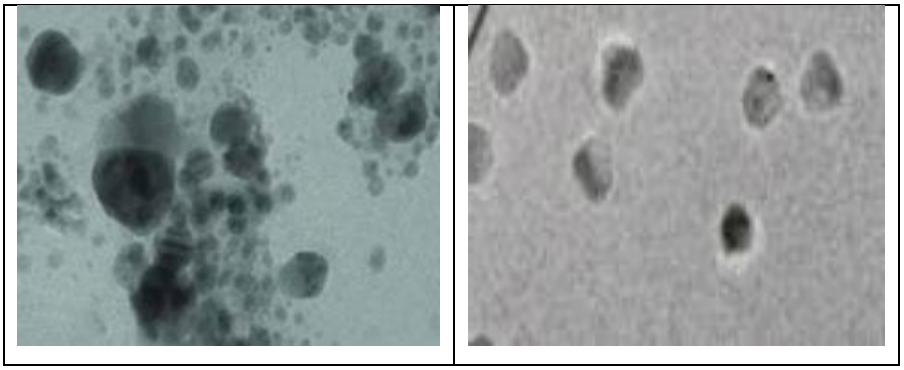


Figure 6. TEM images of Ag NPs (50nm), and GO-Ag NPs.(100nm) (particle size shown in range from12 to 22 nm)

Antimicrobial activity of Ag-GO NP determination; Ag-GO NP exhibited concentration-dependent antimicrobial activity against C. albicans and S. aureus strain recorded (Figure 7).



Figure 7. Antimicrobial activity of Ag-GO NP against C. albicans and S. aureus strain

As a result of synthesis of NPs in acidic environment: It has been observed that they tend to cluster together by coming together. It was observed that the effective diameters of NPs synthesized with plant extracts were compatible with ours. 12,13

In the 2θ plane by XRD analysis observed peaks of 39.0°,44.7°,63.9°and 77.9° respectively

It corresponds to the planes (1 1 1), (2 0 0), (2 2 0) and (3 1 1) with the peaks obtained by XRD analysis.

The presence of Ag in the structure of NK was confirmed and crystalline structure has been determined. Similar to our study, Some et al., (2019) and Hsu and Chen (2014) performed the biosynthesis of Ag@GO NKs in the crystal plane (1 1 1), (2 0 0), (2 2 0) and (3 1 1), which were found to be in agreement with our study. 14.15

The presence of functional groups involved in the structure of biologically synthesized NPs with the use of R. officinalis leaf extract as a reducing and coating agent was investigated by FT-IR analysis.

As a result of this test, the peaks observed at 3490, 2953,845, 1628 and 1404 cm^{-1} correspond to alcohol (O-H), alkene (C=C) and aromatic (C=C) groups, respectively. In previous studies, pH, temperature, concentration of reducing agent and reducing metal have an important role in the morphological properties of NPs obtained by using the plant extract demonstrated in studies. 16

Determination of antimicrobial activity; Ag-GO NP, which was synthesized by biological method, was found to be C.albicans exhibited effective antimicrobial activity. The antimicrobial properties of Ag-GO NPs are that they attach to the cell wall of microorganisms, denaturation of proteins and accumulation in the membrane formed by reactive oxygen species (ROS) in the cell can be explained by the cause of death. S. aureus and C.albicans of Ag-GO NP has

antimicrobial activity against determined. 17 According to the data obtained, Ag-based NPs synthesized with the plant extract, graphene oxide oxidation by modification with biomolecules such as capacity and solubility can be increased, as well as clustering can be prevented.

4. CONCLUSİON

The study is original and innovative in terms of biosynthesis and determining the antimicrobial activities of Ag-GO NPs with Rosmarinus officinalis Linn bud extract. It is thought that the data obtained in this study will shed light on the studies in biomedical fields by modifying NPs.

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DETERMINATION OF SOME CHEMICAL CHANGES CAUSED BY SALT STRESS IN ALTERNATIVE GREENS (MIBUNA, MIZUNA AND KOMATSUNA)

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ABSTRACT
In this study, Mibuna (*Brassica rapa* var. *nipposinica*), Mizuna (*Brassica rapa* var. *japonica*) and Komatsuna (*Brassica rapa* L. var. *perviridis*) were used as plant material. Our experiment was established under controlled conditions in a adjustable climate room with a temperature between + 40 °C and 20 °C. All experiments were performed, 20 °C temperature, 65-70% humidity, 10/14 (light / night) hour photoperiod, 400 µmol $m^{-2}s^{-1}$ in a climate room. Hoagland hydroponic solution was used by drip irrigation in hydroponic system during emergence and seeding periods then salt stress applications were made. The experiment consists of 3 replications with randomized plots with 3 replicates (Mibuna, Mizuna and Komatsuna) and 4 salt concentrations (control, 50, 100 and 200 mM NaCl). There were 36 parcels in the experiment, 10 plants in each parcel and 360 plants in the whole experiment. During the harvest, macro and micro nutrients content were determined. According to the obtained results from the trial, when the salt rate in the Hoagland hydroponic solution was increased macro-micro nutrient elements in the leaves decreased. Therefore, it was determined that all of these criteria decreased with the increasing amount of salt.

Keywords: Japanese greens, hydroponic system, salt concentration, NaCl, nutrients

1. INTRODUCTION

Salinity; Particularly in arid and semi-arid climatic regions, it is the event that soluble salts that are washed and mixed with groundwater come to the soil surface through capillarity with high ground water and as a result of evaporation, the water separates from the soil and accumulates on the soil surface and near the surface. (Ekmekçi et al. 2005).

The decrease in natural resources day by day reveals new searches in agriculture as in every field. Although agricultural areas are decreasing due to industrialization and urbanization, the number of people to be fed from these areas is increasing rapidly. For this reason, the researches carried out focus on maximizing the yield to be obtained from the unit area (Erdem et al. 2010). Salt stress is an important abiotic factor that negatively affects many metabolic events in plants and reduces product quality and yield, especially in cultivated plants. When an evaluation is made in terms of stress factors and the mechanisms that the plant develops under stress conditions, there are changes in certain parameters in response to salt stress.

This research, aims to determine some physiological, morphological and chemical changes caused by different salt concentrations in the cultivation of Mibuna (*Brassica rapa* var. *nipposinica*), Mizuna (*Brassica rapa* var. *japonica*) and Komatsuna (*Brassica rapa* L. var. *perviridis*), which are Far East origin and new vegetables for Turkey.

2. MATERIAL and METHOD

2.1. Material

Mibuna (*Brassica rapa* var. *nipposinica*), Mizuna (*Brassica rapa* var. *japonica*) and Komatsuna (*Brassica rapa* L. var. *perviridis*) were used as material in this study (Figure 1).



a b c

Figure 1. (a) Mibuna, (b) Mizuna, (c) Komatsuna seed pack pictures

The cultivation of plants in the research was carried out in the laboratories of the Department of Horticulture, Faculty of Agriculture, Namık Kemal University and in the climate chamber.

Chemical analyzes were carried out at the Faculty of Agriculture, Horticulture and Tekirdağ Commodity Exchange Soil-Leaf Analysis Laboratories. Our experiment was set up in a climate chamber whose temperature can be adjusted between +40°C and –20°C under controlled conditions. All experiments were carried out in a climate chamber with a temperature of 20°C, a humidity of 65-70%, a photoperiodic order of 10/14 (light/night) and a light intensity of 400 $\mu molm^{-2}s^{-1}$. Seeds were sown in plastic multipots on the growing tables in the rearing room (Figure 2). Plants were grown in the cultivation rooms under the most suitable conditions (Figure 3) for mibuna, mizuna and komatsuna, until the first true leaves were seen, by sowing the seeds in peat (Klasmaan TS1 seedling tofu) and performing normal maintenance procedures (Eşiyok et al. 2008).



Figure 2. Images of the period of sowing seeds in plastic multipots in the climate chamber

They were taken into a hydroponic system containing Hoagland nutrient solution when the first true leaves were seen (Figure 4). The plants were grown in pots containing perlite in a volume of 800 ml (13x11cm).



Figure 3. Computer-controlled climate chamber view where plants are grown



Figure 4. View of the automatic control panel of the climate chamber with plastic tanks filled with Hoagland solution in volume of 200 liters

Salt applications were started when the plants were with true leaves, and NaCl was added to the nutrient solution in the containers until the harvest period in a way to provide a salt concentration (Figure 5) of 0, 50, 100 and 200 mM at the irrigation times (Kuşvuran et al. 2008).

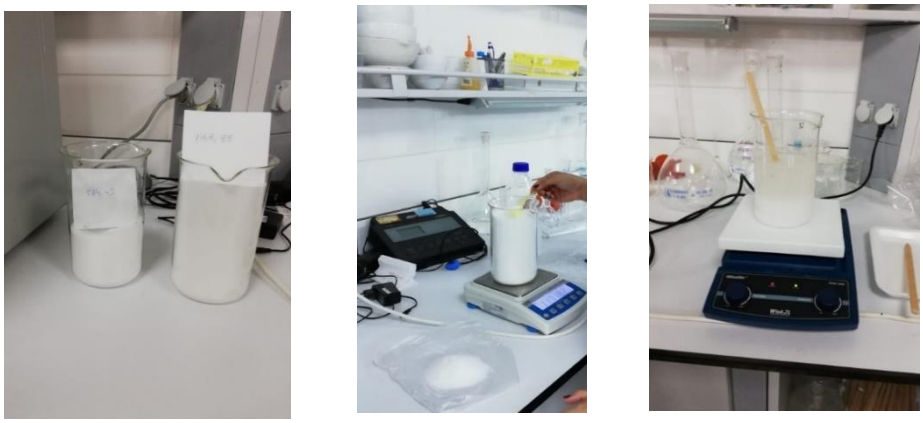


Figure 5. Preparation of different NaCl salt concentrations to be added to the nutrient solution in the containers at irrigation times until the harvest period

The experiment was set up in a randomized plot design with 3 replications and each replication consisted of 3 species (mibuna, mizuna, and komatsuna) and 4 salt concentrations (control, 50, 100, and 200 mM NaCl). There were a total of 36 plots in the whole experiment, 10 plants in each plot, and a total of 360 plants in the whole experiment.

The data obtained from the experiment were made using the MSTAT version 3.00 /EM package program. In the statistical calculation of the obtained data, each type was evaluated within itself. For the differences found to be significant, the groups that were differentiated by the LSD (Least Significant Difference) control method were determined (Akdemir et al. 1994).

3. RESULTS & DISCUSSION

3.1. Macro and Micro Nutrient Amounts (% and ppm)

During the harvest period, the leaf samples were brought to the laboratory as soon as possible, after washing, they were dried in the oven at 70 ºC. Ground leaf samples; It was prepared for analysis by passing through a 0.5 mm sieve. For analysis, dried and sieved leaf samples were placed in glass tubes and their lids were closed, and these leaf samples were sent to Tekirdağ Commodity Exchange Leaf-Soil Analysis Laboratory for macro-micro nutrient analysis and their analysis was done.



Figure 6. During the harvest period, the ground leaf samples are sieved with 0.5 mm sieve and made ready for analysis

3.1.1. Nitrogen Amount (%)

When mibuna, mizuna and komatsuna plants to which different salt concentrations were applied were considered in terms of nitrogen content, it was determined that they were statistically within the 1% error limit (Table 1).

The effect of salt stress applied to 3 different species in the study on the amount of nitrogen and the groups according to the LSD test are as shown in Table 1 and Figure 1.

Table 1. The effect of different salt stress applied to Mibuna, mizuna and komatsuna plants on nitrogen (%) averages and groups according to LSD test.

		Salt Applications				**Avg.**
Criterion	**Type**	**Ctrl**	**50 mM**	**100 mM**	**200 mM**	
Nitrogen (%)	**Mibuna**	4,43 a	4,40 a	3,39 b	3,08 c	3,83
	% change in salinity compared to control		-0,68	-23,48	-30,47	
	Mizuna	4,73 a	4,48 b	3,81 c	3,53 d	4,14
	% change in salinity compared to control		-5,29	-19,45	-25,37	
	Komatsuna	4,28 a	4,28 a	3,73 b	3,17 c	3,86
	% change in salinity compared to control		0,00	-12,85	-25,93	

*There is no difference between the averages with the same letter.
LSD $(\%1)_{Mibuna}$: 3,027104 LSD $(\%1)_{Mizuna}$: 3,451429 LSD $(\%1)_{Komatsuna}$: 3,174854

As can be seen from Table 1, the amount of nitrogen decreases with the increase of different salt concentrations applied to these plants.

Considering all the results in terms of the main effect of salt concentrations, the amount of nitrogen; It is seen that it has the highest value in the control group and the lowest nitrogen amount is in the 200 mM group. In this context; Since salt was not applied to the control group, it is understood that the amount of nitrogen increases with the increase in the development of these plants, since they can easily take the nutrients and water from the soil and at the same time can perform photosynthesis without any problems. In the 200 mM group, where the highest salt concentration is applied, the reason for the decrease in the amount of nitrogen is that the plants cannot continue their development due to salt stress and they cannot take the nutrients in the growing medium in sufficient amount.

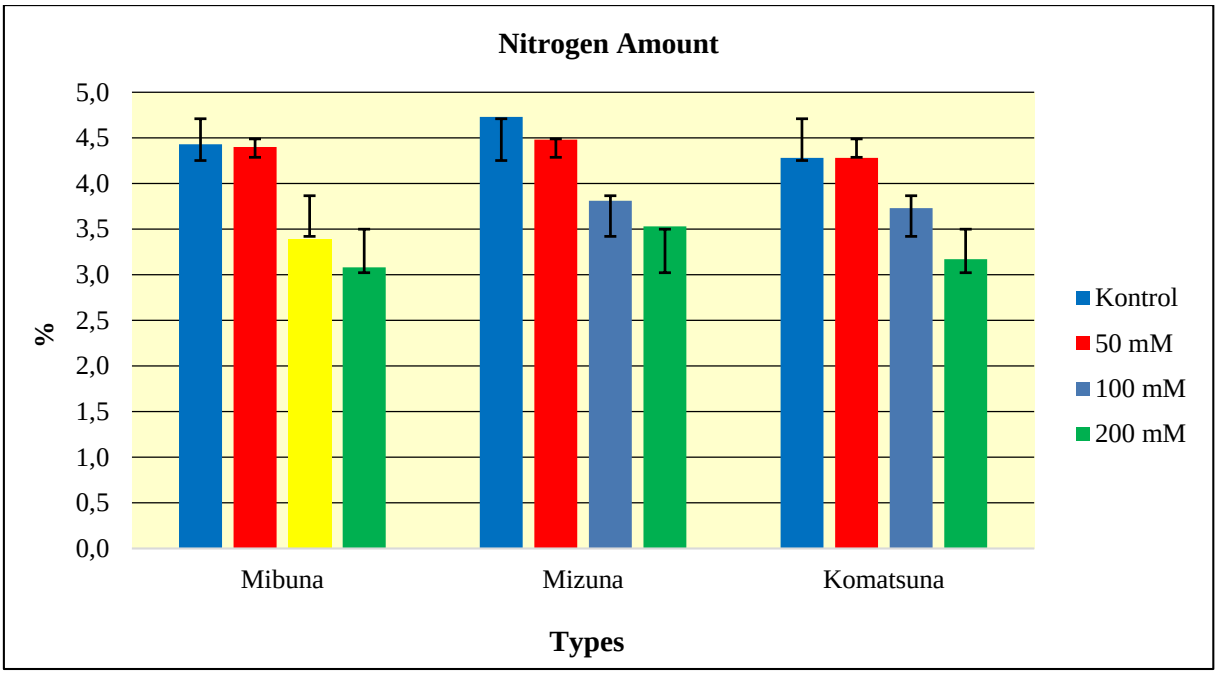


Figure 1. Effects of different salt concentrations on the mean nitrogen (%) of mibuna, mizuna and komatsuna plants

3.1.2. Phosphorus Amount (%)

It is seen that the differences in the amount of phosphorus in the leaves of the plants of the different salt amounts applied to the mibuna, mizuna and komatsuna plants are statistically significant at the 1% level.

Table 2. The effect of different salt stress applied to Mibuna, mizuna and komatsuna plants on the mean phosphorus (%)* and groups according to LSD test

		Salt Applications				**Avg.**
Criterion	**Type**	**Ctrl**	**50 mM**	**100 mM**	**200 mM**	
Phosphorus (%)	**Mibuna**	0,65 a	0,58 b	0,52 c	0,49 c	0,56
	% change in salinity compared to control		-10,77	-20,00	-24,62	
	Mizuna	0,56 a	0,53 ab	0,50 b	0,43 c	0,51
	% change in salinity compared to control		-5,36	-10,71	-23,21	
	Komatsuna	0,56 a	0,55 a	0,54 a	0,51 b	0,54
	% change in salinity compared to control		-1,79	-3,57	-8,93	

*There is no difference between the averages with the same letter.
LSD (%1)$_{Mibuna}$: 3,174854 LSD (%1)$_{Mizuna}$: 3,027104 LSD (%1)$_{Komatsuna}$: 3,027104

In the study, the effect of salt stress applied to mibuna, mizuna and komatsuna plants on the amount of phosphorus and the groups according to the LSD test are as shown in Table 2 and Figure 2.

In terms of the main effect of different salt amounts, it is understood that the amount of phosphorus decreases with the increase in the amount of salt.

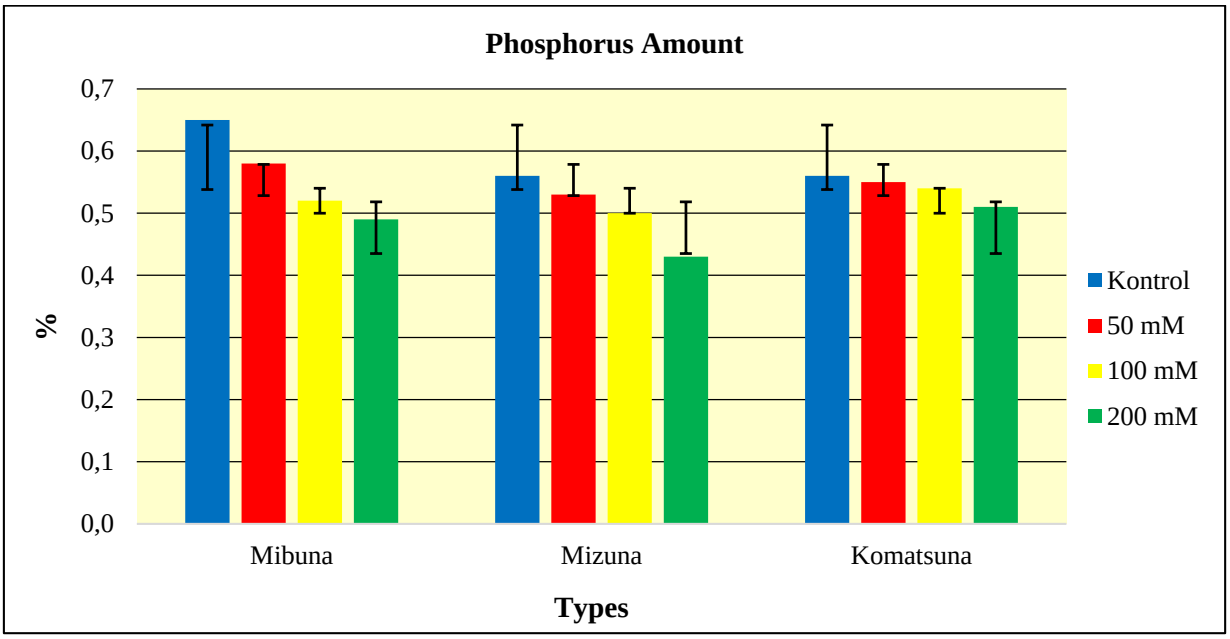


Figure 2. The effects of different salt concentrations on the mean phosphorus (%) of mibuna, mizuna and komatsuna plants

When the % changes of the species were examined in terms of phosphorus amount compared to the control, it was determined that the biggest difference was in mibuna (24.62% decrease), while the least change was in komatsuna plant leaves (8.93% decrease).

3.1.3. Potassium Amount (%)

The data on the amount of potassium in mibuna, mizuna and komatsuna plants, which are the subject of our research, are shown in Table 3 and Figure 3.

Table 3. The effect of different salt stress applied to Mibuna, mizuna and komatsuna plants on average potassium (%)* and groups according to LSD test

		Salt Applications				Avg.
Criterion	**Type**	**Ctrl**	**50 mM**	**100 mM**	**200 mM**	
Potassium (%)	**Mibuna**	3,20 a	2,55 b	2,00 c	1,82 c	2,39
	% change in salinity compared to control		-20,31	-37,50	-43,13	
	Mizuna	3,82 a	3,18 b	2,51 c	2,15 d	2,92
	% change in salinity compared to control		-16,75	-34,29	-43,72	
	Komatsuna	3,60 a	2,77 b	2,52 c	2,41 d	2,83
	% change in salinity compared to control		-23,06	-30,00	-33,06	

*There is no difference between the averages with the same letter.
LSD (%1)$_{Mibuna}$: 3,174854 LSD (%1)$_{Mizuna}$: 3,316026 LSD (%1)$_{Komatsuna}$: 3,316026

In this study, the effect of salt application was found to be statistically significant at the 1% level.

It is understood from Table 3 that the amount of potassium in the leaves decreased with increasing salt content compared to the control. When these reductions are considered on the basis of species, they were highest in mizuna (43.13%) and lowest in komatsuna (33.06%).

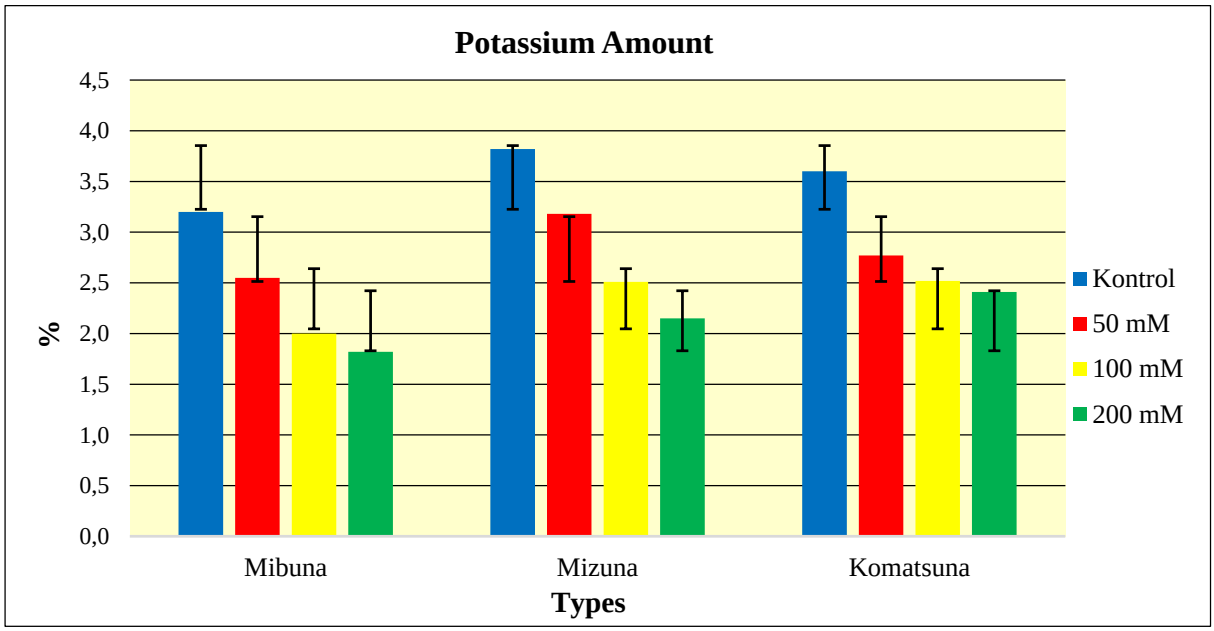


Figure 3. The effects of different salt concentrations on the averages of potassium (%) of mibuna, mizuna and komatsuna plants

3.1.4. Calcium Amount (%)

The averages of the changes in the calcium content of the salinity applied to the mibuna, mizuna and komatsuna plants that we have grown in the climate room during our research are given in

Table 4 and Figure 4.

Table 4. The effect of different salt stress applied to mibuna, mizuna and komatsuna plants on the average of calcium (%)* and groups according to LSD test

		Salt Applications				Avg.
Criterion	**Type**	**Ctrl**	**50 mM**	**100 mM**	**200 mM**	
Calcium (%)	**Mibuna**	2,76 a	2,54 b	2,52 b	1,80 c	2,41
	% change in salinity compared to control		-7,97	-8,70	-34,78	
	Mizuna	2,29 a	2,15 b	1,81 c	1,71 d	1,99
	% change in salinity compared to control		-6,11	-20,96	-25,33	
	Komatsuna	2,50 a	2,41 b	2,20 c	1,85 d	2,25
	% change in salinity compared to control		-3,60	-12,00	-26,00	

*There is no difference between the averages with the same letter.
LSD (%1)$_{Mibuna}$: 4,280972 LSD (%1)$_{Mizuna}$: 3,316026 LSD (%1)$_{Komatsuna}$: 3,189252

In this experiment, the main effect of salt application was found to be statistically significant at the 1% level.

When Table 4 is examined, the calcium content was found to be highest in mibuna (2.76%) in the control groups that did not receive salt, followed by komatsuna (2.50%) and mizuna (2.29%), respectively.

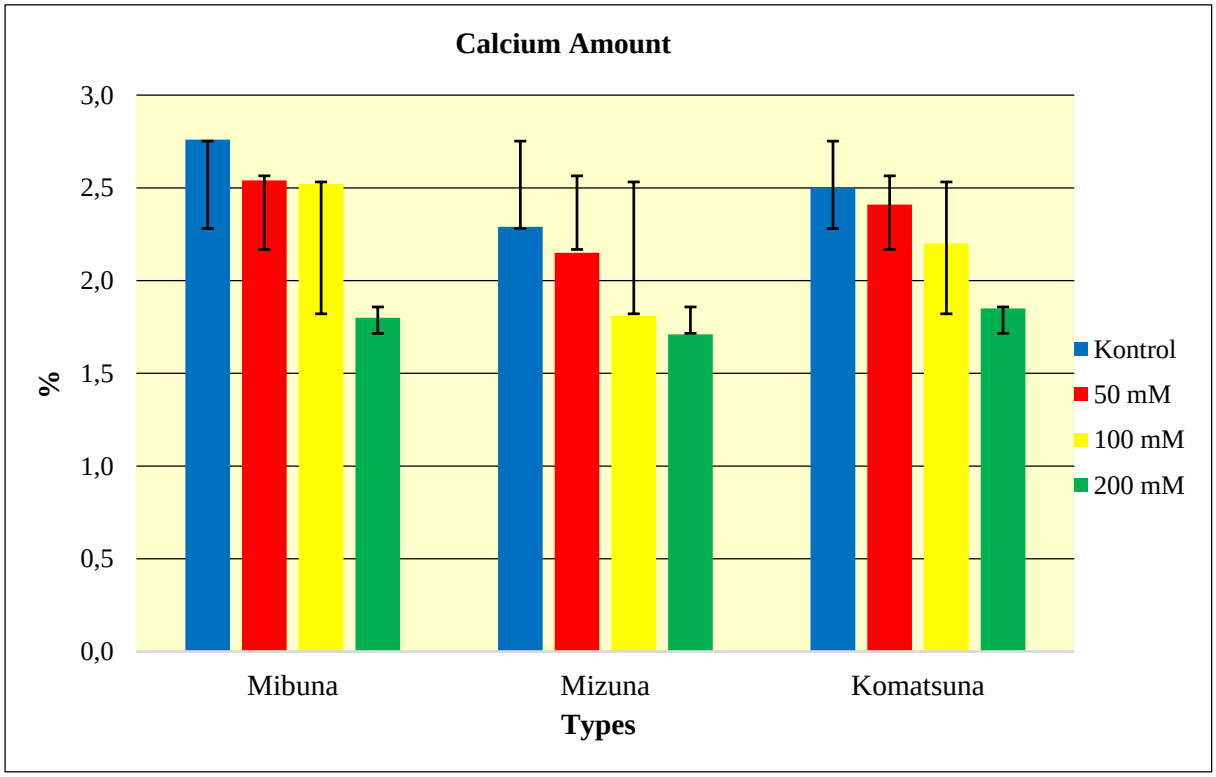


Figure 4. The effects of different salt concentrations on the mean calcium (%) of mibuna, mizuna and komatsuna plants.

Considering all the species that are the subject of this experiment, it is seen that there is a decrease in the amount of Ca with the increase in salt concentration, the highest value is in the control groups, and the lowest values are found in the groups where 200 mM salt concentration is applied.

3.1.5. Magnesium Amount (%)

The changes in magnesium amounts of mibuna, mizuna and komatsuna plants that we discussed in our experiment are given in Table 5 and Figure 5.

Table 5. The effect of different salt stress applied to Mibuna, mizuna and komatsuna plants on the average of magnesium (%)* and groups according to LSD test

		Salt Applications				Avg.
Criterion	**Type**	**Ctrl**	**50 mM**	**100 mM**	**200 mM**	
Magnesium (%)	**Mibuna**	0,42 a	0,41 a	0,35 b	0,30 c	0,37
	% change in salinity compared to control		-2,38	-16,67	-28,57	
	Mizuna	0,40 a	0,32 b	0,31 b	0,30 b	0,33
	% change in salinity compared to control		-20,00	-22,50	-25,00	
	Komatsuna	0,46	0,37	0,36	0,21	0,60
	% change in salinity compared to control		-19,57	-21,74	-54,35	

*There is no difference between the averages with the same letter.
LSD (%1)$_{Mibuna}$: 3,316026 LSD (%1)$_{Mizuna}$: 3,451429

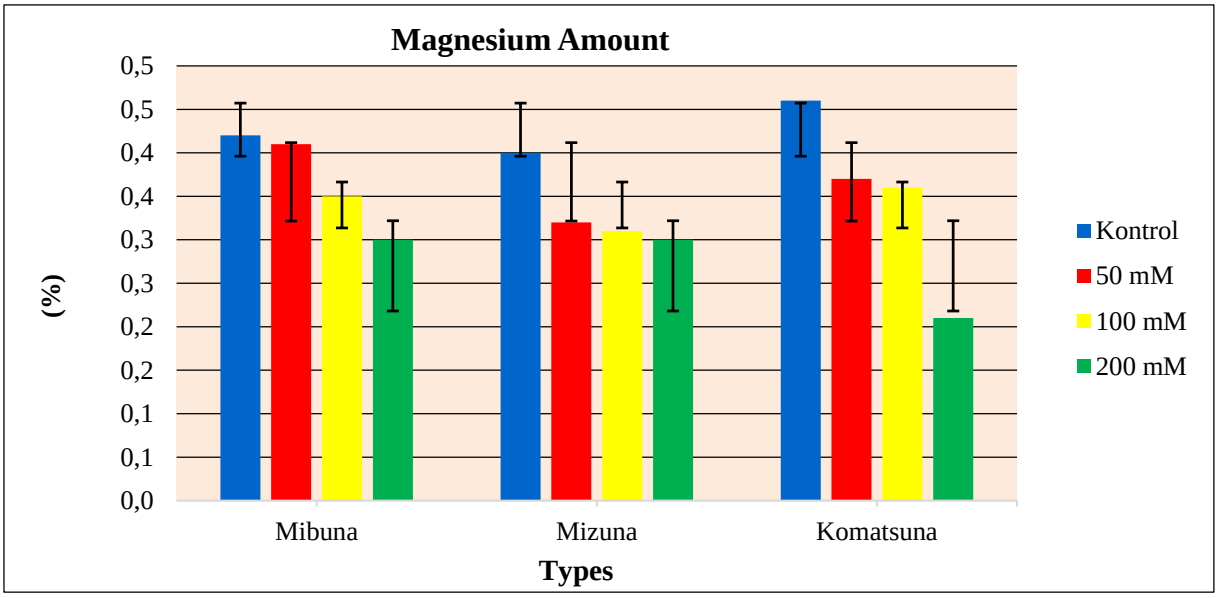


Figure 5. The effects of different salt concentrations on the mean magnesium (%) of mibuna, mizuna and komatsuna plants

As a result of the statistical analyzes made within each species that is the subject of this research, it was determined that the salt applications applied on mibuna and mizuna species were statistically significant at the level of 1%, while the difference between the averages of the komatsuna species was determined to be statistically insignificant.

3.1.6. Zinc Amount (ppm)

The changes in the amount of zinc with increasing salt applications in mibuna, mizuna and komatsuna plants included in our research are given in Table 6 and Figure 6.

When we compared the species in terms of % change in salinity compared to the control, the most change in the amount of zinc was observed in the mibuna leaves (39.01% decrease), while the least effect occurred in the komatsuna leaves (24.81% decrease).

While the control group had the highest manganese value in the species we examined in this study, it was observed that the amount of manganese decreased as the salt content increased.

Table 6. The effect of different salt stress applied to Mibuna, mizuna and komatsuna plants on zinc (ppm) averages* and groups according to LSD test

		Salt Applications				**Avg.**
Criterio	**Type**	**Ctrl**	**50 mM**	**100 mM**	**200 mM**	
Zinc (ppm)	**Mibuna**	156,00 a	149,00 b	96,67 c	95,15 c	124,20
	% change in salinity compared to control		-4,49	-38,03	-39,01	
	Mizuna	116,00 a	109,00 b	105,00 b	73,00 c	100,75
	% change in salinity compared to control		-6,03	-9,48	-37,07	
	Komatsuna	94,40 a	77,74 b	76,00 c	70,98 d	79,78
	% change in salinity compared to control		-17,65	-19,49	-24,81	

*There is no difference between the averages with the same letter.

LSD (%1)$_{Mibuna}$: 3,35449 LSD (%1)$_{Mizuna}$: 4,004482 LSD (%1)$_{Komatsuna}$: 1,333301

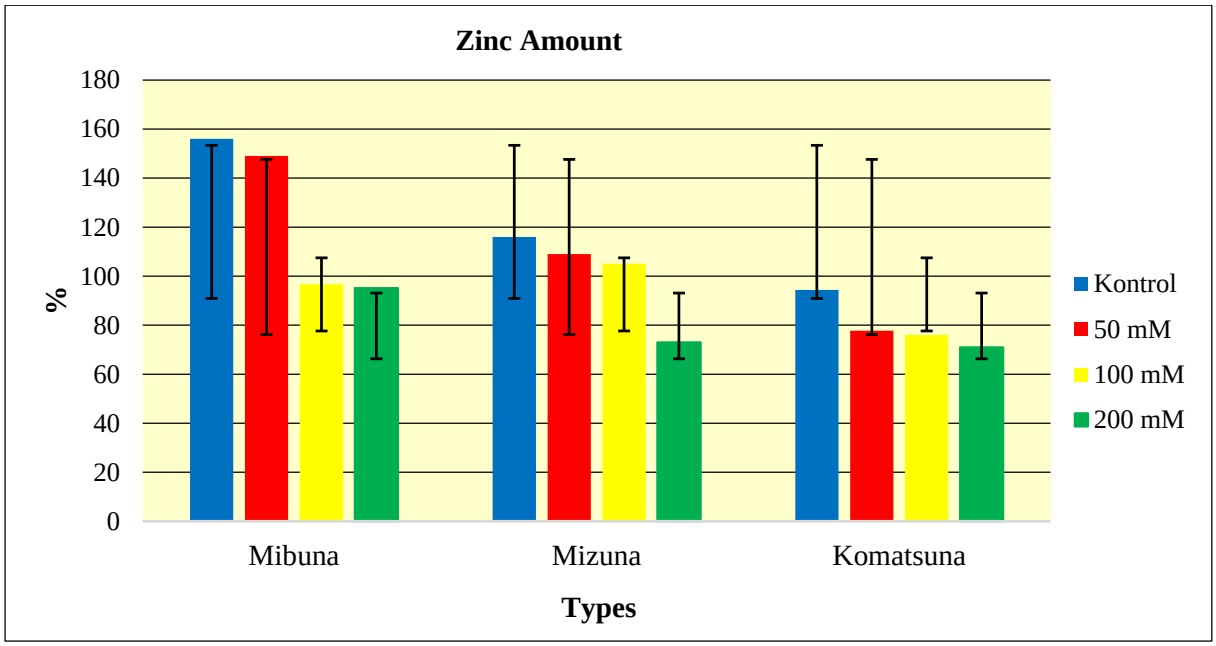


Figure 6. Effects of different salt concentrations on zinc (ppm) averages of mibuna, mizuna and komatsuna plants

3.1.7. Manganese Amount (ppm)

The effects of different salt concentrations applied to mibuna, mizuna and komatsuna plants on the manganese amount and their groups according to the LSD test are given in Table 7 and Figure 7 in the experiment.

In this study, the effect of salt concentration was statistically significant at the 1% level.

Table 7. The effect of different salt stress applied to Mibuna, mizuna and komatsuna plants on manganese (ppm) averages* and groups according to LSD test

		Salt Applications				**Avg.**
Criterion	**Type**	**Ctrl**	**50 mM**	**100 mM**	**200 mM**	
Manganese (ppm)	**Mibuna**	58,00 a	57,68 a	51,50 b	50,00 c	54,30
	% change in salinity compared to control		-0,55	-11,21	-13,79	
	Mizuna	90,00 a	74,65 b	74,00 b	68,00 c	76,66
	% change in salinity compared to control		-17,06	-17,78	-24,44	
	Komatsuna	46,81 a	43,00 b	43,00 b	41,49 b	43,58
	% change in salinity compared to control		-8,14	-8,14	-11,37	

*There is no difference between the averages with the same letter.

LSD (%1)$_{Mibuna}$: 1,49834 LSD (%1)$_{Mizuna}$: 1,883141 LSD (%1)$_{Komatsuna}$: 3,320169

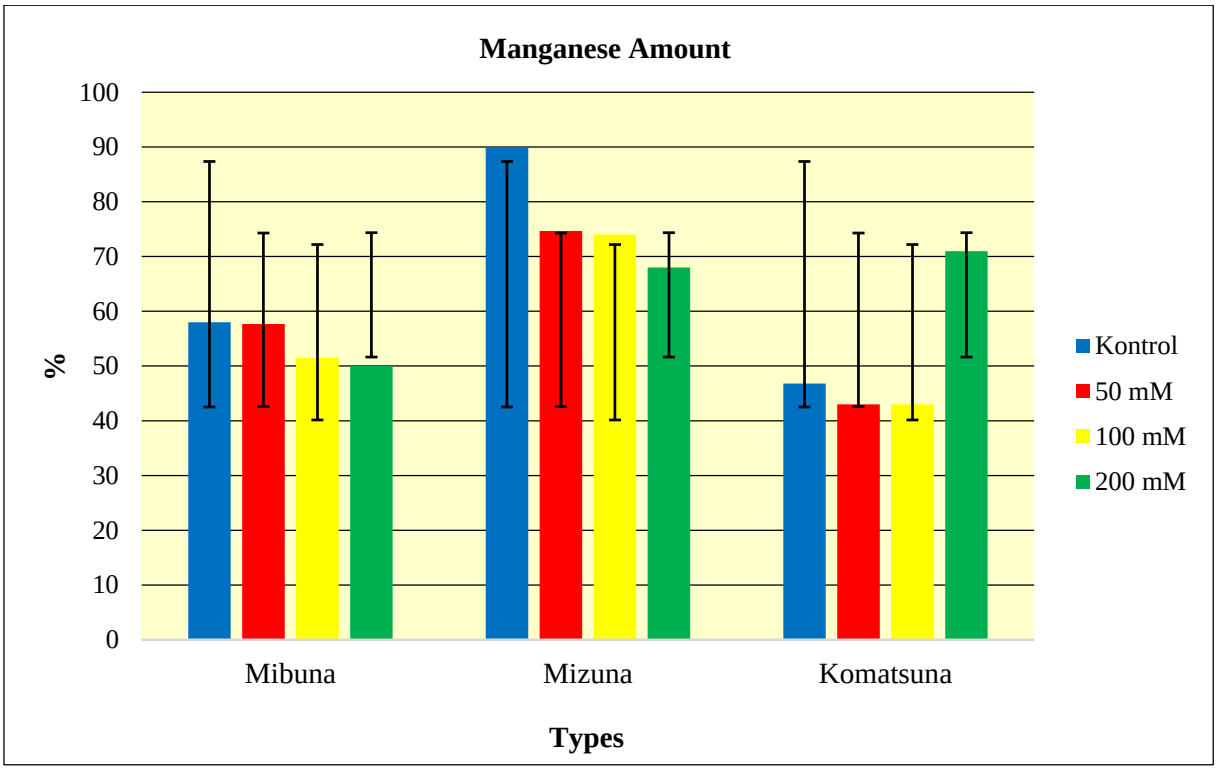


Figure 7. Effects of different salt concentrations on manganese (ppm) averages of mibuna, mizuna and komatsuna plants

While the control group had the highest manganese value in the species we examined in this study, it was observed that the amount of manganese decreased as the salt content increased. When the species were compared in terms of % change in salinity compared to the control, the most change in manganese content was seen in mizuna leaves (24.44% decrease), while the least effect in manganese content from salt stress occurred in komatsuna leaves (11.37% decrease).

3.1.8. Copper Amount (ppm)

The effects of different salt concentrations applied to mibuna, mizuna and komatsuna plants in our study on the total copper amount and LSD test groups are given in Table 8 and Figure 8. When the total copper amounts in Mibuna, mizuna and komatsuna plants were considered in terms of salt effect, the highest copper content was seen in the control groups, while the lowest copper amounts were found in 200 mM salt application.

Significant decreases occurred in the amount of copper in the leaves in all three species, from control applications with no salt application to 200 mM salt application. While these ratios showed themselves in the first place with a decrease of 43.16% in 200 mM compared to the control, this decrease was determined as 27.54% in mizuna.

Similar to the results of this experiment, researchers reported that the amount of copper in plants

decreased due to the increase in salt concentration in different vegetable species (Erdal et al. 2000, Bilgin and Yıldız 2008, Esringü et al. 2011, Kalyoncu 2013, Bora 2015, Tuğcu 2016).

Table 8. The effect of different salt stress applied to mibuna, mizuna and komatsuna plants on copper (ppm) averages* and groups according to LSD test

		Salt Applications				**Avg.**
Criterion	**Type**	**Ctrl**	**50 mM**	**100 mM**	**200 mM**	
Copper (ppm)	**Mibuna**	22,45 a	17,78 b	14,51 c	12,76 d	16,88
	% change in salinity compared to control		-20,80	-35,37	-43,16	
	Mizuna	17,94 a	15,43 b	14,95 b	13,00 c	15,33
	% change in salinity compared to control		-13,99	-16,67	-27,54	
	Komatsuna	21,00 a	15,39 b	13,74 c	13,00 d	15,78
	% change in salinity compared to control		-26,71	-34,57	-38,10	

*There is no difference between the averages with the same letter.

LSD (%1)$_{Mibuna}$: 0,1658013 LSD (%1)$_{Mizuna}$: 1,510522 LSD (%1)$_{Komatsuna}$: 9,525544

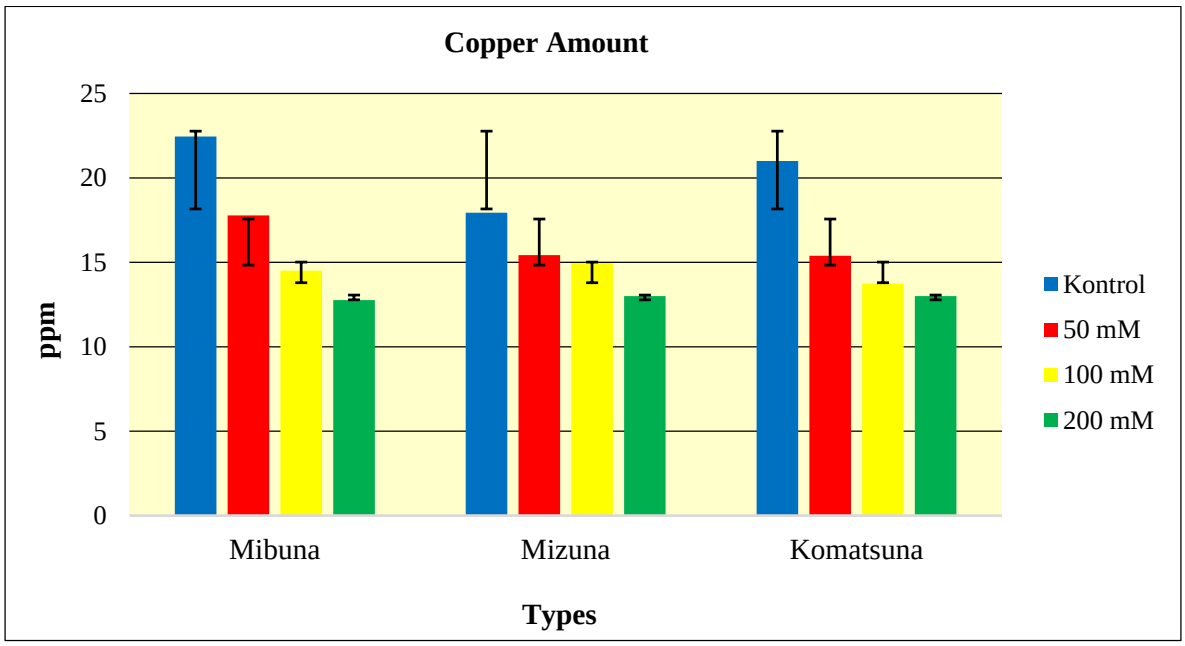


Figure 8. Effects of different salt concentrations on copper (ppm) averages of mibuna, mizuna and komatsuna plants

3.1.9. Iron Amount (ppm)

The iron content research findings and LSD test results of mibuna, mizuna and komatsuna vegetable species grown in the climate chamber are given in Table 9 and Figure 9.

In the data obtained in Table 9, all 3 species were subjected to statistical analysis within themselves and were found to be statistically significant at the 1% level among the averages.

Table 9. The effect of different salt stress applied to Mibuna, mizuna and komatsuna plants on iron (ppm) averages* and groups according to LSD test

		Salt Applications				Avg.
Criterion	**Type**	**Ctrl**	**50 mM**	**100 mM**	**200 mM**	
Iron (ppm)	**Mibuna**	124,00 a	120,00 b	102,00 c	83,64 d	107,41
	% change in salinity compared to control		-3,23	-17,74	-32,55	
	Mizuna	115,00 a	111,00 b	109,00 b	102,15 c	109,29
	% change in salinity compared to control		-3,48	-5,22	-11,17	
	Komatsuna	157,00 a	123,00 b	103,00 c	92,00 d	118,75
	% change in salinity compared to control		-21,66	-34,39	-41,40	

*There is no difference between the averages with the same letter.
LSD (%1)$_{Mibuna}$: 2,914521 LSD (%1)$_{Mizuna}$: 3,365399 LSD (%1)$_{Komatsuna}$: 4,11728

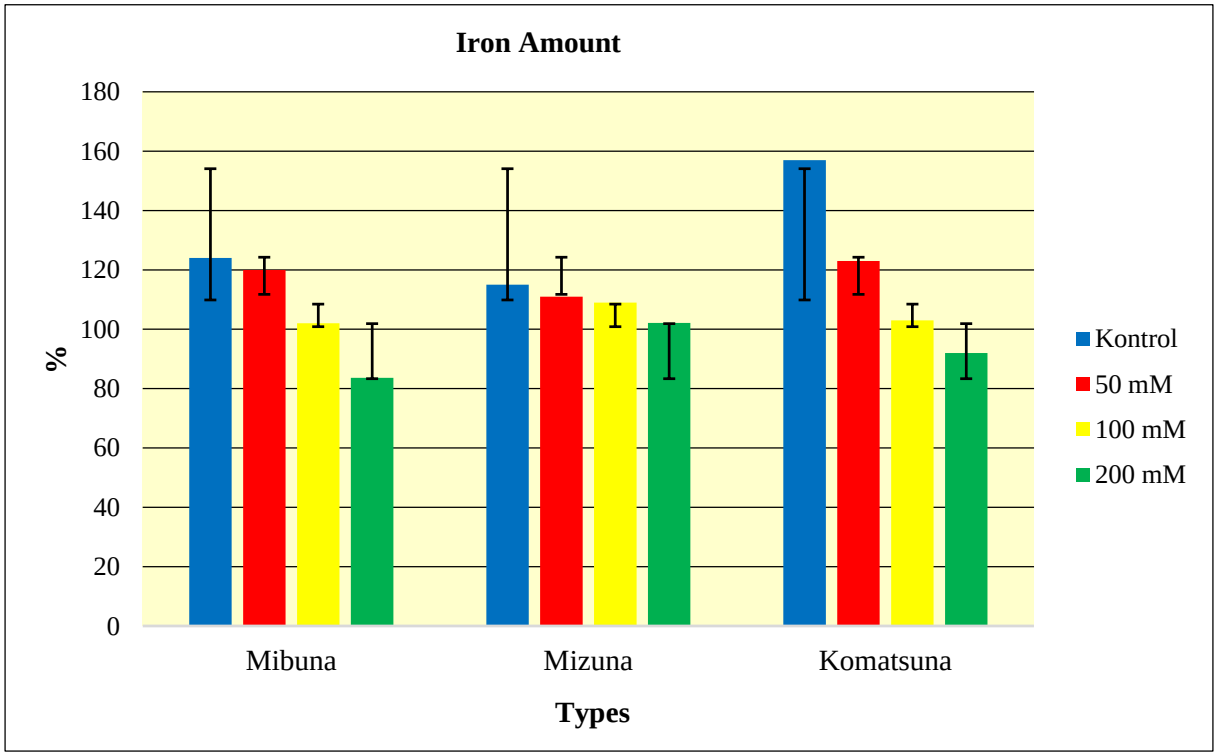


Figure 9. Effects of different salt concentrations on iron (ppm) averages of mibuna, mizuna and komatsuna plants

The variation of iron content against salt stress is given in Table 9. According to the amount of change that occurs from the control applications towards the highest salt amount; While the least amount of iron decreased in mizuna (11.17%), then in mibuna (32.55%), the highest decrease in iron amount occurred in komatsuna (41.40%).

Similarly, in salinity studies conducted by different researchers, it has been stated that there is a decrease in the amount of iron taken by the plant due to the increase in the salt ratio in the

plant (Erdal et al. 2000, Köse 2011, Arıcı and Erarslan 2012, Bora 2015, Tuğcu 2016, Öztürk 2018).

4. CONCLUSION

Salt stress occurs in the soil due to the increase in the ratio of NaCl and other soluble salts. This negatively affects the growth and development of the plant. The increase in the amount of salt in the soil and the decrease in water intake reduce the osmotic potential in the cells and cause quite a reaction in the plant. Therefore, salt stress affects plant growth, development, germination rate, photosynthesis and many other biological factors based on amount and duration.

In this study, mibuna, mizuna and komatsuna plants were inversely proportional to the increase in salt concentrations; It was observed that there were decreases in the ratios of macro and micro nutrients (N, P, Ca, K, Zn, Cu, Fe, Mg, Mn) in the leaves. Therefore, it was determined that all of these criteria decreased with the increase in the amount of salt.

As a result, it is a well-known fact that salinity problems in soils are inevitable due to global warming and water scarcity in our country and the world in recent years. For this reason, the cultivation of mibuna, which is known as Japanese greens, which we have discussed especially in terms of vegetable cultivation and increasing diversity, especially in regions with salinity problems, is recommended due to its tolerance to salt.

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BAZI EGZOTİK SEBZE TÜRLERİNDE FARKLI KURAKLIK UYGULAMALARININ FİZYOLOJİK DEĞİŞİKLİKLER ÜZERİNE ETKİSİ

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ÖZET

Bu araştırmada materyal olarak Mibuna (*Brassica rapa* var. nipposinica), Mizuna (*Brassica rapa* var. Japonica), Misome (*Brassica campestris* var. narinosa), Komatsuna (*Brassica rapa* var. perviridis), Japon hardalı (*Brassıca juncea* L.), Çin hardalı (*Brassica campestris* var. chinensis), Kişniş (*Coriandrum sativum* L.), Frenk soğanı (*Allium schoenoprasum*), Fesleğen (*Ocimum basilicum*), Molehiya (*Corchorus capsularis* ve *Corchorus olitoruus*) kullanılmıştır. Tüm deneyler, 25/20 °C (gündüz /gece) sıcaklık, %65-70 nem, 12/12 (aydınlık/karanlık) saatlik fotoperiyodik düzende, 400 µmol $m^{-2}s^{-1}$ ışık şiddetine sahip iklim odasında gerçekleştirilmiştir. Bitkiler iklim odasında çıkış ve fide dönemlerine kadar damla sulama ile Hoagland besin çözeltisi içeren hidroponik sisteme alınmış, daha sonra 800 ml hacminde multipotlara alınarak Hoagland çözeltisi ile beraber su stresi uygulamalarına başlanmıştır. Deneme tesadüf parselleri deneme desenine göre 5 tekerrürlü olarak kurulmuştur. Her tekerrürde 10 tür (Mibuna, Mizuna, Misome, Komatsuna, Japon hardalı, Çin hardalı, Kişniş, Frenk Soğanı, Fesleğen ve Molehiya) ve 4 PEG6000 konsantrasyonu (kontrol, -4 MPa, -8 MPa ve -12 MPa) uygulaması bulunmaktadır. Hasat döneminde, bitkilerde membran zararlanma indeksi (%), yaprak stoma geçirgenliği (mmol $m^{-2}s^{-1}$), yaprak sıcaklıkları (°C) ile yaprak hücrelerinde klorofil miktarı (SPAD değeri), ölçümleri yapılmıştır. Elde edilen sonuçlara göre denemede su stresinin artmasına ters orantılı olarak egzotik sebze türlerinin hepsinde; yaprak klorofil miktarlarında azalmaların olduğu görülmüştür. Buna karşın ele alınan türlerin yaprak stoma geçirgenlikleri ile yaprak sıcaklıkları, su konsantrasyonu artışıyla doğru orantılı olarak artmıştır. Sonuç olarak; kuraklık problemi olan yerlerde diğer türlere göre kuraklığa daha dayanıklı olduğu görülen Frenk soğanı, Molehiya ve Japon hardalı yetiştiriciliği önerilmektedir.

Anahtar Kelimeler: Japon yeşillikleri, PEG6000, yaprak sıcaklığı, klorofil, stoma geçirgenliği

THE EFFECT OF DIFFERENT DROUGHT APPLICATIONS ON PHYSIOLOGICAL CHANGES IN SOME EXOTIC VEGETABLE SPECIES

ABSTRACT

In this study, Mibuna (*Brassica rapa* var. nipposinica), Mizuna (*Brassica rapa* var. Japonica), Misome (*Brassica campestris* var narinosa), Komatsuna (*Brassica rapa var.* perviridis), Japanese mustard (*Brassıca juncea* L.), Chinese mustard (*Brassica campestris* var. chinensis), Coriander (*Coriandrum sativum* L.), Chives (*Allium schoenoprasum*), Basil (*Ocimum basilicum*), Molehiya (*Corchorus capsularis* and *Corchorus olitoruus*) were used as plant material. All experiments were carried out in a climate room with a temperature of 25/20 °C (day/night), 65-70% humidity, 12/12 (light/dark) hour photoperiodical order, and a light intensity of 400 µmol $m^{-2}s^{-1}$. Hoagland hydroponic solution was given by drip irrigation in hydroponic system during the emergence and seedling periods, and then water stress applications were launched. The experiment was set up in a randomized plot design with 5 replications. There are 10 species (Mibuna, Mizuna, Misome, Komatsuna, Japanese mustard, Chinese mustard, Coriander, Chives, Basil and Molehiya) and 4 PEG6000 concentrations (control, -4 MPa, -8 MPa and -12 MPa) per replication. During the harvest period, leaf temperatures (°C), membrane damage index in leaf cells (%), chlorophyll content (SPAD Value) and leaf stomatal permeability (mmol $m^{-2}s^{-1}$) measurements were made in plants. According to the obtained results from the trial, when the PEG_{6000} concentrations in the Hoagland hydroponic solution was increased chlorophyll amount in the leaves decreased. Contrary to these results, leaf stoma permeability and leaf temperature values increased with the increasing rates of water stress. As a result; In places with drought problems, chives, Molehiya and Japanese mustard cultivation are recommended, which seem to be more drought-resistant than other species.

Keywords: Japanese greens, PEG6000, leaf temperature, chlorophyll, stomatal permeability

1. GİRİŞ

Dünya üzerindeki kullanılabilir alanlar stres faktörlerine göre sınıflandırıldığında doğal bir stres faktörü olan kuraklık stresi %26'lık payıyla en büyük dilimi içermektedir. Bunu %20 ile mineral stresi ve %15 ile soğuk ve don stresi takip etmektedir. Bunların dışında kalan diğer tüm stresler %29'luk bir pay alırken, yalnızca %10'luk bir alan herhangi bir stres faktörüne maruz kalmamaktadır. Dünyadaki doğal kaynakların nüfusu besleme kapasitelerinin azalmasına ve bunun sonucunda milyonlarca insanın açlıktan ölmesine neden olabileceği göz önüne alındığında, kuraklık, dünya üzerindeki tüm canlı yaşamı için tehlike oluşturmaktadır (Blum, 1986).

Çeşitli iklim modellerine göre, 2030'lu yıllar itibarı ile karmaşık iklim yapısı içinde olan Türkiye'nin, özellikle küresel ısınmaya bağlı olarak gerçekleşecek bir iklim değişikliğinden, büyük oranda etkileneceği, büyük bir kısmının kuru ve sıcak bir iklimin etkisine gireceği, su kaynakları, ekolojik ve ekonomik süreçler, ekosistem ve biyolojik çeşitlilik, tarım gibi birçok alanda önemli ölçüde etkileneceği öngörülmüştür (Demir, 2009).

Türkiye karmaşık iklim yapısı içinde, özellikle küresel ısınmaya bağlı olarak, bir iklim değişikliğinden en fazla etkilenecek ülkelerden birisidir. Doğal olarak üç tarafından denizlerle çevrili olması, arızalı bir topografyaya sahip bulunması ve orografik özellikleri nedeniyle, Türkiye'nin farklı bölgeleri iklim değişikliğinden farklı biçimde ve değişik boyutlarda etkilenecektir. Örneğin, sıcaklık artışından daha çok çölleşme tehdidi altında bulunan Güney Doğu ve İç Anadolu gibi, kurak ve yarı kurak bölgelerle, yeterli suya sahip olmayan yarı nemli Ege ve Akdeniz Bölgeleri daha fazla etkilenmiş olacaktır. Meydana gelecek iklim değişiklikleri, tarımsal faaliyetlerde hayvan ve bitkilerin doğal yaşam alanlarında değişikliklere yol açacak, özellikle yukarıda belirtilen bölgelerimizde, su kaynakları bakımından önemli sorunlar ortaya çıkacaktır (Öztürk, 2002). Tüm dünyada olduğu gibi Türkiye'de küresel ısınmanın özellikle su kaynaklarının zayıflaması, kuraklık ve çölleşme ile buna bağlı ekolojik bozulmalarla karşı karşıya olup küresel ısınmanın potansiyel etkileri açısından risk grubu ülkeler arasındadır. Küresel iklim değişikliği, kurak ve yarı kurak alanların genişlemesine ek olarak kuraklığın süresinde ve şiddetindeki artışlar, çölleşme süreçlerini, tuzlanma ve erozyonu da tetikleyeceği bildirilmektedir (Türkeş, 1997). Tüm dünyada olduğu gibi ülkemizde de küresel iklim değişikliği ve kuraklık son dönemlerde yetiştiricilik açısından önemli durumlara gelmiştir. Bölgemizde çoğunlukla yaz döneminde yapılan sebze yetiştiriciliği kurak ve yağışsız şartlara denk gelebilmektedir. Bu araştırmada Türkiye için yeni sebzelerden olan Uzak Doğu kökenli 10 farklı egzotik kökenli sebze fidesinin farklı kuraklık şartlarında meydana getirdiği

fizyolojik, morfolojik ve kimyasal değişiklikleri belirlenmeye çalışılmıştır.

2. MATERYAL VE YÖNTEM

Denemede bitkilerin yetiştiriciliği ile fizyolojik analizler Tekirdağ Namık Kemal Üniversitesi Ziraat Fakültesi Bahçe Bitkiler Bölümü fizyoloji laboratuvarı ve iklim Ünitesi'nde yapılmıştır.

2.1. Materyal

Bu araştırmada materyal olarak mibuna (*Brassica rapa* var. *nipposinica*), mizuna (*Brassica* var. *japonica*), misome (*Brassica campestris narinosa*), komatsuna (*Brassica rapa* var. *perviridis*), Japon hardalı (*Brassıca juncea* L.), Çin hardalı (*Brassica campestris* var. *chinensis*), kişniş (*Coriandrum sativum* L.), Frenk soğanı (*Allium schoenoprasum*), fesleğen (*Ocimum basilicum*), molehiya (*Corchorus capsularis* ve *Corchorus olitoruus*) kullanılmıştır.

2.2. Yöntem

2.2.1. Denemenin Kuruluşu

Denememiz kontrollü koşullar altında sıcaklığı +40°C ile –20°C arasında ayarlanabilen iklim odasında kurulmuştur (Şekil 1). Bitkilerin yetiştiriciliği, 25/20°C sıcaklık (gündüz/gece), %65-70 nem, 12/12 (aydınlık/karanlık) saatlik fotoperiyodik düzende, 400 µmol $m^{-2}s^{-1}$ ışık şiddetine sahip iklim odasında gerçekleştirilmiştir (Şekil 2).



Şekil 1. Bitkilerin yetiştirildiği bilgisayar kontrollü iklim ünitesi görünümü



Şekil 2. Sıcaklık ve ışık sistemleri görünümü

Yetiştirme odasında yetiştirme masaları üzerinde plastik multipotlara tohum ekimi yapılmıştır 10 türe ait bitki tohumlarının her biri 35 gözlü viyollere ekilmiştir (Şekil 3).



Şekil 3. Tohum ekimi yapılmış viyoller

Tohum ekimi torf içerisine yapılmış ve normal bakım işlemleri yapılarak iklim odasında fide hasat dönemine kadar (3-4 gerçek yapraklı dönem sonuna kadar) uygun şartlarda yetiştirilmiştir (Eşiyok vd., 2008). Tohumların çimlenmesinden sonra fide şaşırtma dönemine kadar Hoagland besin çözeltisi içeren (Hoagland ve Arnon 1950) hidroponik sisteme alınmıştır. Kuraklık şartları; ilk gerçek yaprakların görüldüğü dönemden itibaren -4, -8 ve -12 MPa su potansiyeli sağlayacak şekilde besin tanklarına PEG6000 ilave edilerek (Şekil 4) sağlanmıştır (Michel ve Kaufmann, 1973).



Şekil 4. PEG_{6000} hazırlanması ve uygulanması

2.2.2. Verilerin Değerlendirilmesi

Tesadüf parselleri deneme deseni göre 5 tekerrürlü olarak kurulan araştırmada her tekerrürde 10 tür ve 4 kuraklık koşulundan (kontrol, -4, -8 ve -12 MPa PEG_{6000}) oluşmuştur.

Denemede materyal olarak;

1. Mibuna (*Brassica rapa* var. nipposinica),
2. Mizuna (*Brassica rapa* var. Japonica),
3. Misome (*Brassica campestris* var. narinosa),
4. Komatsuna (*Brassica rapa* var. perviridis),
5. Japon hardalı (*Brassıca juncea* L.),
6. Çin hardalı (*Brassica campestris* var. chinensis),
7. Kişniş (*Coriandrum sativum* L.),
8. Frenk soğanı (*Allium schoenoprasum*),
9. Fesleğen (*Ocimum basilicum*),
10. Molehiya (*Corchorus capsularis* ve *Corchorus olitoruus*) kullanılmıştır.

Denemenin tamamında 5 tekerrür, 10 tür ve 4 kuraklık koşulu bulunmaktadır. Toplam 200 parsel (5 tekerrür X 10 tür X 4 kuraklık ortamı) olan denemede, her parselde 10 bitki ve tüm denemede toplam 2000 bitki kullanılmıştır.

Denemeden elde edilen verilerin istatistiki analizleri MSTAT versiyon 3,00/EM paket programı kullanımıyla yapılmıştır. Önemli bulunan farklılıklar için LSD kontrol yöntemiyle farklılığı oluşturulan gruplar tespit edilmiştir (Akdemir vd., 2004).

2.2.3. Yaprak hücrelerinde membran zararlanmasının belirlenmesi (%)

Membran Zararlanma İndeksi-MZİ hücreden dışarıya verilen elektrolitin ölçülmesi ile hesaplanmıştır (Dlugokecka ve Kacperska-Palacz, 1978; Fan ve Blake, 1994). Fide hasat döneminde stres ve kontrol bitkilerinin yapraklarından 17 mm çapında alınan diskler de-iyonize su içerisinde 5 saat bekletildikten sonra EC ölçülmüş, aynı diskler 100˚C'de 10 dakika bekletildikten sonra çözeltinin EC değeri tekrar ölçülmüştür. Elde edilen değerden aşağıdaki formül yardımıyla (3.1) yaprak hücrelerinde membran zararlanması (%) belirlenmiştir.

MZİ=(Lt-Lc/1-Lc)x100

Lt: Tuz stresindeki yaprağın otoklav edilmeden önceki EC/Otoklav edildikten sonraki EC

Lc: Kontrol yaprağının otoklav edilmeden önceki EC/Otoklav edildikten sonraki EC

2.2.4. Yaprak stoma geçirgenliğinin belirlenmesi (mmol $m^{-2}s^{-1}$)

Fide hasat döneminde her parselde tesadüfi seçilmiş 3 fidenin yapraklarında stomalarından gaz geçişi 10-11 saatleri arasında Decagon marka SC-1 model taşınabilir porometre kullanılarak kaydedilmiştir (Fischer vd., 1998; Pietragalla ve Pask, 2012).

2.2.5. Yaprak sıcaklıklarının saptanması (°C)

Bitki yüzey sıcaklığının ölçülmesine dayalı infrared termometre tekniği bitkiye dokunmaksızın,

daha hızlı ve doğru ölçüm yapma olanağı sağlar. Ölçümlerde 7-18 mm dalga boyunda ışınları algılayan filtrelere sahip infrared termometre (IRT) (Raynger ST8 model) kullanılmıştır (Ödemiş ve Bastuğ, 1999). Fide hasat döneminde iklim odasında yaprak su potansiyelinin yapıldığı gün ortası ölçümleri öncesi her parselden tesadüfi seçilmiş 3 fidenin yapraklarının 3-4 bölgesinde yapılan sıcaklık ölçüm ortalamaları kullanılmıştır.

Klorofil tayini (SPAD Değeri)

Klorofil tayini için, fide hasat döneminde her parselden tesadüfi seçilmiş 3 fidenin yapraklarında, yaprağın ana damara yakın iki bölgesi "Konica Minolta SPAD-502" portatif klorofilmetre ile saat 11-14 saatleri arasında ölçülmüştür (Geravandi vd., 2011).

5. BULGULAR VE TARTIŞMA

3.1. Yaprak Hücrelerinde Membran Zararlanma İndeksi (%)

Bazı egzotik sebze türlerü fidelerine üzeine yapay kuraklık uygulamalarının yaprak membran zararlanması (%) ortalamalarına etkisi ve LSD testine göre gruplar Tablo 1 ve Şekil 5'de görüldüğü gibidir.

Tablo 1'de materyal olarak kullanılan 10 egzotik sebze türü üzerine farklı kuraklık uygulamalarının yaprak hücrelerinde membran zararlanmaları LSD testine göre %1 hata seviyesinde istatistiki olarak önemli çıkmıştır. Bu kriterimizde ölçülen değerler %0,15 ile %99,19 aralığında değişim göstermiştir.

PEG6000 ile oluşturulan yapay kuraklık uygulama konsantrasyonları artışına paralel şekilde türlerin yapraklarında meydana gelen yaprak hücresi membran zararlanması da artmıştır. Özetle kuraklık artışına bağlı olarak yaprak hücrelerinde membran zararı artmıştır.

Yaprak hücrelerinde membran zararlanmasındaki değişimleri kontrole göre olan azalışlar bakımından Tablo 1'de türler bazında inceleyecek olursak; En yüksek zararlanma kontrole göre %57966,67 (yaklaşık 580 kat zararlanma artışı) ile Kişniş bitkisinde olduğu görülmektedir. En düşük yaprak hücrelerinde membran zararlanması %3221,34 (yaklaşık 32 kat zararlanma artışı) ile Frenk soğanı bitkisinde olduğu görülmektedir.

Uyan (2011)'a göre kuraklık stresinde su yetersizliğine bağlı olarak, hücre membranlarının ve lipidlerin yapısında bozulma meydana gelmektedir. Buna bağlı olarak enzim aktivitelerini çalıştıran ve ozmotik düzenlemeyi sağlayan yapılarda zararlanma görülmektedir.

Araştırmacı bitki hücrelerinde çözünmüş madde konsantrasyonu arttığında ve su potansiyeli düştüğünde, hücresel membranların kararsızlaştığını ve fotosentetik safhanın aksadığını saptamıştır (Sağlam 2004).

Tablo 1. Bazı egzotik sebze türlerinde farklı kuraklık uygulamalarının yaprak hücrelerinde membran zararlanma indeksi (%) ortalamalarına etkisi ve LSD testine göre gruplar

Kriter	**Tür**	**PEG_{6000} Uygulamaları**				
		Kontrol	**-4 MPa**	**-8 MPa**	**-12 MPa**	**Ort.**
Yaprak hücrelerinde membran zararlanma indeksi (%)	**Mibuna**	0,95 d	14,35 c	61,71 b	76,54 a	38,39
	Kuraklıkta kontrole göre % artış		1410,53	6395,79	7956,84	
	Mizuna	0,62 c	40,19 b	68,17 a	88,37 a	49,34
	Kuraklıkta kontrole göre % artış		6382,26	10895,16	14153,23	
	Misome	0,93 d	20,24 c	52,46 b	87,99 a	40,41
	Kuraklıkta kontrole göre % artış		2076,34	5540,86	9361,29	
	Komatsuna	0,23 d	13,38 c	55,39 b	74,55 a	35,89
	Kuraklıkta kontrole göre % artış		5717,39	23982,61	32313,04	
	Japon hardalı	1,31 c	12,78 c	54,32 b	86,36 a	38,69
	Kuraklıkta kontrole göre % artış		875,57	4046,56	6492,37	
	Çin hardalı	0,73 c	10,68 c	56,63 b	81,13 b	37,29
	Kuraklıkta kontrole göre % artış		1363,01	7657,53	11013,70	
	Kişniş	0,15 d	11,58 c	62,52 b	87,1 a	40,34
	Kuraklıkta kontrole göre % artış		7620,00	41580,00	57966,67	
	Frenk soğanı	2,53 c	9,98 c	66,56 b	84,03 a	40,78
	Kuraklıkta kontrole göre % artış		294,47	2530,83	3221,34	
	Fesleğen	0,25 c	42,52 b	72,46 a	88,62 a	50,96
	Kuraklıkta kontrole göre % artış		16908,00	28884,00	35348,00	
	Molehiya	2,59 c	9,85 c	54,7 b	91,19 a	39,58
	Kuraklıkta kontrole göre % artış		280,31	2011,97	3420,85	

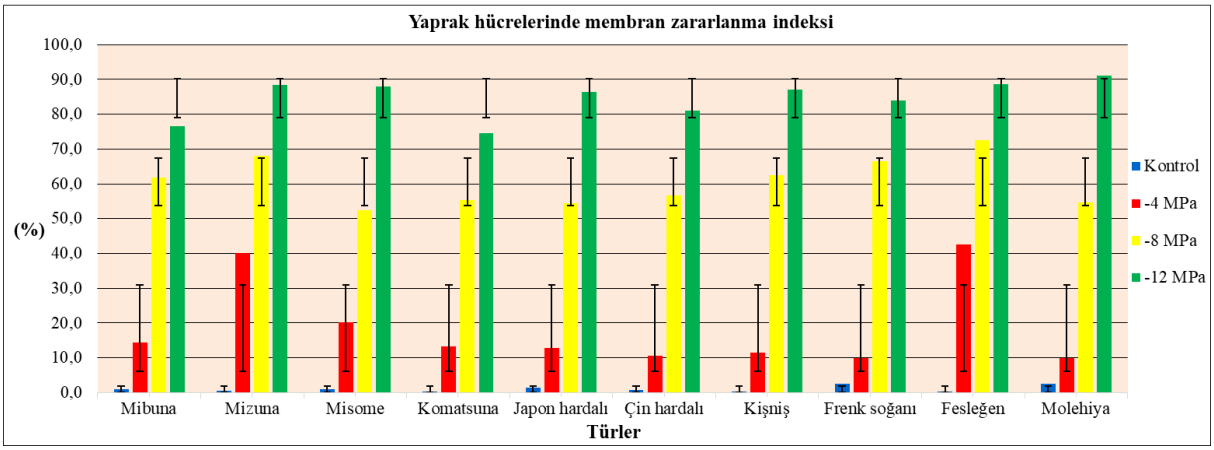
*Aynı harfi taşıyan ortalamalar arasında fark yoktur.

$LSD\ (\%1)_{Mibuna}$: 48,3313 $LSD\ (\%1)_{Mizuna}$: 22,6501 $LSD\ (\%1)_{Misome}$: 15,8714 $LSD\ (\%1)_{Komatsuna}$: 8,9763

$LSD\ (\%1)_{Japon\ hardalı}$: 12,4616 $LSD\ (\%1)_{Çin\ hardalı}$: 16,9646 $LSD\ (\%1)_{Kişniş}$: 6,4725

$LSD(\%1)_{Frenk\ soğanı}$: 11,8262

$LSD\ (\%1)_{Fesleğen}$: 26,2085 $LSD\ (\%1)_{Molehiya}$: 13,2709



Şekil 5. Farklı kuraklık uygulamalarının bazı egzotik sebze türlerinde yaprak hücrelerinde membran zararlanma indeksi (%) ortalamaları üzerine etkileri

Araştırıcıların farklı türlerde kuraklık stresi ile yaptıkları çalışmalarda kuraklığın artmasıyla yaprak dokularında membran bütünlüğünün ve geçirgenliğinin kontrol gruplarına oranla önemli miktarda artmış olduğu görülmüştür (Deveci ve Bora, 2016; Deveci ve Çelik, 2016; Deveci ve Pıtır, 2016; Deveci ve Uyan, 2011; Furkan ve Deveci, 2019; Ünal, 2010).

3.1.2. Yaprak Stoma Geçirgenliği (mmol $m^{-2}s^{-1}$)

Fide hasat döneminde her parselden tesadüfi seçilmiş 3 fidenin stomalarından gaz geçişi 10 – 11 saatleri arasında Decagon marka SC–1 model porometre kullanılarak ortalamalar kaydedilmiş ve bu ortalamalara ait değişimler Tablo 2 ve Şekil 6'da verilmiştir.

Tablo 2'de 10 tür egzotik sebze üzerine farklı dozlarda uygulanan yapay kuraklık koşullarının yaprak stoma geçirgenliklerine ait ortalamalar verilmiştir. Ortalamalar arasında istatistikî olarak %1 önem düzeyinde farklılıklar olduğu saptanmış ve bu ortalamaların oluşturdukları önem grupları verilmiştir.

Yaprak stoma direncine ait ortalamalar Tablo 2'de 6,15-61,48 mmol $m^{-2}s^{-1}$ aralığında değişmiştir.

Tablo 2. Bazı egzotik sebze türlerinde farklı kuraklık uygulamalarının yaprak stoma geçirgenliği (mmol $m^{-2}s^{-1}$) ortalamalarına etkisi ve LSD testine göre gruplar

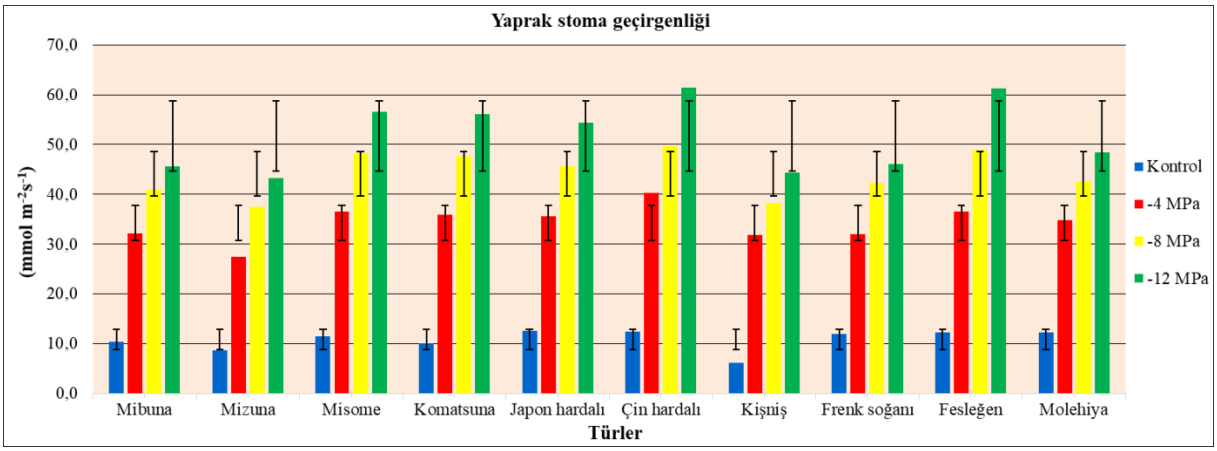
Kriter	Tür	PEG_{6000} Uygulamaları				Ort.
		Kontrol	-4 MPa	-8 MPa	-12 MPa	
Yaprak stoma geçirgenliği (mmol $m^{-2}s^{-1}$)	**Mibuna**	10,38 c	32,15 b	40,93 ab	45,6 a	32,27
	Kuraklıkta kontrole göre % artış		209,73	294,32	339,31	
	Mizuna	8,63 c	27,38 b	37,5 ab	43,25 a	29,16
	Kuraklıkta kontrole göre % artış		217,27	334,53	401,16	
	Misome	11,55 c	36,48 b	48,3 a	56,63	38,24
	Kuraklıkta kontrole göre % artış		215,84	318,18	390,30	
	Komatsuna	10,08 c	35,88 b	47,68 ab	56,03 a	37,42
	Kuraklıkta kontrole göre % artış		255,95	373,02	455,85	
	Japon hardalı	12,60 c	35,55 b	45,65 ab	54,3 a	40,99
	Kuraklıkta kontrole göre % artış		182,14	262,30	330,95	
	Çin hardalı	12,45 d	40,28 c	49,73 b	61,48 a	37,03
	Kuraklıkta kontrole göre % artış		223,53	299,44	393,82	
	Kişniş	6,15 b	31,85 a	38,18 a	44,3 a	30,12
	Kuraklıkta kontrole göre % artış		417,89	520,81	620,33	
	Frenk soğanı	11,93 d	32,05 c	42,25 b	46,08 a	33,08
	Kuraklıkta kontrole göre % artış		168,65	254,15	286,25	
	Fesleğen	12,23 d	36,55 c	48,83 b	61,3 a	39,73
	Kuraklıkta kontrole göre % artış		198,86	299,26	401,23	
	Molehiya	12,28 c	34,88 b	42,7 ab	48,45 a	34,58
	Kuraklıkta kontrole göre % artış		184,04	247,72	294,54	

*Aynı harfi taşıyan ortalamalar arasında fark yoktur.

$LSD\ (\%1)_{Mibuna}$: 9,9869 $LSD\ (\%1)_{Mizuna}$: 13,2028 $LSD(\%1)_{Misome}$: 9,7669 $LSD(\%1)_{Komatsuna}$: 16,2323

$LSD\ (\%1)_{Japon\ hardalı}$: 12,4376 $LSD\ (\%1)_{Çin\ hardalı}$: 8,8681 $LSD\ (\%1)_{Kişniş}$: 18,4279 $LSD(\%1)_{Frenk\ soğanı}$: 0,6230

$LSD\ (\%1)_{Fesleğen}$: 8,0108 $LSD\ (\%1)_{Molehiya}$: 7,8852



Şekil 6. Farklı kuraklık uygulamalarının bazı egzotik sebze türlerinde yaprak stoma geçirgenliği (mmol $m^{-2}s^{-1}$) ortalamaları üzerine etkileri

Denemede ana faktör olan kuraklık şartlarının her tür üzerine etkileri önemli çıkmıştır. Su kısıtının olmadığı kontrol şartlarından -12 MPa PEG6000 şartlarına doğru su kısıtlaması arttıkça stoma geçirgenliklerinde artışlar meydana gelmiştir. Yani kuraklığın artmasıyla stoma iletkenliğinin azaldığı, bunun yanı sıra, stoma direncinin arttığı anlaşılıştır.

Tablo 2'de en yüksek kuraklık uygulamasının (-12 MPa) kontrol uygulamalarına göre olan artışları incelendiğinde; Egzotik kökenli 10 bitki içinden en düşük yaprak stoma geçirgenlik oranı %286,25 (yani kontrole göre yaklaşık 2,9 kat artış) ile Frenk soğanında olmuştur. Kontrole göre en yüksek yaprak stoma geçirgenliği oranı %620,33 (yani kontrolün 6,2 katı artış) ile Kişnişe türüne ait fidelerin yapraklarında meydana gelmiştir. Frenk soğanı ile Kişniş arasında bu artış oranı çoğalarak artmış ve sıralama Molehiya, Japon hardalı, Mibuna, Misome, Çin hardalı, Mizuna, Fesleğen, Komatsuna şeklinde olmuştur.

Makbul vd. (2011) çalışmalarında kuraklık stresi koşullarında olan soya fasulyesi bitkisinde stoma iletkenliğinin azaldığı görülmüştür. Bunun sonucunda kuraklık stresine maruz bırakılan soya fasulyesinde bir takım anatomik ve fizyolojik değişikliler oluştuğu saptanmıştır.

Yılmaz vd. (2011)'ne göre, bitkiler üzerindeki stresin, net fotosentezi, transpirasyonu ve stoma iletkenliklerini azalttığını ve bunun yanısıra, stoma direncini de arttırdığını rapor etmişlerdir.

Miyashita vd. (2004) yaptıkları bir çalışmada normal sulanıp daha sonra su stresine maruz bırakılan Kidney fasulyelerin de (Phaseolus vulgaris L.) ilk iki gün içinde fotosentetik oran ve transpirasyon oranı ile stoma iletkenliğin azaldığı belirlemişlerdir.

Franca vd. (2000) bitki su ilişkilerinin fasulye üzerinde etkilerinin belirlenmesine yönelik çalışmalarında, sera koşullarında çeşitler arasında kuraklığa bağlı olarak büyüme oranı üzerine önemli farklılıklar belirlemişlerdir. Düşük seviyedeki su stresinde (Ψw= -0.60 MPa) bazı çeşitlerin stomalarını tamamen kapattığını, buna karşılık diğer çeşitlerin Ψw= -0.90 MPa'lık

stres koşulunda stomalarını kapadığını ve net asimilasyon oranının tamamen stoma açıklığı ile ilgili olduğunu belirtmişlerdir.

Denememizdeki stoma geçirgenliği üzerine elde ettiğimiz sonuçlar bu konuda deneme yapan araştırıcıların elde ettiği veriler ile paralellik göstermektedir.

3.2. Yaprak Sıcaklıkları (°C)

Denemede farklı türler üzerine uygulanan kuraklık uygulamalarının fide yaprak sıcaklıkları ortalamaları üzerine etkileri ve LSD testi grupları Tablo 3 ve Şekil 7'de gösterilmiştir.

Ortalamaların incelenmesi sonucunda yaprak sıcaklıkları bakımından her tür kendi içinde değerlendirilmiş ve yapay kuraklık koşullarının tüm türlerde % 1 hata düzeyinde istatistiki açıdan önemli olduğu saptanmıştır.

Bazı egzotik sebze türlerine ait yaprak sıcaklıkları ortalamaları Çizelge 4.15'de 25,85°C ile 30,33 °C arasında değişmiştir.

Tablo 3'de PEG_{6000} uygulamalarına ait ortalamalar arasındaki farklılık %1 seviyesinde önemli çıkmıştır. Türlerin kendi içerisinde değerlendirildiği Tabloda Yaprak sıcaklıkları kontrol parselindeki bitkilerde en düşük olurken bunu -4, -8 ve -12 MPa uygulamaları takip etmiştir.

Tablo 3. Bazı egzotik sebze türlerinde farklı kuraklık uygulamalarının yaprak sıcaklıkları (°C) ortalamalarına etkisi ve LSD testine göre gruplar

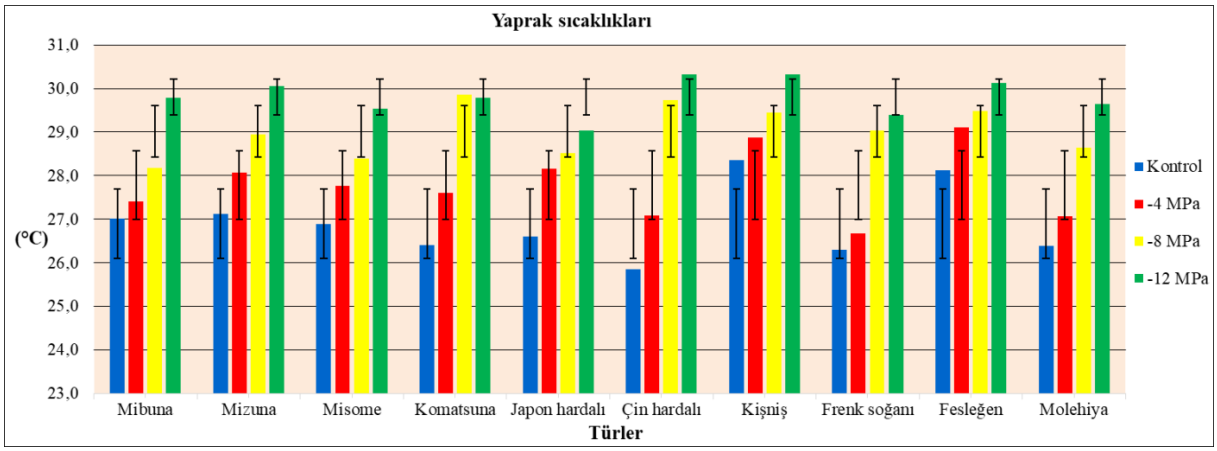
Kriter	Tür	PEG_{6000} Uygulamaları				Ort.
		Kontrol	-4 MPa	-8 MPa	-12 MPa	
Yaprak sıcaklıkları (°C)	**Mibuna**	27,12d	28,07c	28,94b	30,05a	28,48
	Kuraklıkta kontrole göre % artış		3,5	6,71	9,81	
	Mizuna	26,40d	27,60c	29,85b	29,78a	28,56
	Kuraklıkta kontrole göre % artış		4,55	13,07	15,15	
	Misome	26,88d	27,76c	28,40b	29,53a	28,14
	Kuraklıkta kontrole göre % artış		3,27	5,65	9,86	
	Komatsuna	27,02c	27,41c	28,17b	29,78a	28,10
	Kuraklıkta kontrole göre % artış		1,44	4,26	10,21	
	Japon hardalı	26,60c	28,15b	28,52b	29,04a	28,08
	Kuraklıkta kontrole göre % artış		5,83	7,22	9,17	
	Çin hardalı	26,29d	26,67c	29,03b	29,40a	27,85
	Kuraklıkta kontrole göre % artış		1,45	10,42	11,83	
	Kişniş	25,85d	27,08c	29,73b	30,33a	28,25
	Kuraklıkta kontrole göre % artış		4,76	15,01	17,33	
	Frenk soğanı	28,35d	28,87c	29,44b	30,33a	29,25
	Kuraklıkta kontrole göre % artış		1,83	3,84	6,98	
	Fesleğen	26,38d	27,07c	28,65b	29,65a	27,94
	Kuraklıkta kontrole göre % artış		2,62	8,61	12,4	
	Molehiya	28,13c	29,10b	29,48b	30,13a	29,21
	Kuraklıkta kontrole göre % artış		3,45	4,8	7,11	

*Aynı harfi taşıyan ortalamalar arasında fark yoktur.

$LSD\ (\%1)_{Mibuna}$: 0,6748 $LSD\ (\%1)_{Mizuna}$: 0,5184 $LSD\ (\%1)_{Misome}$: 0,3054 $LSD\ (\%1)_{Komatsuna}$: 0,193

$LSD\ (\%1)_{Japon\ hardalı}$: 0,4405 $LSD\ (\%1)_{Çin\ hardalı}$: 8,6395 $LSD\ (\%1)_{Kişniş}$: 0,3289 $LSD\ (\%1)_{Frenk\ soğanı}$: 0,2026

$LSD\ (\%1)_{Fesleğen}$: 0,4732 $LSD\ (\%1)_{Molehiya}$: 0,1496



Şekil 7. Farklı kuraklık uygulamalarının bazı egzotik sebze türlerinde yaprak sıcaklıkları (°C) ortalamaları üzerine etkileri

En yüksek su stresinin uygulandığı -12 MPa parselerinden elde edilen yaprak sıcaklıkları ortalamalarının kontrol şartlarına göre olan oranları Tablo 3'de Kuraklıkta kontrole göre % artış satırlarında verilmiştir. Bu oranlara göre türler içerisinde kontrol şartlarına göre en yüksek yaprak sıcaklığı artışı %17,33'lük artış ile Kışniş fide yapraklarında olmuştur. Yaprak sıcaklık artşının kontrole göre en az olduğu tür ise %6,98 ile Frenk soğanı olmuştur.

Bitkilerin büyüme döneminde aldığı su sınırlanırsa, gözenek direnci artar, tranpirasyon azalır ve yaprak sıcaklığı yükselir (Taiz ve Zeiger, 2008). Tablo 3 ve Şekil 7'den anlaşılacağı üzere kuraklık uygulamalarının tüm bitkilerin yaprak sıcaklıklarına genel olarak etkisi kuraklık artışına paralel olarak yaprak sıcaklığının da artmasıdır.

Buna göre kuraklık stresi sonucunda sınırlanan suya rağmen yaprak sıcaklığı en az yükselen Frenk soğanı olurken bunu Molehiya Japon hardalı, Mibuna, Misome, Komatsuna, Çin hardalı, Fesleğen ve mizuna izlemiştir. Kuraklık koşullarında yaprak sıcaklığı en fazla yükselerek su kıtlığına en hassas ise Kışniş olmuştur.

Daşgan (2008) bitkilerin düşük yaprak sıcaklığına sahip olması transpiransyonla kendini serinletme çabası olarak strese karşı bir adaptasyon mekanizması olabileceğini bildirmiştir.

Araştırıcılar bitkilerin strese girdiği ilk evrelerde oluşan belirtilerden birinin yaprak sıcaklığının artması olduğunu, bu durumu radyasyon emiliminin olmasından ve transpirasyonun engellenmesinden ileri geldiği şeklinde yorumlamışlardır (Buschmann ve Lichtenthaler, 1998; Chaerle ve Van Der Straeten, 2000).

Jackson vd. (1986) birçok arazi denemesi kurarak el radyometreleri ile bitki karakteristiklerinin spektral tepkilerini ölçmüşlerdir. Yapılan radyometik ölçümlere göre, bitki örtü sıcaklığı referans bir sıcaklık ile karşılaştırıldığında (hava sıcaklığı), kuraklık stresine ilişkin önemli bir gösterge değerindedir.

Su kısıtlamasının doğal sonucu olarak oluşan kuraklığın açıklanması üzerine çalışan araştırıcılar oluşan su stresi sonucu bitkilerin stomaları kapatmaları üzerine yaprak sıcaklıklarında artışlar meydana geldiğini ve bununda özellikle kuraklık ve tuzluluk stresinin belirlenmesinde etkili bir yöntem olduğunu bildirmişlerdir (Deveci ve Çelik, 2015; Deveci Pıtır, 2016; Deveci ve Uyan, 2011; Deveci ve Yarış, 2019; Furkan ve Deveci, 2019; Kaya, 2011; Küçükkömürcü, 2011; Süyüm, 2011; Tuğcu, 2016; Ünal, 2010).

3.3. Klorofil Miktarı (SPAD Değeri)

Araştırmada ele alınan 10 tür egzotik sebzeye ait ortalama klorofil miktarı değişimleri Tablo 4 ve Şekil 8'de gösterilmektedir.

Tablo 4. Bazı egzotik sebze türlerinde farklı kuraklık uygulamalarını klorofil miktarı (SPAD) ortalamalarına etkisi ve LSD testine göre gruplar

Kriter	Tür	PEG_{6000} Uygulamaları				Ort.
		Kontrol	-4 MPa	-8 MPa	-12 MPa	
Klorofil miktarı (SPAD)	**Mibuna**	29,32a	24,50b	22,03b	14,93c	22,70
	Kuraklıkta kontrole göre % azalış		-16,44	-24,86	-49,08	
	Mizuna	28,54a	21,14b	15,89c	9,15d	18,65
	Kuraklıkta kontrole göre % azalış		-25,93	-44,32	-67,94	
	Misome	41,03a	30,94b	26,57bc	20,86c	29,85
	Kuraklıkta kontrole göre % azalış		-24,59	-35,24	-49,16	
	Komatsuna	29,31a	24,39b	19,17c	13,68d	21,64
	Kuraklıkta kontrole göre % azalış		-16,79	-34,60	-53,33	
	Japon hardalı	33,82a	29,65b	24,26c	18,50d	26,56
	Kuraklıkta kontrole göre % azalış		-12,33	-28,27	-45,30	
	Çin hardalı	30,38a	26,04b	23,41b	13,05c	23,22
	Kuraklıkta kontrole göre % azalış		-14,29	-22,94	-57,04	
	Kişniş	22,92a	17,37b	13,80c	5,76d	14,96
	Kuraklıkta kontrole göre % azalış		-24,21	-39,79	-74,87	
	Frenk soğanı	30,22a	24,36b	22,81b	19,05c	24,11
	Kuraklıkta kontrole göre % azalış		-19,39	-24,52	-36,96	
	Fesleğen	8,37a	6,20b	4,90b	2,73c	5,55
	Kuraklıkta kontrole göre % azalış		-25,93	-41,46	-67,38	
	Molehiya	28,36a	23,41b	19,94c	16,13d	21,96
	Kuraklıkta kontrole göre % azalış		-17,45	-29,69	-43,12	

*Aynı harfi taşıyan ortalamalar arasında fark yoktur.

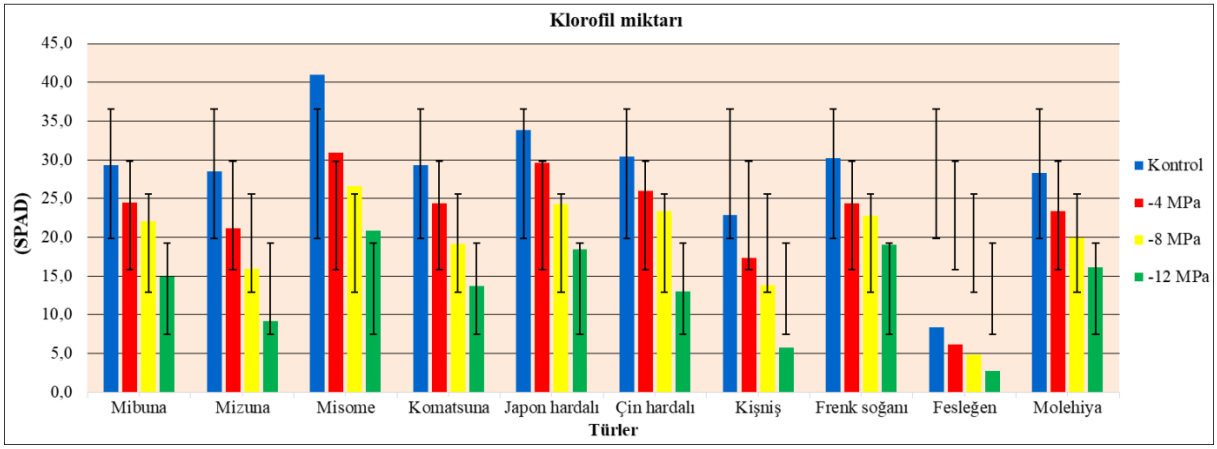
$LSD\ (\%1)_{Mibuna}$: 4,0495 $LSD\ (\%1)_{Mizuna}$: 3,1838 $LSD\ (\%1)_{Misome}$: 5,9125 $LSD\ (\%1)_{Komatsuna}$: 3,9826

$LSD\ (\%1)_{Japon\ hardalı}$: 2,2776 $LSD\ (\%1)_{Çin\ hardalı}$: 3,0177 $LSD\ (\%1)_{Kişniş}$: 1,2815 $LSD(\%1)_{Frenk\ soğanı}$: 2,0049

$LSD\ (\%1)_{Fesleğen}$: 1,5778 $LSD\ (\%1)_{Molehiya}$: 2,5196

Klorofil miktarı ortalamaları bakımından türler içerisindeki kuraklık dozları istatistiki olarak %1 seviyesinde önemli bulunmuş ve bu ortalamaların LSD testi grupları Tablo 4'de verilmiştir. Klorofil miktarı ortalamalarına bakılarak değerlendirme yapıldığında Mibuna, Mizuna, Misome, Komatsuna, Japon hardalı, Çin hardalı, Kişniş, Frenk soğanı, Fesleğen ve Molehiya bitkileri üzerine PEG6000 dozlarının istatistiksel açıdan önemli olduğu ve kuraklık arttıkça tüm bitkilerin klorofil miktarlarında düşüşler olduğu anlaşılmıştır.

Denemede en yüksek kuraklık uygulamasından elde edilen ortalamarın kontrol uygulamasına göre en yüksek klorofil miktarındaki azalma %74,87 lik oran ile Kişniş bitkisinde olurken yine kontrol uygulamasına göre en az klorofil miktarındaki azalma %36,96'luk oran ile Frenk soğanı bitkisinde meydana gelmiştir.



Şekil 8. Farklı kuraklık uygulamalarının bazı egzotik sebze türlerinde klorofil miktarı (SPAD) ortalamaları üzerine etkileri

Araştırıcıların yapmış olduğu bir çalışmada, klorofil değerlerinin kuraklık ve tuzluluk stresi altında yetiştirilen bitkilerde arttığı tespit edilmiştir (Kaya ve Daşgan, 2013).

Kuraklık stresi ile birlikte klorofil miktarında meydana gelen azalmalar genel olarak klorofil membranlarının zarar görmesi nedeniyle meydana gelmektedir (Yağmur, 2008).

Klorofil miktarındaki azalma fotosentetik yapıların zarar görmesinin yanı sıra (Yasseen, 1983), klorofil parçalanmasından sorumlu olan klorofilaz enzimi gibi proteolitik (proteinleri parçalayıcı) enzimlerin oluşumları sebebiyle olabilmektedir.

Sebzelerin fizyolojik parametrelerini kuraklık stresi altında inceleyen araştırmacılar toplam klorofil içeriğini ölçmüş ve kontrol bitkileriyle kıyaslandığında toplam klorofil içeriğinin azaldığını görmüşlerdir (Çırak ve Esendal, 2006; Deveci ve Çelik, 2016; Deveci ve Pıtır, 2015; Deveci ve Yarış, 2019; Kabay, 2014; Kayabaşı, 2011; Kuşvuran, 2010; Makbul vd., 2011; Riccardi, 2016; 2016; Tuğcu, 2016; Ünal, 2010).

4. SONUÇ VE ÖNERİLER

Stres koşullarına adapte olabilen bitki tür ve çeşitlerindeki savunma mekanizmalarının ortaya çıkarılması ve böylelikle ürün kayıplarının en aza indirilmesi, suyun etkili kullanımı, beslenme ve tarım ekonomisi açısından son derece önemlidir. Su stresi de bitkilerde büyüme ve gelişmeyi aynı zamanda verim ve kaliteyi olumsuz yönde etkilemektedir. Çok fazla ürün kaybına neden olmasından dolayı tuz stresi, ciddi ekonomik zararlara neden olur.

Çalışma sonucunda yapılan ölçümlerin değerlendirilmesinde kontrol koşullarından yapay kuraklık şartlarının sağlandığı PEG6000 konsantrasyonlarının artışına paralel olarak ele alınan 10 egzotik sebze türündeki değişimler Tablo 5'de gösterilmiştir.

Tablo 5'de artan yapay kuraklık koşullarında fide boyu, fide kök boyu, fide gövde çapı, fide yaprak sayısı, fide yaprak ağırlığı, yaprak kalınlığı, fide toplam yaprak alanı, fide yaş ağırlığı, fide kuru ağırlığı, yaprak su potansiyeli, klorofil miktarı, makro-mikro besin element miktarları azalmıştır. Kuraklığın artışına bağlı olarak yaprak hasar indeksi, yaprak hücrelerinde membran zararlanması ve yaprak stoma geçirgenliğinde ise ölçülen değerlerde artışlar meydana gelmiştir.

Tablo 5. Bazı egzotik sebze türlerinin kuraklığa toleransının belirlenmesinde kontrol koşullarından kuraklık koşullarına gidildikçe ele alınan bazı fizyolojik parametrelerin değişimleri

Fizyolojik değişimlere ait bazı ölçüm ve analizler			
1	Yaprak hücrelerinde membran zararlanması (%)		Artma
2	Yaprak stoma geçirgenliği (mmol $m^{-2}s^{-1}$)		Artma
3	Yaprak sıcaklıkları (°C)		Artma
4	Klorofil miktarı (SPAD)	Azalma	

Araştırmamızda egzotik sebze türlerinin kuraklığa karşı dayanımlarının karşılaştırılması bakımından türlerin normal sulama olarak yapılan kontrol sulamalarından en yüksek su kısıtının uygulandığı -12 MPa lık bir osmotik basınçla oluşturulan kuraklık uygulaması arasında meydana gelen değişimler incelenmiştir. Buna göre ele alınan kriterlerde Frenk soğanı, Molehiye ve Japon hardalı kuraklık şartlarında % olarak daha az zarar meydana gelmiştir. Kişniş ise kuraklık koşullarında kontrol koşullarına göre en fazla hasara uğrayan tür olmuştur.

Küresel ısınma ve sera etkisinin dünyada ve özellikle yurdumuzda son yıllarda artışının sonucu olarak gelecek yıllarda su kıtlığı sonucu oluşacak kuraklık olasılığı bilinen ve beklenen bir gerçektir. Bu sebeple özellikle kuraklık probleminin olduğu bölgelerde sebze yetiştiriciliği ve çeşitliliğin arttırılması bakımında özellikle ele aldığımız Japon yeşillikleri olarak bilinen bu türlerden özellikle Frenk soğanı, Molehiyanın ve Japon hardalının kuraklık problemi olan

yerlerde yetiştiriciliği kurağa toleranslarında dolayı önerilmektedir.

TEŞEKKÜR

Bu çalışma Tekirdağ Namık Kemal Üniversitesi Araştırma Projeleri Koordinasyon Birimince Desteklenmiştir. Proje Numarası NKUBAP.03.YL.19.204

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FARKLI TUZ KONSANTRASYONLARINA SAHİP SULAMA SULARININ PAZININ BAZI MAKRO-MİKRO BESİN ELEMENTİ MİKTARLARI ÜZERİNE ETKİLERİ

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ÖZET

Denemede materyal olarak Türkiye'de yetiştiriciliği yapılan Marmara Bölgesine iyi adapte olmuş Pazı (*Beta vulgaris* L. var. *cicla moq*.) türünün Sarma çeşidi kullanılmıştır. Bitkilerin yetiştiriciliği, ısıtmasız plastik üretici serasında 6 litre hacmindeki plastik torbalarda yapılmıştır. Pazı fidelerine ilk 4-5 gerçek yapraklı olduğu dönemden itibaren hasada kadar sulama zamanlarında farklı konsantrasyonlarda hazırlanan tuzlu su ile sulama yapılmıştır. Tuz konsantrasyonlarını hazırlamada sulama sularına NaCl ilave edilmiştir. Tesadüf parselleri deneme desenine göre 4 tekerrürlü olarak kurulan denemede her tekerrürde 5 parsel (Normal sulama suyu, 8, 16, 24 ve 32 dS/m' lik tuzlu sulama suyu) her parselde 16 bitki olmak üzere tüm denemede 20 parselde 320 bitki yetiştirilmiştir. Hasat döneminde pazıdaki bazı makro-mikro besin maddelerindeki değişimler incelenmiştir. Denemede pazı bitkisinde sulama suyundaki tuz oranı arttırıldığında, tuz miktarıyla ters orantılı olarak yaprakta bulunan makro-mikro besin elementleri azalmıştır. Farklı tuz konsantrasyonlarına sahip sulamanın makro-mikro besin elementi içeriği üzerine etkilerinde kontrol parsellerinde en yüksek makro mikro besin elementi içeriğine ulaşılmıştır. Suda tuz konsantrasyonunun artması ile besin elementi miktarlarında önemli azalmalar meydana gelmiştir. Tuzlu su uygulamaları sonucunda makro ve mikro besin elementleri topluca incelendiğinde kontrol grubunda en yüksek değerlere ulaşılırken, en düşük oranların ise 32 dS/m grubundan alındığı tespit edilmiştir.

Anahtar Kelimeler: Sebze, *Beta vulgaris* L. *var. cicla moq,* tuz stresi, NaCl, besin elementleri

THE EFFECTS OF IRRIGATION WATERS HAVING DIFFERENT SALT CONCENTRATIONS ON SOME MACRO-MICRO NUTRIENT AMOUNTS OF CHARD

ABSTRACT

The plant material was chard (*Beta vulgaris* L. var. *cicla moq*.) where is cultivated in Turkey and has adopted well to Marmara region. Plants were grown in plastic bags having 6 litre volume into an unheated greenhouse. When the seedling has 4-5 true leaves, the salty irrigation water was used for water requirement until harvest to propose salty water, the different amount of NaCl was added to irrigation water. The study was set up as 4 replications, according to randomized plot design. There were 5 treatments (normal irrigation water, 8, 16, 24 and 32 dS/m saline irrigation water) each time in the experiment. There were 20 parcels in all the experiment, 16 plants in each parcel. A total of 320 plants were cultivated. During the harvest period Changes in some macro-micro nutrients of chard were investigated. When the salt rate in the irrigation water was increased macro-micro nutrient elements in the leaves decreased. In the effects of irrigation with different salt concentrations on the macro-micro nutrient content, the highest macro-micronutrient content was reached in the control plots. With the increase of salt concentration in water, significant decreases occurred in the amount of nutrients. As a result of salt water applications, when macro and micro nutrients were examined collectively, it was determined that the highest values were reached in the control group, while the lowest rates were obtained from the 32 dS/m group.

Keywords: Vegetable, *Beta vulgaris* L. var. *cicla moq*, salt stress, NaCl, nutrients

1. GİRİŞ

Pazı, Ispanak ve Pancarında içinde bulunduğu Chenopodiaceae (Kazayaklılar) familyasına ait latince adı *Beta vulgaris* var. *cicla* olan ve anavatanı. Anadolu, Kafkas ülkeleri ve Yakındoğu ülkelerinin batı kesimleri pazının anavatanı içinde yer almaktadır. Anadolu'da yer yer yabani pazıya rastlanmaktadır. Zaman içinde pazı Doğu Asya ülkelerine yayılmış ve bu ülkelerde de iyi bir gelişme göstererek kabul görmüştür. Bu ülkeler bugün pazının ikincil anavatanı görünümündedirler. Pazı, Türk mutfağında börek içlerinde, etli ve zeytinyağlı sarma yapımında ve doğrudan yemek olarak etli pirinçli veya yumurtalı kavurma şeklinde yer alan bir sebzedir. Enerji değeri düşük bir sebzedir. Bu sebeple yağ ve et gibi ilave besinlerle zenginleştirilmediği sürece iyi bir perhiz yemeğidir. Yaprakların Ca içeriği yüksektir, fakat okzalat formunda olduğu için ıspanakta da belirtildiği üzere çok az bir kısmı sindirime iştirak etmektedir. En önemli özelliğinin yüksek oranda K ihtiva etmesidir. Bu sebeple sindirim sistemi üzerine çok olumlu etkileri vardır. Demir bakımından zengindir. Bu açıdan Fe eksikliğinin giderilmesinde çok iyi bir kaynaktır. Yaprakları A ve C vitaminlerince de zengindir (Şalk ve ak.2000).

Pazı ılık iklim sebzesidir. Direk tohum ekilerek veya fide yetiştirmek suretiyle yetiştiriciliği yapılmaktadır. Tohum ekildikten 2-3 ay sonra hasat edilir (Şeniz ve ark. 1995).

Pazı (*Beta vulgaris* L. var. *cicla*) oldukça besleyici bir sebze türüdür. İçeriğinde yüksek miktarda sodyum barındırır. Düşük kalorili olan pazı bitkisi mineraller bakımından fakir bir bitki olmasına karşın askorbik asit (Vitamin C) içeriği açısından oldukça zengindir (Pokluda ve Kuben 2002, Alibaş ve Okursoy 2012). Yüksek miktarda A vitamini içeren pazı yaprakları buna bağlı olarak sodyum da içermektedir. Sodyumun yanında pazı içerisinde kalsiyum, fosfor, magnezyum, demir ve potasyum da bulunmaktadır. Ayrıca pazı içerisinde palmitik, sitrik, oleik (Omega-9), linoleik asit (Omega-6) gibi uçucu yağ asitleri, folik asit, pektin, askorbik asit, fosfolipit, glikolipit ve polisakkaridler de bulunmaktadır (Bolkent ve ark. 2000).

Kuraklık ve tuzluluk dünyada tarımsal üretimi sınırlandıran en önemli abiyotik stres sorunları olarak karşımıza çıkmaktadır. Dünya tarım alanlarının yaklaşık olarak % 45'i sürekli olarak kuraklık stresine maruz kalırken, dünya yüzeyinde bulunan alanların yaklaşık % 6'sı tuzluluk sorunu ile karşı karşıya gelmiştir (Asraf ve Foolad, 2007).

Tuzluluk; özellikle kurak ve yarı kurak iklim bölgelerinde yıkanarak yeraltı suyuna karışan çözünebilir tuzların yüksek taban suyuyla birlikte kapillarite yoluyla toprak yüzeyine çıkması ve buharlaşma sonucu suyun topraktan ayrılarak tuzun toprak yüzeyinde ve yüzeye yakın bölümünde birikmesi olayıdır (Ekmekçi ve ark., 2005).

Tuzlulukla ilgili çalışmalardaki ana düşünce, tuzluluğun tüm canlı yaşamına olan etkisinin

anlaşılmasını sağlayarak, yaşamın hangi ölçü içinde tuzluluktan etkilenmediğini ortaya koymaktır. Toprağın tuzluluğunun artması nedeniyle yaşamını tarıma bağlamış sayısız uygarlığın yok olduğunu tarih içerisinde anımsarız. Günümüzde en yeni ve çağdaş toprak, su, bitki ve çiftlik işletmeciliği tekniğine karşın tuzluluk nedeniyle tarım dışı kalmış alanlar oldukça yaygındır. Türkiye'de yaklaşık 1.5 milyon hektarda tuzluluk ve alkalilik sorunu bulunmaktadır. Bu, sulamaya uygun arazilerin yaklaşık %32.5' ine denktir. Toprakların tuzlulaşma ve alkalileşmesini sulama, drenaj toprak özellikleri ve iklim etmenleri gibi etmenler önemli ölçüde etkilemektedir (Ekmekçi ve ark., 2005).

Bu çalışmada, farklı tuz konsantrasyonlarındaki sulama suyu ile sulanan pazının (*Beta vulgaris* L. var. *cicla*) hasat döneminde yapraklarında bulunan bazı makro-mikro besin elementlerinde meydana gelen değişimleri belirlenmiştir.

2. MATERYAL ve YÖNTEM

Bu çalışma, Çekmeköy ilçesinde farklı tuz konsantrasyonlarındaki sulama suyuyla sulanan pazıda meydana gelen fizyolojik, morfolojik ve kimyasal değişikliklerin araştırılması amacıyla ısıtmasız plastik serada yürütülmüştür.

2.1. Materyal

Araştırmada materyal olarak Türkiye'de yetiştiriciliği yapılan Marmara Bölgesine iyi adapte olmuş Argeto tohum firmasına ait Pazı (*Beta vulgaris* L. var. *cicla moq*.) türünün Sarma çeşidi kullanılmıştır.

Sarma çeşidi; açık tarla yetiştiriciliğine uygun, orta erkenci bir çeşittir. Bitki çok dallı, dik yapılı ve geniş yapraklı, yaprak sapları 15-20 cm boyunda, yaklaşık 4 cm çapında, düz, açık yeşil renktedir. Yapraklar belirgin damarlı, geniş, etli ve kırışıklı görünümlü olup 40-45 cm boyundadır. Soğuk ve sıcak hava koşullarına dayanıklıdır. Hasat olumu 50-55 gündür. Çok çabuk gelişen, uzun ömürlü olup birkaç kere hasat edilebilir. Bütün bölgelerde yetişebilen, adaptasyon kabiliyeti yüksek verimli bir çeşittir. Taze tüketime uygun, sofralık lezzetli bir çeşittir (URL 1).

2.2. Yöntem

2.2.1. Denemenin Kuruluşu

Açıkta arazide yetiştiriciliği yapılan pazıda deneme harici beklenmeyen yağmur riski nedeniyle denemedeki bitkilerin yetiştiriciliği İstanbul ili Çekmeköy ilçesinde bulunan ısıtmasız üretici serasında (41°.02'05 K, 29°.08'26 D) yapılmıştır (Şekil 1).

Kimyasal analizler ise Namık Kemal Üniversitesi Ziraat Fakültesi Bahçe Bitkileri Laboratuvarı

ile Tekirdağ Ticaret Borsası Laboratuvarında yapılmıştır.

Deneme, ısıtmasız plastik üretici serasında ayrılan alanda sera toprağı ile doldurulmuş 6 litre hacmindeki plastik torbalara pazı fidelerinin dikilmesi ile başlamıştır. Seradan alınan toprakların kimyasal özellikleri Tablo 1'de verilmiştir. Fide dikiminden itibaren normal bakım işleri yapılarak (Şalk ve ark. 2008) fideler hasada kadar sulama dönemlerinde farklı konsantrasyonlarda hazırlanan tuzlu su ile sulama yapılmıştır.



Şekil 1. Bitkilerin yetiştirildiği ortamdan genel görünüm

Tablo 1. Denemede kullanılan toprağın kimyasal özellikleri*

Parametre	**Birim**	**Sonuç**	**Metod**
pH		6,59	Saturasyon
Tuz	(%)	0,29	Saturasyon
Kireç	(%)	0,04	Kalsimetrik
İşba		57,00 (Killi Tınlı)	Saturasyon
Organik Madde	(%)	4,95	Walkey-Black
Toplam Azot (N)	(%)	0,25	Kjeldahl
Fosfor (P)	(ppm)	189,45	Olsen-ICP
Potasyum (K)	(ppm)	374,67	A. Asetat-ICP
Kalsiyum (Ca)	(ppm)	3.028,80	A. Asetat-ICP
Magnezyum (Mg)	(ppm)	354,22	A. Asetat-ICP
Demir (Fe)	(ppm)	51,63	DTPA-ICP
Bakır (Cu)	(ppm)	2,55	DTPA-ICP
Çinko (Zn)	(ppm)	16,13	DTPA-ICP
Mangan (Mn)	(ppm)	29,80	DTPA-ICP

***Kaynak :** T.C. Tekirdağ Ticaret Borsası tarımsal amaçlı analiz laboratuvarı toprak analiz raporu

Kontrol parsellerine normal sulama suyu uygulanırken, diğer parsellere tuzluluk oranı 8 dS/m, 16 dS/m, 24 dS/m ve 32 dS/m olan sulama suyu uygulanmıştır. Her sulamada bitki başına 625 ml sulama suyu verilmiştir.

Tesadüf parselleri deneme desenine göre 4 tekerrürlü olarak kurulmuş olana çalışmada (Açıkgöz 1984), her tekerrürde 1 kontrol (normal sulama suyu), 4 farklı konsantrasyonda (8, 16, 24 ve 32 dS/m) tuzlu su ile sulanmıştır. Sulama sularındaki tuz konsantrasyonlarını hazırlamada sulama sularına NaCl ilave edilerek (Kuşvuran ve ark. 2008) belirlenen tuzluluktaki sular kullanılmıştır. Denemede her tekerrürde 5 parsel, her parselde 16 bitki olmak üzere tüm denemede 20 parsel ve 320 bitki bulunmaktadır.

2.2.2. Makro ve Mikro Elementlerin Tayini (% ve ppm)

Farklı sulama konularının uygulandığı bitkilerin hasat dönemlerinde alınan yaprak örnekleri, en kısa sürede laboratuara getirilip, yıkandıktan sonra fırında 70 ºC de etüvde kurutulmuş, öğütülen yaprak örnekleri; 0,5 mm'lik elekten geçirilerek analiz için hazır hale getirilmiştir (İbrikci ve ark. 1994). Yaprak örnekleri T.C. Tekirdağ Ticaret Borsası Tarımsal Amaçlı Analiz Laboratuarında makro besin elementlerinden N, P, K, Ca, Mg; mikro besin elementlerinden Zn, Mn, Cu, Fe değerleri sırasıyla % ve ppm olarak ölçülmüştür.

2.2.3. Verilerin Değerlendirilmesi

Denemeden elde edilen verilerin istatistiki analizleri MSTAT versiyon 3,00/EM paket programı kullanılarak yapılmıştır. Önemli bulunan farklılıklar için LSD kontrol yöntemiyle farklılığı oluşturulan gruplar tespit edilmiştir (Akdemir ve ark. 1994).

3. ARAŞTIRMA BULGULARI ve TARTIŞMA

3.1. Makro ve Mikro Besin Elementleri Tayini (% ve ppm)

Farklı tuz konsantrasyonlarına sahip sulama sularının pazı yapraklarının makro besin elementi ortalamaları üzerine etkileri Tablo 2 ve Şekil 2'de görüldüğü gibidir. Sonuçlar makro besin elementleri olarak (N, P, K, Ca, Mg) tek çizelge ve şekil üzerinde % olarak belirtilmiştir.

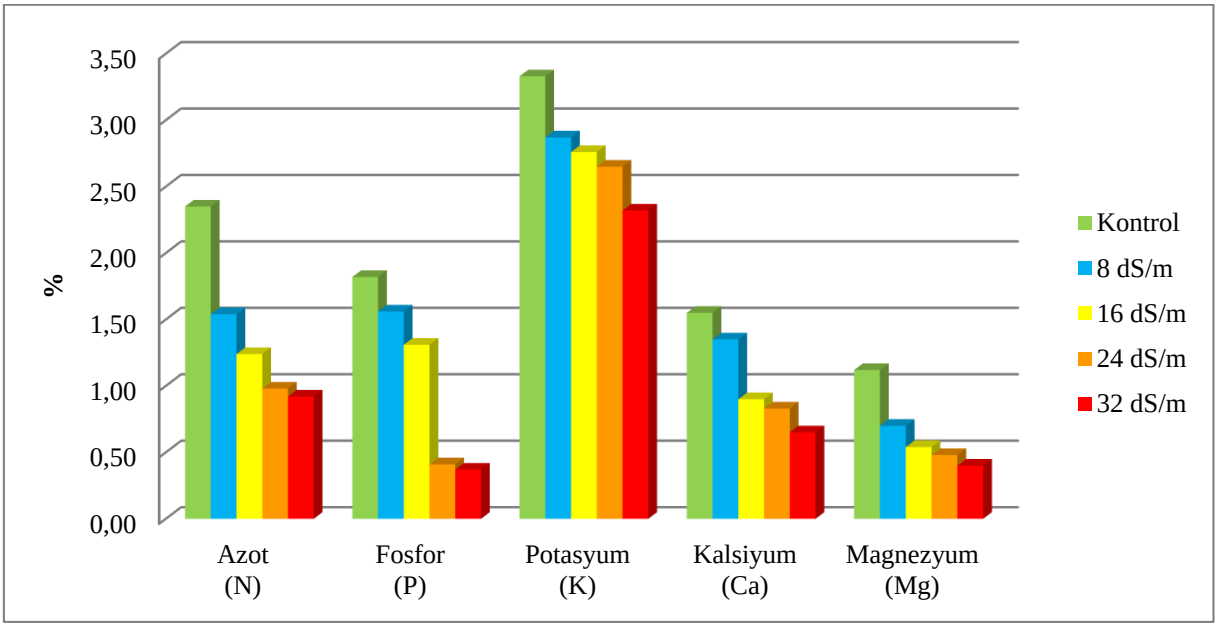
Tablo 1 incelendiğinde makro besin elementlerinin tamamının istatistiki olarak %1 hata sınırları içinde kaldığı tespit edilmiştir.

Tablodaki makro besin elementlerinin kontrolden itibaren artan tuzlu su konsantrasyonuna bağlı olarak yapraktaki miktarlarının düştüğü anlaşılmıştır. Makro besin elementleri arasında azot ve fosfor miktarında 24 ve 32 dS/m konsantrasyonları aynı istatistiki önem grubunda kaldıkları görülmüştür.

Tablo 2. Farklı tuz konsantrasyonlarına sahip sulama sularının pazının yapraklarındaki makro besin elementleri ortalamalarına etkisi (%) ve LSD testine göre gruplar

Makro Besin Elementleri	**Kontrol**	**8 dS/m**	**16 dS/m**	**24 dS/m**	**32 dS/m**
Azot (N)	2,35 a	1,54 b	1,24 c	0,98 d	0,92 d
Fosfor (P)	1,82 a	1,56 b	1,31 c	0,41 d	0,37 d
Potasyum (K)	3,33 a	2,87 b	2,76 bc	2,65 c	2,32 d
Kalsiyum (Ca)	1,55 a	1,35 b	0,90 c	0,83 d	0,65 e
Magnezyum (Mg)	1,12 a	0,70 b	0,54 c	0,48 cd	0,40 d

* Aynı harfi taşıyan ortalamalar arasında 0.01 düzeyinde fark yoktur



Şekil 2. Farklı tuz konsantrasyonlarına sahip sulama sularının pazının yapraklarındaki makro besin elementleri (%) farklılıkları

Pazının farklı tuz konsantrasyonlarına sahip sulama suları ile yetiştiriciliği sonucunda yapraklarında meydana gelen mikro besin elementi değişimlerine ait ortalamalar Tablo 3 ve Şekil 3'de görüldüğü gibidir. Sonuçlar mikro besin elementleri olarak (Fe, Cu, Zn, Mn) tek Tablo ve Şekil üzerinde ppm olarak belirtilmiştir.

Tablo 3'de pazı yapraklarında yapılan mikro besin elementi tayinine göre ele alınan besin elementlerinin tümünün istatistiki olarak 0.01 düzeyinde önemli olduğu saptanmıştır. Sulama sularında yapılan tuz uygulamasının artmasına paralel olarak yapraklardaki mikro besin elementlerinin kontrole nazaran tamamında azalmalar meydana geldiği tespit edilmiştir.

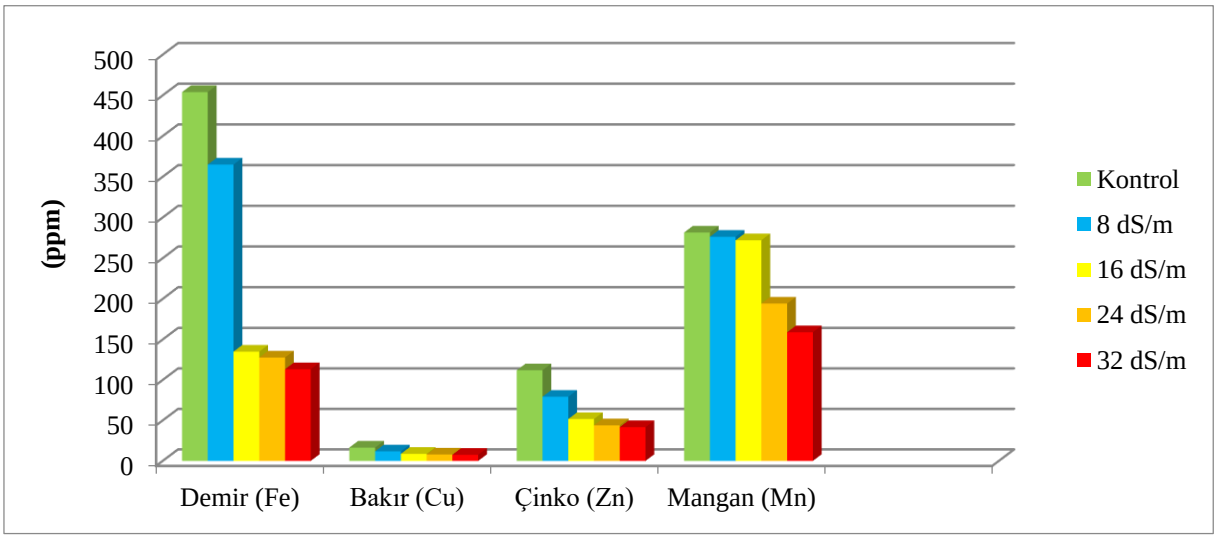
Demirde 16, 24 ve 32 dS/m uygulamaları istatistiki olarak aynı önem seviyesinde çıkmıştır. Benzer şekilde yapraklardaki bakır elementi miktarında da 24 ve 32 dS/m lik tuzlu su uygulamalarında istatistiki olarak fark oluşmamış aynı istatistik grubunda kalmışlardır (Tablo

3).

Tablo 3. Farklı tuz konsantrasyonlarına sahip sulama sularının pazının yapraklarındaki mikro besin elementleri ortalamalarına etkisi (ppm) ve LSD testine göre gruplar

Mikro Besin Elementleri	**Kontrol**	**8 dS/m**	**16 dS/m**	**24 dS/m**	**32 dS/m**
Demir (Fe)	454,00 a	365,00 b	135,00 c	127,75 c	113,25 c
Bakır (Cu)	16,50 a	11,85 b	8,76 c	7,94 c	7,57 c
Çinko (Zn)	112,00 a	79,25 ab	51,75 bc	44,00 bc	41,75 c
Mangan (Mn)	281,50 a	276,25 b	272,00 c	194,25 d	159,00 e

* Aynı harfi taşıyan ortalamalar arasında 0.01 düzeyinde fark yoktur



Şekil 3. Farklı tuz konsantrasyonlarına sahip sulama sularının pazının yapraklarındaki mikro besin elementleri (ppm) farklılıkları

Farklı tuz konsantrasyonlarına sahip sulamanın makro-mikro besin elementi içeriği üzerine etkilerinde kontrol parsellerinde en yüksek makro mikro besin elementi içeriğine ulaşılmıştır. Suda tuz konsantrasyonunun artması ile besin elementi miktarlarında önemli azalmalar meydana gelmiştir.

Toprak çözeltisindeki aşırı miktarda bulunan çözülebilir tuzlar, bitkilerin sudan yararlanabilirliğini azaltmaktadır. Böyle durumlarda yaygın bir yanıt olan su potansiyelindeki azalma, turgor potansiyelinin devamı için çözünen madde içeriğinin arttırılması sonucu ozmotik potansiyeldeki azalma ile dengelenebilmektedir. Tuzluluğun artışı, bitkilerin su ve ozmotik potansiyelini daha negatif hale getirmektedir (Mudgal ve ark. 2010).

Tuzlu su uygulamaları sonucunda makro ve mikro besin elementleri topluca incelendiğinde kontrol grubunda en yüksek değerlere ulaşılırken, en düşük oranların ise 32 dS/m grubundan alındığı tespit edilmiştir. Bunun sebebi ise; kontrol grubunda bitkilere tuz uygulaması

yapılmadığı için gelişimlerini tam olarak tamamlamış olup toprakta bulunan su ve suda erimiş besin maddelerini rahatlıkla alabilmiş ve fotosentez herhangi bir sekteye uğramadığı için bitki gelişimi ve buna paralel olarak yapraklarda besin elementleri miktarlarının arttığı düşünülmüştür. 32 dS/m grubunda en düşük çıkmasının sebebi ise, bitkinin tuz stresine girerek gelişimini tamamlayamadığından topraktan yeterli besin elementi alımını gerçekleştiremediği için bünyesindeki besin elementi miktarları düşük olmaktadır.

Tablo 2'de çalışmada elde ettiğimiz kontrol grubuna ait makro besin maddelerine ait ortalamalar pazı üzerine çalışan diğer araştırıcıların yaptığı araştırma sonuçları ile uyum içerisindedir (Pokluda ve Kuben 2002, Dzida ve Pitura 2008, Knezevic ve ark. 2014, Abdel-Rahman ve ark. 2017, Angeny 2017).

Kaburagi ve ark. (2014), pazıda yaptıkları çalışmada azotun (N) bitki dokularında önemli bir bileşen olduğunu, bitki büyümesi için şart olduğunu belirtmişlerdir. Yüksek NaCl seviyelerinin, pazıda azalan N alımının bir sonucu olarak bitki büyümesini azalttığını tespit etmişlerdir. Yapılan çalışmada, pazı içerisindeki toplam N konsantrasyonunun çalışmamızda olduğu gibi ortamdaki NaCl artışı ile belirgin bir şekilde azaldığı görülmüştür.

Farklı sebze türleri üzerine yapılan tuzluluk çalışmalarında araştırıcılar kök ortamında artan tuz miktarının azot (N) alımını olumsuz etkilediği ve bitkide azot oranının azaldığını bildirmişlerdir (Yokaş ve ark. 2007, Bilgin ve Yıldız 2008, Kant 2008, Esringü ve ark. 2011, Bora 2015).

Yüksek miktarda uygulanan tuz, yaprak ve köklerin makro element miktarlarını da etkilemiştir. Tuz uygulamasında yaprak ve köklerdeki makro elementlere bakıldığında artan Na miktarlarına paralel olarak P, K, Ca, Mg miktarlarında azalmalar saptanmıştır (Köşkeroğlu 2006).

Tuz stresi üzerine yapılan diğer çalışmalarında araştırıcılar değişik sebze türlerinde çalışmamıza paralel şekilde kök ortamında artan tuz oranının fosfor (P) alımını olumsuz etkilediğini ve bitkide fosfor oranını azalttığını bildirmişlerdir (Erdal ve ark. 2000, Yakıt ve Tuna 2006, Bilgin ve Yıldız 2008, Şen 2008)

Tuz stresine dayanıklılıklarının bitkilerin kök sistemleriyle aşırı Na ve K alımını engellemelerine bağlı olduğu bildirilmiştir (Güneş ve ark. 1997). Aşırı miktarda Na ve Cl absorbsiyonunun, iyon dengesinde potasyum aleyhine meydana getirdiği bozulmanın sebep olduğunu söylemek mümkündür. Na genellikle K alımını engellemekte, Cl ise özellikle NO3 üzerine olumsuz etki yaparak bitkilerde iyon dengesinde bozulmalara sebep olmaktadır (Alparslan ve ark. 1998). Pazıda uygulanan farklı konsantrasyonlardaki NaCl miktarlarının yapraklardaki potasyum oranını önemli derecelerde azalttığını belirlenmiştir (Kaburagi ve ark. 2014, Kaburagi ve ark. 2015). Pazı üzerine yapılan çalışmamızda, kök bölgesindeki Na ve Cl

miktarlarının gitgide arttırılması sonucu potasyum alımının azalmasının bu iyon dengesindeki bozulmalardan meydana geldiği şeklinde yorumlanmıştır.

Pazı üzerine yapılan farklı tuzlu su ile sulamanın etkisinin araştırıldığı çalışmamızda olduğu gibi tuzluluk stresinin şiddetlenmesiyle sodyum (Na) konsantrasyonundaki artış ve potasyum (K) alımında azalmaların olduğu farklı araştırıcılar tarafından daha önce farklı türlerde saptanmıştır (Erdal ve ark. 2000, Özcan ve ark. 2000, Kuşvuran 2010, Esringü ve ark. 2011, Küçükkömürcü 2011, Bora 2015).

Tuzluluk stresinde Na toksisitesi nedeniyle, kalsiyum (Ca) alımının engellediği bilinmektedir. Membranlarda element bağlanma bölgelerinde Na ile özellikle diğer katyonik elementler rekabete girdiğinden ve hücre içi elektrolit dengesinin bozulmasından dolayı tuz stresi altındaki bitkilerde başta Ca ve K olmak üzere diğer bazı besin elementlerinin alımı ve taşınımı azalmaktadır (Yakıt ve Tuna 2006).

Hussain ve ark. (2008), hint darısında yaptıkları tuzluluk çalışmasında yüksek tuz konsantrasyonunun bitkilerde Na ve Cl iyonlarının birikimine neden olduğunu, Ca oranının ise azalma eğilimine geçtiğini bildirmişlerdir.

Yüksek tuz konsantrasyonlarının bitkinin kalsiyum alımını ve taşınımını azalttığı, kalsiyum yetersizliği ve bitkide iyon dengesizliğine neden olduğu pek çok araştırmacı tarafından da vurgulanmıştır (Kaya 2011, Süyüm 2011). Farklı araştırıcılar çalışmamızda elde edilen bulgulara benzer şekilde, değişik sebze türlerinde ortamdaki tuz konsantrasyonunun artmasıyla, bitkinin almış olduğu kalsiyum miktarında düşmeler olduğunu belirtmişlerdir (Yokaş ve ark. 2007, Bilgin ve Yıldız 2008, Kant 2008, Kaya ve ark. 2010, Kuşvuran 2010, Esringü ve ark. 2011, Kaya ve Daşgan 2013).

Tablo 2'de bulunan pazı yapraklarında magnezyum (Mg) miktarının artan tuzlu su konsantrasyonuna bağlı olarak azalması sonucuna benzer şekilde birçok sebze türünde yapılan tuz stresi çalışmasında, ortamdaki tuz konsantrasyonunun artmasıyla bitkinin almış olduğu magnezyum miktarında düşmeler olduğunu belirtmişlerdir (Köşkeroğlu 2006, Bilgin ve Yıldız 2008, Kant 2008; Esringü ve ark. 2011, Bora 2015).

Tablo 3'de pazının yapraklarındaki mikro besin elementleri ortalamalarında tuz stresinin uygulanmadığı kontrol grubundan elde ettiğimiz mikro besin elementlerine ait ortalamalar pazı üzerine yapılan farklı çalışmalardan elde edilen sonuçlar ile uyum içerisindedir (Knezevic ve ark. 2014, Abdel-Rahman ve ark. 2017).

Uygulanan tuz konsantrasyonlarının arttırılmasıyla elde edilen yapay tuz stresine cevap olarak farklı sebze türlerinde çalışmalar yapılmıştır. Bu çalışmalara göre de ortamdaki tuz

konsantrasyonunun artmasıyla birlikte bitkinin almış olduğu demir, bakır, çinko ve mangan miktarında düşmeler olduğu belirlenmiştir (Erdal ve ark. 2000, Bilgin ve Yıldız 2008, Kant 2008, Şen 2008, Esringü ve ark. 2011, Bora 2015).

4. SONUÇ

Bu çalışmada farklı tuz konsantrasyonlarına sahip sulama sularının pazının bazı büyüme ve gelişme özellikleri üzerine etkileri ile yapay tuz stresinin pazı yapraklarında meydana getirdiği makro-mikro besin elementlerinin değişimleri araştırılmıştır.

Denemeden elde edilen değerler incelendiğinde, pazı bitkisinde sulama suyundaki tuz oranı arttırıldığında, tuz miktarıyla ters orantılı olarak yaprakta bulunan makro-mikro besin elementleri azalmıştır.

Çalışmada pazının sulama suyu ile kök bölgesinde oluşturulan yapay tuz stresine dayanıklı olduğu, birçok kültür sebzesinin gelişme gösteremediği tuzlulukta rahatça büyüyebildiği tespit edilmiştir.

Sonuç olarak yurdumuz ve dünyada son yıllarda görülen küresel ısınma ve su kıtlığına bağlı olarak topraklarda görülen tuzluk sorunlarının kaçınılmaz olduğu bilenen bir gerçektir. Bu sebeple özellikle tuzluluk probleminin olduğu bölgelerde sebze yetiştiriciliği ve çeşitliliğin arttırılması bakımında özellikle pazı tuza olan toleransından dolayı önerilmektedir.

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AN ORGANIC SOIL IMPROVER: COMPOST

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ABSTRACT
One of the most effective ways to recycle waste food in nature is composting. By composting food waste, at home and in waste storage valuable nutrients can be returned to the soil by reducing and reusing waste in landfills. Composting involves plant and animal waste, food scraps, and carbon dioxide such as cardboard and newspaper based residues are formed into an earthy structure called compost by microorganisms. It is a biological process in which it is transformed. This process is the process of organic wastes in nature in natural ways. It is the same as the process of turning into humus. In composting, only the conditions are taken under control and the organic materials decompose faster. Composting is a valid process not only for the waste generated in domestic consumption, but also for all organic waste produced in the garden, field, and cities, and is one of the most effective means of recycling for agricultural use. Anywhere, in any condition can be done. The aim of this paper to study a review article about the existing literature holding the compost, with special emphasis on thermal composting. Briefly to summarize compost definition, its uses, and benefits. Then to sum up the composting definition and review its process, benefits and discuss its types and methods. Finally to mention compost applications in horticultural and agronomic practices in this article.

Keywords: Organic matter, compost, composting process, thermal compost, horticulture.

1. INTRODUCTION

Most agricultural, industrial and municipal organic wastes is being disposed off in landfills. Studies of some waste management sites worldwide showed that 50 to 75% of wastes (by weight) of urban communities are organic biodegradable matter. While organic wastes can be recycled by composting. Thus, composting is a great potential for reducing wastes positively affecting both environmental and economic aspects.

While reducing wastes through composting, compost – which is the product of composting process – can be used in horticulture and agronomy positively affecting the biological, chemical and physical properties of soils.

1.1. Organic Matter Definition

One of the most important components of soil is organic matter. Although there is no single definition regarding soil organic matter, it is defined as any matter of organism (such as plant or animal origin).

Usually, organic matter is usually an unwanted by-product provided by agricultural fields, animal farms, municipalities, food chain markets, and industrial companies in form of organic wastes (Chatterjee et al., 2013).

Organic matter used in composting can be from plant origin (i.e. leaves, roots, bark, etc); animal origin (i.e. manure, feathers, bones, hair, etc.) and even from dead microorganisms such as nematodes, bacteria, fungi etc. (Roman et al., 2015).

1.2. Compost Definition

Compost can be defined as a stabilized and sanitized product of organic wastes composting process (Nakakubo et al., 2012; Chatterjee et al., 2013). It is a degraded end product, completely different from the original organic material. It is a product of microorganisms (i.e., bacteria, fungi, actinomycetes etc.) degradation of organic matter (Meena et al., 2021).

Compost has some characteristics like dark brown color and pleasant earth smell (Goluekem, 1991) and should not contain contaminants such as non-organic and non-biodegradable wastes (Kawai et al., 2020).

The major natural compounds found in composts are lignin, cellulose, hemicelluloses, murein and chitin.

- **Lignin**

Lignin is a major component of plants, and it is known that it degrades slowly in composting process. The degradation of lignin is primarily well-mannered by fungi (i.e. *Trametes versicolor*, *Stereum hirsutum*, *Pleurotus ostreatus*, etc.); Lignin functions as a structural

compound in plants.

- **Cellulose**

Cellulose is a heavily component found in plants. It is also degraded by fungi (i.e. *Pleurotus ostreatus*). It functions as a structural compound in plants.

- **Hemicelluloses**

Hemicelluloses such as *Xylan Araban* and *Mannan Galaktan* are cell wall compounds found in algae, seeds, wood and straw.

- **Murein**

In most bacteria, murein is the main components of cell walls.

- **Chitin**

In most fungi, chitin is the main structural compound of its cell walls. Fungi (i.e. *Aspergillus*) And bacteria (i.e. *Cytophaga*, *Flavobacterium*) Uses chitin as nitrogen and carbon source (Diaz et al., 2011).

2. MATERIAL & METHOD

2.1. Compost Uses and Benefits

Compost (product) can be used in different sectors in farming, the most important applications of composts are in:

• open fields and orchards

• nurseries

• landscaping

Compost is considered as an organic soil improver affecting physical, chemical, and biological properties of soil in various ways (Gomez, 1998).

2.2. Physical properties:

Reduces risk of soil erosion.

Reduces water evaporation from soil.

Reduces water logging in clay soils.

Reduces water run-off.

Increases water retention in sandy soils.

Improves water infiltration.

Improves water holding capacity of soil.

Regulates soil temperature.

Regulates moisture content in soil.

Maintains soil structure (Diaz et al., 2011; Legros and Petruzzelli, 2001; Seyedbagheri, 2010; Edwards & Araya, 2011).

2.3. Chemical properties:

Supplies soil with long release micro and macro nutrients.

Increases carbon storage in soil.

Improves cation exchange capacity of soil.

Helps buffer soil pH (Roman et al., 2015; PAS, 2005; Meena et al., 2021; Nakakubo et al., 2012; Neave, 2011; Leonard, 2003).

2.4. Biological properties:

Provides microorganisms capable of transforming insoluble matter into plants nutrients and deration of harmful substances in soils.

Eliminates weed seeds.

Improves the biodiversity of soil.

Helps in controlling weeds, pests and diseases.

Provides soil with humus.

In brief, compost affects positively the biological, chemical and physical properties of soils (Benedetti, 2004; Neave, 2011; Hermann et al., 2011; Kawai et al., 2020; Edwards & Araya, 2011).

2.5. Composting Definition

Composting is a biological process of transforming organic matter into a homogeneous mixture called compost; this biological process is done under optimum conditions (aeration, moisture, temperature); by micro and macro-organisms and under a period of time. We should mention here that the transformation of pure matter is a fermentation or bio-oxidation process, but not composting.

Many adjectives are being used to describe compost and composting process, some of them are correct and some are in contradiction of compost and composting definitions. For example, adjectives such as aerobic and solid state are correct. Some other adjectives such as anaerobic and liquid state are delusive, thus should be avoided (Roman et al., 2015; Chatterjee et al., 2013; Diaz et al., 2011; Meena et al., 2021; Gomez, 1998).

2.6. Composting Process

In 1933, Browne was the first to prove that compost self-heating is due to a biological activity. The microorganisms involved in composting process are:

• Bacteria

• Actinobacteria

• Archaea

• Fungi

The activity and reproduction of microorganisms are affected by several parameters (Aeration, carbon dioxide, moisture, temperature, pH, Carbon-Nitrogen ratio, particle size) that will be discussed below (TNAU, 2020).

• **Aeration (Oxygen)**

As mentioned before, composting is an aerobic process; so oxygen plays an important role in composting. Oxygen requirements are needed by microorganisms, which respirate and release carbon dioxide (CO2) into atmosphere. Also, aeration helps in reducing compaction and water content in compost materials. Thus, it is necessary to provide supply of oxygen to complete the composting process.

Supplying compost with oxygen can be by turning the compost pile using machines or by hands, or it can be done by installing ventilation in composting piles.

Low oxygen levels can cause anaerobic organisms to exceed aerobic ones and this can lead to anaerobic process and fermentation. Excess moisture levels can decrease the aeration in composting process which inhibits the growth of anaerobic organisms. In anaerobic conditions, odours and acidity, variety of gases like methane, nitrogen oxides, and ammonia are produced. Excessive aeration can cause moisture loss by evaporation, causing microorganisms activity to stop thus temperature loss in thermal composting method. The optimum oxygen content of pore space in a pile is to be at least 5% as mentioned by while the optimum oxygen level is 10% (Raabe, 2001; Roman et al., 2015; Seyedbagheri, 2010; Chatterjee et al., 2013; Meena et al., 2021; Diaz et al., 2011).

• **Carbon dioxide (CO2)**

During the composting process, raw material and organisms' activity releases and thus, CO2 concentration in a pile varies with the organisms' activity and substrate.

• **Moisture**

Moisture parameter should be presented in appropriate amounts in composting cycle and in the product (compost).

Moisture content varies with variation of composting materials, particles size, C: N ratio and with the composting system types. The best moisture level in composting process is the level which meets the organisms needs without restricting air movement. Excess water tends to close pores restricting gas exchange in the compost process. So, moisture content and gases are

closely interrelated. Water and moisture deficiency ceases the organism activity thus affecting the overall composting process. All microbial activity thrives when moisture content is below 8-12%. Roman et al. (2015) mentioned that the optimum moisture content in composting process is 45% to 60% water by weight of the organic material. Meena et al. (2021) reported that around 55% is the ideal moisture level in composting process.

When composting process is done and the product (compost) is ready, water content should be low (about 30%) (Diaz et al., 2011).

• **Temperature**

The exothermic process occurring in some composting processes produces energy in form of heat, which results in increase of matter temperature. Jaccard et al. (1993) suggested the use of a part of the heat to produce hot water.

Temperature and heat will be discussed more in thermal composting phases.

• **Potential of Hydrogen (pH)**

The compost pH depends on source materials. In general, organic matter having pH between 3 and 11 can be composted (De Bertoldi et al., 1985) while the optimum range mentioned by Diaz et al. (2011) is between 5.5 and 8.0.

In thermal composting process - which will be discussed in composting types and methods – pH varies in each phase, in general pH drops at the beginning of composting process due to the bacterial and fungal activity, then pH tends to increase at the end of composting process (Roman et al., 2015).

• **Carbon-nitrogen (C: N) ratio**

The Carbon-Nitrogen (C: N) ratio is a critic parameter for composting process success. Both Carbon and Nitrogen are needed by organisms involved in composting process. A high C: N ratio (Low nitrogen) leads to N insufficiency for organisms in composting process, while a low C: N ratio (High nitrogen) can produce bad odor in composting process.

The optimum C: N ration of the final product mentioned by Rynk et al. (1992) is between 12:1 and 20:1; is 15:1 as reported by Meena et al. (2021); is between 25:1 and 30:1 as declared by Seyedbagheri (2010).

• **Particle size**

Microorganisms' activity is related to organic matter particles size. If organic matter particles are small, there will be more specific surface which make easy for microorganisms to access the substrate. The ideal size of organic matter substrate is 5 to 20 cm as informed by Meena et al. (2021) and Roman et al. (2015).

2.7. Composting Benefits

Composting process benefits are on both environmental and economic aspects.

• Environmental aspect:

Reducing wastes.

Recycling organic wastes.

Decreasing gas emissions from landfill sites (Edwards et al., 2000; Kawai et al., 2020).

• Economic aspect:

Lowers production costs on animal farms by reducing costs of managing manure.

Increases profits on animal farms by adding a by-product to the farm (composted manure).

Lowers production costs on agricultural farms by minimizing the uses of synthesized fertilizers.

2.8. Composting Types & Methods

There are three methods to produce compost (thermal composting, cold composting, and static composting) which will be discussed below.

2.8.1. Thermal Composting Method:

It is generally accepted that thermal composting consists of four phases; phases identified based on temperature variation and maturation. These phases are:

1.1 Hot Phase (Mesophilic Phase)

1.2 Curing Phase (Thermophilic Phase)

1.3 Cooling Phase (Mesophilic Phase II)

1.4 Maturation Phase

Each one of these phases will be discussed below.

2.8.1.1 Hot Phase (Mesophilic Phase) (25-40° C)

In this phase, easily degradable compounds such as proteins and sugars are degraded by bacteria, actinobacteria and fungi (Decomposers). The mesophilic phase starts immediately after the pile has been built up with ambient temperature that increases with time (in a few days or even hours). Temperature increase is due to the increasing biological activity releasing energy in form of heat. This phase lasts few days and then the thermophilic phase starts.

2.8.1.2 Curing Phase (Thermophilic Phase) (40-65° C)

In this phase, temperature rises to high levels, killing weed seeds, bacteria of faecal origin (example *Escherichia coli, Salmonella sp.*), phytopathogen fungi spores and insect larvae. Thus, hygenizing the mixture.

Organisms capable of holding high temperatures, mostly bacteria (thermophilic bacteria), starts to replace the mesophilic flora (mesophilic microorganisms) in composting piles. Thermophilic

microorganisms degrade complex sources such as cellulose and lignin, waxes, hemicellulose and other complex compounds. The temperature varies from zone to zone in the compost pile; thus, it is important to regulate turning of substrate through the composting process (Meena et al., 2021; Diaz et al., 2011; Roman et al., 2015).

Large amount of heat can increase mass temperature to 70-90◦C, which we don't want to happen. Finstein et al. (1980) calls this increases in temperature "microbial suicide".

2.8.1.3. Cooling Phase (Mesophilic Phase II)

The second mesophilic phase is characterized by the increase of organisms (bacteria and fungi) degrading starch and cellulose. Thus, activity of mesophilic organisms resumes. In this phase some fungi can produce visible structures. Cooling phase requires several weeks to complete (Meena et al., 2021; Roman et al., 2015).

2.8.1.4. Maturation Phase

During maturation phase, temperature of matter drops to the ambient temperature. Proportion of fungi compared to bacteria increases. Polymerization and carbonaceous compounds occur which then, helps in formation of humic acid and fulvic acid. Lignin-humus complexes are also formed in this phase.

2.8.2. Cold Composting Method

Vermicomposting is a cold composting process done by earthworms as decomposers of organic matter. These worms consume every organic matter, including bacteria, fungi and protozoa. As they digest organic matter, they leave a nutrient rich matter called casting. Earthworms – unlike other organisms – breaks down organic matter both chemically and physically. The first studies on earthworms date back to Cherles Darwin in 1881. Darwin described the role of earthworms in soil.

For vermicomposting, it is necessary to held the organic material and earthworms in a container in a suitable environment condition to earthworms. Nonetheless, there are few scientific studies on vermicompost and casting compared to other composting methods (Nardi et al., 1983; Riffaldi and Levi-Minzi, 1983; Bouchè, 1987).

2.8.3. Static Composting Method

In static composting method, organic matter is stacked in windrows, kept unturned; but aerated from beneath by built-in aeration systems. This composting method is usually made for commercial uses.

2.9. Compost Applications

The use of compost in agriculture and farming is considered as a sustainable activity. Compost

is commonly used as a:

Surface mulch used in farms and gardens.

Potting mix used in nurseries.

Starting mix used in nurseries.

Substrate mixed with soil in fields.

Compost tea used on cultured plants.

Compost extract used in fields farms and gardens (Diaz et al., 2011; Roman et al., 2015).

3. RESULT

European Union directives and Waste Management Regulation the usage periods of the waste amounts going to the landfills according to the approximately 90% of municipal waste regular/irregular storage media are subject to expiry. This situation is that waste health is not done and the European Union merging directives and device configuration is a proper waste indicates that the management structure has not been established. Organised biodegradable wastes to be limited in storage facilities evaluation of devices such as waste composting, biogas production or production energy/material recovery for evaluation is necessary. In this case, domestic organic wastes separated at the source, with the receiving waste gas source. Evaluation with composting process without mixing use it as an attractive method. Thus, the storage In the regions, the need will decrease and organic wastes will be removed from the soil by turning it into a healing agent, green areas are also is the relationship. In this transitional period, limiting organic waste for a sustainable waste management precautions need to be prepared.

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THE EFFECT OF DIFFERENT ORGANOMINERAL AND MINERAL FERTILIZER APPLICATIONS ON SOME PHYSIOLOGICAL PROPERTIES IN SPINACH GROWING

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ABSTRACT

In this research, the cultivation of plants was carried out between January and May 2022 in Tekirdağ Namık Kemal University, Faculty of Agriculture, Department of Horticulture, Climate Room. Matador spinach variety (Spinacia oleracea var. Matador) was used as material. In the fertilization, two organomineral fertilizers (8:8:8 NPK + 22% organic matter and 11:11:11 NPK + 10% organic matter) with different organic matter amount obtained by using ash and urea as organomineral fertilizers, two mineral fertilizers (15:15:15 NPK+ trace elements and 12:12:17 NPK + trace elements) and a total of four types of fertilizers and control conditions were used. In the fertilizations, the garden soil placed in the pots without fertilizer, the soil in the range of macro-micro nutrients that should be in vegetable cultivation, the soils with 5 different fertilizations (Control, 2 organomineral and 2 mineral fertilization) were used. Two different doses were used for mixing organomineral and mineral fertilizers into the garden soil. Accordingly, the pots were fertilized with 10 and 20 kg/da NPK. Organomineral and mineral fertilizers were given to the pots in three equal parts. The first fertilization is half of the total fertilizer (5 and 10 kg/da N) into the pots before sowing the seeds, 10 days after the first true leaves appear in the second fertilization (2,5 and 5 kg/da N), and the last fertilization is 20 days after the first true leaves appear (2,5 and 5 Kg/da N) were added to the pots to provide the determined concentrations. The research was established in randomized parcels in the climate room according to the 3-factor factorial experiment design with 3 replications. There were 60 plots in total in the experiment, 6 plants were grown in each plot and a total of 360 plants were grown in the whole experiment. Chlorophyll content (SPAD value), pH and water-soluble dry matter content (%) were measured in spinach leaves during the harvest period. According to the findings obtained; As a soil type, garden soil (GS) without fertilization and without additional nutritional supplement gave the lowest results. Other soil type; The ideal soil for vegetable cultivation gave the best results in vegetable cultivation. The results were examined only in terms of the main effect of the fertilizer dose, the highest results were obtained in all criteria from the 20 kg/da fertilizer dose in spinach. In these criteria, the second organomineral (OM2) fertilizer (11:11:11) gave the highest results in this experiment. These results were followed by the 1st mineral (M1) fertilization (15:15:15), which is sometimes different and sometimes in the same group. These results were followed by the 2nd mineral (M2) fertilization (12:12:17) and the 1st Organomineral (OM1) fertilization (8:8:8), while the unfertilized (control) garden soil gave the lowest results.

Keywords: Vegetables, fertilization, amount of chlorophyll, pH, amount of water-soluble substance

FARKLI ORGANOMİNERAL VE MİNERALGÜBRE UYGULAMALARININ ISPANAK YETİŞTİRİCİLİĞİNDE BAZI FİZYOLOJİK ÖZELLİKLER ÜZERİNE ETKİSİ

ÖZET

Araştırmada bitkilerin yetiştiriciliği 2022 yılı Ocak-Mayıs ayları arasında Tekirdağ Namık Kemal Üniversitesi Ziraat Fakültesi Bahçe Bitkileri Bölümü İklim odasında yürütülmüştür. Materyal olarak Matador ıspanak çeşidi (*Spinacia oleracea* var. *Matador*) kullanılmıştır. Gübreleme de organomineral gübre olarak kül ve üre kullanılarak elde edilmiş farklı organik madde miktarına sahip 2 adet organomineral gübre (8:8:8 NPK + %22 organik madde ve 11:11:11 NPK + %10 organik madde) ile 2 mineral gübre (15:15:15 NPK+ iz elementler ve 12:12:17 NPK + iz elementler) olmak üzere toplam 4 çeşit gübre ve kontrol koşulları kullanmıştır. Yapılan gübrelemelerde saksılara konulacak bahçe toprağı gübresiz, sebze yetiştiriciliğinde olması gereken makro-mikro besin elementleri aralığındaki toprak, 5 farklı gübreleme (Kontrol, 2 organomineral ve 2 adet mineral gübreleme) yapılmış topraklar kullanılmıştır. Organomineral ve mineral gübrelerin bahçe toprağına karıştırılmasında 2 farklı doz kullanılmıştır. Buna göre saksılara 10 ve 20 kg/da N gelecek şekilde gübreleme yapılmıştır. Saksılara organomineral ve mineral gübreler 3 eşit kısımda verilmiştir. İlk gübreleme tohum ekiminden önce saksılara toplam gübrenin yarısı (5 ve 10kg/da N), ikinci gübrelemede ilk gerçek yaprak çıkışından 10 gün sonra (2,5 ve 5 kg/da N) son gübrelemede ilk gerçek yaprak çıkışından 20 gün sonra (2,5 ve 5 Kg/da N) saksılara belirlenen konsantrasyonları sağlayacak şekilde ilave edilmiştir. Araştırma iklim odasında tesadüf parsellerinde 3 faktörlü faktöriyel deneme desenine göre 3 tekerrürlü olarak kurulmuştur. Denemede toplam 60 parsel, her parselde 6 bitki ve tüm denemede toplam 360 bitki yetiştirilmiştir. Hasat döneminde ıspanak yapraklarında klorofil miktarı (SPAD Değeri), pH ve suda çözünebilir kuru madde miktarı (SÇKM) (%) ölçülmüştür. Elde edilen bulgulara göre; toprak tipi olarak gübrelemesiz ve ek besin takviyesi yapılmayan bahçe toprağı (BT) en düşük sonuçları vermiştir. Diğer toprak çeşidi olan seze yetiştiriciliğinde olması gereken toprak (OGBT) tipinde yapılan yetiştiricilikler en iyi sonuçları vermiştir. Sadece gübre dozu ana etkisi bakımından sonuçlar incelendiğinde ıspanakta 20 kg/da gübre dozundan tüm kriterlerde en yüksek sonuçlar alınmıştır. Ele alınan bu kriterlerde en yüksek sonuçları bu denemede 2. organomineral (OM_2) gübre (11:11:11) vermiştir. Bu sonuçları istatistiki olarak bazen farklı bazen aynı grupta olan 1. mineral (M_1) gübreleme (15:15:15) izlemiştir. Bu sonuçları 2. mineral (M2) gübreleme (12:12:17) ve 1. Organomineral (OM1) gübreleme (8:8:8) takip ederken hiçbir gübrelemenin yapılmadığı bahçe tipi toprak (kontrol) en düşük sonuçları vermiştir.

Anahtar Kelimeler: Sebze, gübreleme, klorofil miktarı, pH, SÇKM

1. INTRODUCTION

Turkey is one of the few countries in the world in spinach production. It is currently the fourth largest producer in the world with an average annual production of 225 thousand tons. China is in the first place with an annual production of 24.4 million tons. The United States is in second place with 323 thousand tons and Japan is in third place with 248 thousand tons.

Spinach is a vegetable grown in almost every part of Turkey, except for the Eastern Black Sea Region, due to heavy rainfall and humidity. Spinach is produced in an area exceeding 160 thousand decares in Turkey. 22 percent of the production areas are made in İzmir Torbalı and Menemen, 14 percent in Ankara Beypazarı regions (Anonymous, 2021).

Rapid population growth in the world has increased the need for food and agricultural products. Efforts have been made to increase agricultural production in order to meet the increasing need, and the consumption of chemical fertilizers used to provide the plant nutrients required for the increase of production has also accelerated. However, many of the recent studies report that the use of chemical fertilizers is not sustainable and yield decreases are seen due to the problems such as the environmental damage as well as the rapid increase in soil pH in the long term. Again, in the studies conducted on this subject, it is suggested that organomineral fertilizers are the best alternative to chemical fertilizers due to their potential to provide plant nutrients and their effect on improving soil properties.

Organomineral fertilizers, which are provided by adding minerals to organic wastes that improve fertilizer value or soil properties, are considered as a different fertilizer class from organic and mineral fertilizers in terms of their basic structure (Ozer, 2017).

2. MATERIAL and METHOD

2.1. Material

In this study, Matador (*Spinacia oleracea* var. Matador), which is widely grown in Turkey and well adapted to the Thrace Region, was used as material (Figure 1).



Figure 1. Matador *(Spinacia oleracea* var. Matador) Spinach Seeds

In the research, organomineral and mineral fertilizers (Figure 2) were supplied from ASOS Proses Makina Sanayi ve Ticaret joint stock company (Çorlu/Tekirdağ).



Figure 2. Organomineral and mineral fertilizers procured from ASOS Proses Makina San. ve Tic. joint stock company

For this purpose, 2 organomineral fertilizers (8:8:8 NPK + 22% organic matter and 11:11:11 NPK + 10% organic matter) with different organic matter amounts obtained by using ash and urea as organomineral fertilizers and 2 mineral fertilizers (15:15:15 NPK+ trace elements and 12:12:17 NPK + trace elements) in total 4 types of fertilizers were used.

Information on organomineral and mineral fertilizers used in the research is given in Table 1 and Table 2 below.

Table 1. 8:8:8 and 11:11:11 Organomineral granular fertilizer content

No.	Input	Unit	8:8:8		11:11:11	
			Quantity	%	Quantity	%
1	Ash	g	624,2	31	315	32
2	Organic Matter	g	432,4	22	101	10
3	Urea	g	273,4	14	171	17
4	MKP	g	0	0	22,5	2
5	DAP	g	0	0	63	6
6	K2SO4	g	28,8	1	50,6	5
7	H2SO4	g	480,4	24	180	18
8	H3PO4	g	88,8	4	29,4	3
9	7% Ammonia	g	72	4	67,5	7
Total			2000		1000	

Table 2. 15:15:15 and 12:12:17 Mineral fertilizer content

No.	Input	Unit	15:15:15		12:12:17	
			Quantity	%	Quantity	%
1	Waste Plant Ash	g	730,00	14,60	1000,00	20,00
2	H2SO4 % 98	g	255,50	5,11	300,00	6,00
3	Urea	g	1250,00	25,00	980,00	19,60
4	DAP	g	1041,80	20,84	1050,00	21,00
5	MAP	g	400,00	8,00	100,00	2,00
6	K2SO4	g	1322,70	26,45	1470,00	29,40
Total			5000,00	100,00	5000,00	100,00

2.2. Method

The cultivation of plants in the research was carried out in Tekirdağ Namık Kemal University Faculty of Agriculture, Horticulture Department laboratories and climate room.

Chemical analyzes were carried out at the Faculty of Agriculture, Horticulture laboratory, Namık Kemal University Scientific and Technological Research Application and Research Center (NABİLTEM) and Tekirdağ Commodity Exchange laboratories.

Our experiment was set up in a climate chamber whose temperature can be adjusted between +40 °C and – (minus) 20°C under controlled conditions. All experiments were carried out in a climate room with a temperature of 22-23°C during the day, 17-18°C at night and a humidity of 65-70%. (10/14 (bright/night) hour photoperiodic order, 400 µmol $m^{-2}s^{-1}$ light intensity). The spinach seeds were planted in plastic pots on the growing tables in the climate room. Plants were grown in garden soil filled in plastic pots with a volume of 800 ml.

For this study, soils were taken from two different soil layers and samples from these soils were sent for analysis (Table 3). As a result of the soil analysis, the texture and chemical composition

of the soil were determined.

These soils were moist, so they were laid out in the laboratory to dry to make them suitable before potting. The laboratory was brought to a suitable temperature for the soils to dry out (Figure 3).

Table 3. NABİLTEM analysis results of soil samples filled into plastic pots

NAMIK KEMAL ÜNİVERSİTESİ BİLİMSEL ve TEKNOLOJİK ARAŞTIRMALAR UYGULAMA ve ARAŞTIRMA MERKEZİ
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ANALİZ RAPORU

Müşterinin adı/adresi: Prof. Dr. Murat DEVECİ
Rapor Tarihi: 10.01.2022

SONUÇLAR

NUMUNE KODU	KULLANILAN YÖNTEM	ANALİZ SONUCU
ICP/OES/2022/41-42	TL-ICP-002	*Ekteki gibidir.

Sample	Type	Na	Mg	K	Ca	P	Fe	Cu	B	Mn	Zn	Al	Mo
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	Ppm
1721	1	41,38	470,35	77,22	3024,25	3,68	2,81	0,49	0,47	3,30	0,08	0,07	0,00
	2	34,38	466,93	78,48	2971,79	3,92	2,81	0,49	0,47	3,28	0,08	0,07	0,00
	<x>	37,88	468,64	77,85	2998,02	3,80	2,81	0,49	0,47	3,29	0,08	0,07	0,00
1722	1	23,92	603,59	51,50	2633,11	1,70	1,91	0,14	0,58	0,60	0,06	0,06	0,00
	2	22,55	612,36	49,89	2808,20	1,67	2,17	0,14	0,58	0,70	0,06	0,05	0,00
	<x>	23,24	607,97	50,70	2720,65	1,68	2,04	0,14	0,58	0,65	0,06	0,06	0,00

Bu rapor, laboratuvarın yazılı izni olmadan kısmen kopyalanıp çoğaltılamaz.
İmzasız raporlar geçersizdir.
Sonuçlar sadece yukarıda tanımlanan numuneye aittir.
Numuneler müşteri tarafından alınarak NABİLTEM'e ulaştırılmıştır.



Figure 3. Drying of the experiment soil

The research was established in randomized parcels in the climate chamber according to the 3-factor factorial experiment design with 3 replications. In each replication of the experiment, 2 different soils, 5 different fertilizers, 2 fertilizer doses were applied. There were 60 parcels in total in the experiment, 6 plants were grown in each parcel and a total of 360 plants were grown in the whole experiment (Table 4). Organomineral and mineral fertilizers were given to the pots in three equal parts. The first fertilization is half of the total fertilizer (5 and 10 kg/da N) into the pots before sowing the seeds, 10 days after the first true leaves appear in the second fertilization (2,5 and 5 kg/da N), and the last fertilization is 20 days after the first true leaves

appear (2,5 and 5 Kg/da N) were added to the pots to provide the determined concentrations. The solution, for which the necessary calculations were made, was prepared and applied to the pots to be applied to the soil to be improved in the experiment. The fertilizers to be applied were prepared as 800 ml each according to the calculations made before. Some pictures of the trial period are given in Figures 4-9.

Figure 4. 20 g of Leonardite was applied to each pot to prepare IGS.

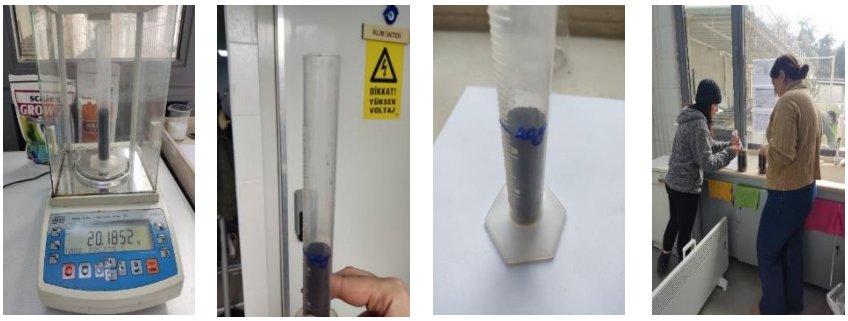


Table 4. Experiment Plan on the Application of Different Factors in Spinach

Soil	**Fertilizer**	**Dose (kg/da N)**	**Practice**
Garden Soil (GS)	Control (Without Fertilizer) (C)		GS+C
	Organomineral 1 (OM_1)	10	GS+OM_1+%10
		20	GS+OM_1+%20
	Organomineral 2 (OM_2)	10	GS+OM_2+%10
		20	GS+OM_2+%20
	Mineral 1 (M_1)	10	GS+M_1+%10
		20	GS+M_1+%20
	Mineral 2 (M_2)	10	GS+M_2+%10
		20	GS+M_2+%20
Garden Soil with Added Macro-Micro Nutrient Element in Spinach Cultivation (Improved Garden Soil)	Control (Without Fertilizer) (C)		IGS+C
	Organomineral 1 (OM_1)	10	IGS+OM_1+%10
		20	IGS+OM_1+%20
	Organomineral 2 (OM_2)	10	IGS+OM_2+%10
		20	IGS+OM_2+%20
	Mineral 1 (M_1)	10	IGS+M_1+%10
		20	IGS+M_1+%20
	Mineral 2 (M_2)	10	IGS+M_2+%10
		20	IGS+M_2+%20



Figure 5. 1.2 g Zinc Sulphate was added to 4,000 ml of water prepared for IGS

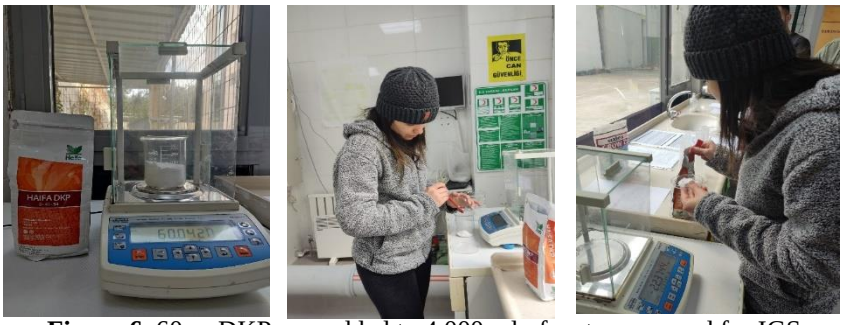


Figure 6. 60 gr DKP was added to 4,000 ml of water prepared for IGS

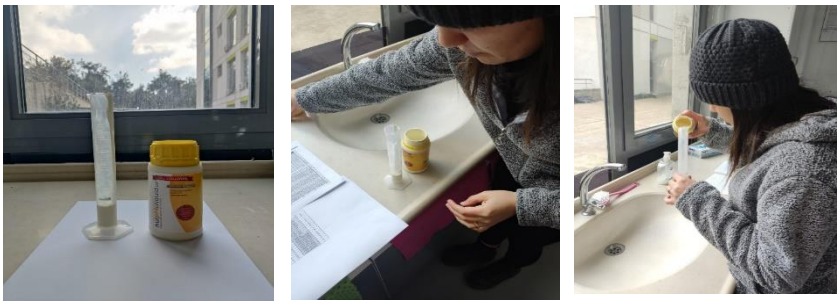


Figure 7. 10 ml of Liquid Sulfur was added to 4,000 ml of water prepared for IGS



Figure 8. The mixture prepared for IGS (4,000 ml) was applied to each pot as 20 ml.

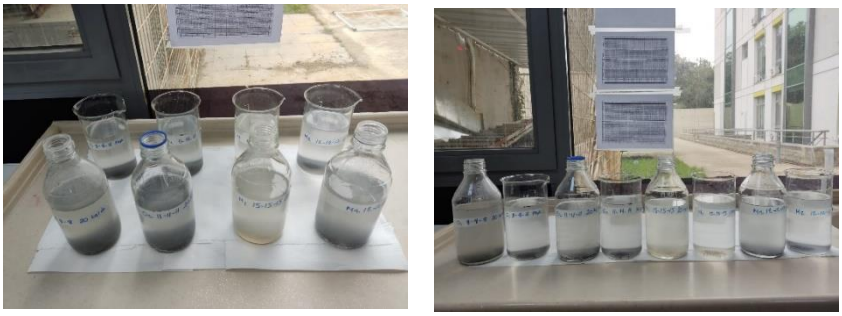


Figure 9. Organomineral and mineral fertilizers prepared in 800 ml

2.3. Experimental Measurements

2.3.1. Amount of chlorophyll (SPAD Value)

For the amount of chlorophyll, the leaves of 4 randomly selected plants from each plot (two areas of the leaf close to the main vein) were measured with a "Konica Minolta SPAD-502" portable chlorophyllmeter (Figure 10) during the harvest period (Geravandi et al., 2011).

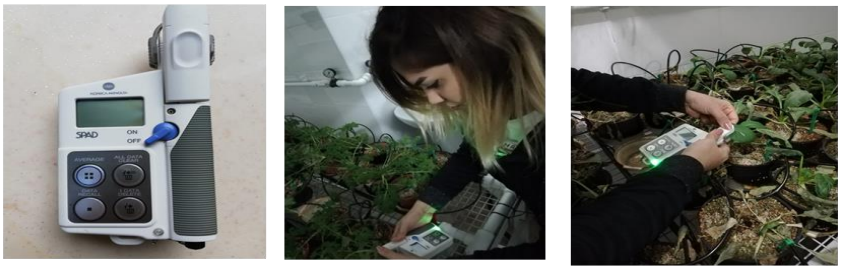


Figure 10. Konica Minolta SPAD-502" portable chlorophyllmeter

2.3.2. Leaf pH value

The liquid obtained from the spinach leaves during the harvest were measured with a pH meter (Figure 11).



Figure 11. pH meter

2.3.3. Amount of water-soluble dry matter (%)

Liquids obtained from spinach leaves during the harvest period, The amount of water-soluble dry matter was measured with a hand-held refractometer (Figure 12).



Figure 12. hand-held refractometer

3. RESULTS

3.1. Amount of chlorophyll (SPAD Value)

The effects of different organomineral and mineral fertilizer applications on the amount of chlorophyll in the leaves of the spinach plant are given in Table 5.

As a result of the evaluation of Table 5, it was determined that the main effects of soil, fertilizer and dose were statistically significant at the 1% level, and the interactions were not significant. In Table 5, the highest amount of chlorophyll in terms of different garden soils was obtained from spinach leaves (46.34 SPAD) grown in the improved garden soil type (IGS). When the table is examined in terms of the effect of the main effect of fertilizer doses on the amount of chlorophyll, the amount of fertilizer dose applied at 20 kg/da (46.54 SPAD) increased the chlorophyll content in the leaves compared to the fertilizer dose of 10 kg/da (43.88 SPAD). The effect of applied organomineral and mineral fertilizers on chlorophyll content is examined in Table 5. Accordingly, the highest chlorophyll content was obtained from Organomineral 2 fertilizer variety (49.22 SPAD), followed by Mineral 1, Organomineral 1 and Mineral 2 fertilizers, respectively, and the lowest chlorophyll content was obtained from spinach leaves (41.92 SPAD) belonging to control applications.

Table 5. Effect of organomineral and mineral fertilizer applications on chlorophyll value (SPAD) of spinach plant in different garden type soils and groups according to LSD test*

Main Effect and Int.	**Fertilizer Types** / **Soil and Doses**		**Control**	**OM 1**	**OM 2**	**Mineral 1**	**Mineral 2**	**Main Effect and Int.**
Soil X Fertilizer Int. and Soil Main Effect	Garden Soil (GS)		41,90	43,07	46,83	42,65	40,73	**43,04 b**
	Improved Soil for Spinach Cultivation (IGS)		41,93	45,53	51,60	47,97	44,68	**46,34 a**
Dose X Fertilizer Int. and Dose Main Effect	10 Kg/da		41,92	41,92	42,45	46,95	46,15	**42,84 b**
	20 Kg/da		51,48	40,52	44,90	48,23	42,38	**46,54 a**
Soil X Dose X Fertilizer Int. and Soil X Dose Int.	Garden Soil (GS)	10 Kg/da	41,90	41,90	42,10	43,17	44,03	**41,41**
		20 Kg/da	50,50	39,37	42,10	44,80	40,50	**44,67**
	Improved Soil for Spinach Cultivation (IGS)	10 Kg/da	41,93	41,93	42,80	50,73	48,27	**44,28**
		20 Kg/da	52,47	41,67	47,70	51,67	44,27	**48,41**
Fertilizer Types Main Effect			**41,92 c**	**44,3 bc**	**49,22 a**	**45,31 b**	**42,71 bc**	**44,69**

*There is no difference between the averages with the same letter.

The differences in the amount of chlorophyll occurring in the leaves as a result of different fertilizers and fertilizer doses applied on the chlorophyll amount of the spinach leaves caused the selected fertilizers to be used by the plant and the high doses to increase the growth and development in the plant, resulting in an increase in the chlorophyll content in the leaf content. Investigated the effects of different doses of organic and inorganic fertilizer applications on plant growth and chlorophyll content in lettuce in their study in pots. In the study, they determined that organic fertilizers increased plant growth, yield and chlorophyll value (SPAD) in lettuce (Tüzel et al. 2011; Liu et al. 2014).

Bharad et al. (2013), the maximum chlorophyll content was obtained from plants treated with 50 kg/ha of urea. It was thought that this might be due to the fact that urea is rich in nitrogen and nitrogen is the basic building block of chlorophyll. Similar results are in line with the study of Gairola et al. (2009) on spinach. It is suggested that the positive effect of organic fertilizers on plant growth and yield may be due to the phytohormones in organic fertilizers (Nogales et al., 2005).

The effects of the application of compost (fruit and vegetable solid waste compost), cow manure compost, cow slaughterhouse waste compost, cow slaughterhouse waste vermicompost and fruit and vegetable solid waste vermicompost obtained from different organic materials in lettuce, the change in bioactive substance content and product yield and soil nutrient status. A related research has been done. Plant growth and chlorophyll content were found to be higher in all soils with fertilizer application, except for city solid waste compost, compared to the control group that did not apply fertilizer (Coria-Cayupan et al., 2009).

In this study, as in other studies, it was observed that the amount of chlorophyll increased as the fertilizer application and dose increased, and the highest increase was observed in organomineral 2 fertilizer.

3.2. Leaf pH value

The effects of different organomineral and mineral fertilizer applications on the pH amount in spinach leaves are shown in Table 6.

Table 6. Effect of organomineral and mineral fertilizer applications on pH of spinach plant in different garden type soils and groups according to LSD test*

Main Effect and Int.	**Fertilizer Types** / **Soil and Doses**		**Control**	**OM 1**	**OM 2**	**Mineral 1**	**Mineral 2**	**Main Effect and Int.**
Soil X Fertilizer Int. and Soil Main Effect	Garden Soil (GS)		6,20	5,33	6,40	6,28	6,25	**6,09**
	Improved Soil for Spinach Cultivation (IGS)		6,21	6,49	6,53	6,45	6,41	**6,42**
Dose X Fertilizer Int. and Dose Main Effect	10 Kg/da		6,21	6,21	5,41	6,44	6,41	**6,15**
	20 Kg/da		6,49	6,33	6,33	6,39	6,34	**6,36**
Soil X Dose X Fertilizer Int. and Soil X Dose Int.	Garden Soil (GS)	10 Kg/da	6,20	6,20	4,32	6,39	6,33	**5,88**
		20 Kg/da	6,40	6,24	6,25	6,30	6,25	**6,30**
	Improved Soil for Spinach Cultivation (IGS)	10 Kg/da	6,21	6,21	6,49	6,49	6,49	**6,41**
		20 Kg/da	6,57	6,41	6,41	6,47	6,43	**6,43**
Fertilizer Types Main Effect			**6,21**	**5,91**	**6,46**	**6,36**	**6,33**	**6,25**

In the results obtained in the analysis of the averages, it was determined that the main factors and interactions were not statistically significant.

The effects of different organomineral and mineral fertilizer applications on the pH amount in spinach leaves are shown in Table 6.

In the results obtained in the analysis of the averages, it was determined that the main factors and interactions were not statistically significant.

Although the averages are not statistically significant in Table 6, the obtained results are compared numerically. Accordingly, in terms of soil mother effect, the pH amount (6.42) found in the leaves of the spinach grown in the improved garden soil (IGS) has a higher pH (6.09) than the leaves of the plants grown in the garden soil (GS). When the results were examined in terms of the effect of the fertilizer doses given per decare, the pH amount in the leaves of the plants obtained as a result of the application of 20 kg/da fertilizer dose was found to be higher (6,36). When the changes in the pH of 5 different fertilizer types applied in spinach cultivation were examined, the pH amount obtained was listed as OM2, M1, M2, OM1 and control applications, respectively.

The contribution of organic fertilizers on plant growth and yield may be due not only to the organic matter and nutrient capacity in its content, but also to the adjustment of some events in favor of the plant, such as pH, humidity, microorganism activity and aeration (Melgarejo et al., 1997).

Similar to this study, Mahadeen (2009) suggested that organic fertilization increases soil electrical conductivity and organic matter content, but does not affect pH much.

3.3. Amount of water-soluble dry matter (%)

When the averages were examined in terms of the amount of water-soluble dry matter in the spinach leaves, the results were found to be statistically significant in terms of the main effect of soil type fertilizers, while the other main factors, fertilizer dose and interactions, were found to be statistically insignificant (Table 7).

The amount of water-soluble dry matter in the leaves was found in Table 7 between 5.60% and 8.80%. In Table 7, IGS as soil type and OM2 as fertilizer type gave the highest results. Although it is not statistically significant, the fertilizer dose of 20 kg per decare caused an increase in the amount of water-soluble dry matter.

Elhassan et al. (2011) determined that the highest water-soluble dry matter content in grapefruit occurred in the application of urea + sheep manure in different combinations and doses of urea and sheep manure. It has been stated that applications consisting of barnyard manure, chicken

manure or a mixture of the two in tomato significantly increase the water-soluble dry matter content compared to the control application with no fertilization (Ibrahim and Fadni, 2013). Mahadeen (2009) suggested that organic fertilization increases vitamin C in strawberries. In another study, it was determined that biofertilizer applications in pepper caused an increase in water-soluble dry matter, vitamin C and carotenoid content.

Table 7. The effect of organomineral and mineral fertilizer applications on water-soluble dry matter (%) of spinach plant in different garden type soils and groups according to LSD test*

Main Effect and Int.	**Fertilizer Types** / **Soil and Doses**		**Control**	**OM 1**	**OM 2**	**Mineral 1**	**Mineral 2**	**Main Effect and Int.**
Soil X Fertilizer Int. and Soil Main Effect	Garden Soil (GS)		5,57	6,08	6,88	6,55	6,28	**6,27 b**
	Improved Soil for Spinach Cultivation (IGS)		5,63	7,48	8,70	8,45	7,95	**7,64 a**
Dose X Fertilizer Int. and Dose Main Effect	10 Kg/da		5,60	7,60	7,40	5,60	7,65	**6,85**
	20 Kg/da		7,93	6,93	6,90	6,67	7,30	**7,07**
Soil X Dose X Fertilizer Int. and Soil X Dose Int.	Garden Soil (GS)	10 Kg/da	5,57	6,60	6,50	5,57	6,70	**6,19**
		20 Kg/da	7,07	6,17	6,13	6,03	6,40	**6,35**
	Improved Soil for Spinach Cultivation (IGS)	10 Kg/da	5,63	8,60	8,30	5,63	8,60	**7,51**
		20 Kg/da	8,80	7,70	7,67	7,30	8,20	**7,78**
Fertilizer Types Main Effect			**5,60 b**	**6,78 a**	**7,79 a**	**7,50 a**	**7,12 a**	**6,96**

*There is no difference between the averages with the same letter.

In another study, it was reported that increasing levels of bat fertilizer application from the soil increased the amount of water-soluble dry matter in tomato plants (Soba, 2012).

The obtained findings are given in Tables 5, 6 and 7.

As a result of the collective evaluation of these charts, in spinach;

✓ In all criteria, garden soil (GS) without fertilization and additional nutritional supplement gave the lowest results as soil type. The other soil type, the improved soil (IGS) type, gave the best results.

✓ In the study, fertilizers were given in 2 different doses (10 and 20 kg/da). In the statistical calculations of the data obtained, the highest results were obtained from the 20 kg/da fertilizer dose when the results were examined only in terms of the main effect of the fertilizer dose.

✓ In the experiment, the physiological highest results; gave 2nd organomineral (OM2) fertilizer (11:11:11) in both species. These results were followed by the 1st mineral (M1) fertilization (15:15:15), which is sometimes different and sometimes in the same group. These results were followed by the 2nd mineral (M2) fertilization (12:12:17) and the 1st Organomineral (OM1) fertilization (8:8:8). And finally, garden type soil with no fertilization (control) gave the lowest results.

✓ As a result; in garden soil type improved (IGS) for vegetable growing; 20 kg/da fertilizer dose application; organomineral 2 (OM2) (11:11:11) gave the best results.

Organomineral granular fertilizer (11:11:11), which gives better results than the mineral fertilizers used in classical plant cultivation, can be an alternative to mineral fertilizers.

ACKNOWLEDGEMENTS

This work was supported by Research Fund of the Tekirdağ Namık Kemal University. Project Numbers NKUBAP.03.DR.22.422

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AYDIN, İZMİR VE MUĞLA İLLERİNDE ARICILIK YAPAN İŞLETMELERİN SOSYO-EKONOMİK ANALİZİ

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ÖZET
Bu çalışmada Ege bölgesinde yer alan Aydın, İzmir ve Muğla illerinde arıcılık yapan işletmelerin sosyo-ekonomik özelliklerinin incelenmesi amaçlanmıştır. Araştırmada kullanılan veriler 2018-2019 dönemine ilişkin olup, toplam 149 arıcılık işletmesinden anket yoluyla elde edilmiştir. Çalışma kapsamındaki arıcılık işletmeleri il grupları ve işletme büyüklük grupları olmak üzere iki farklı şekilde gruplandırılarak, sosyal ve ekonomik özellikleri incelenmiştir. Ayrıca işletmelerin karlılık durumunu ortaya koyabilmek için arıcılık faaliyetine ilişkin brüt kar, net kar ve nispi kâr analizi yapılmıştır. İşletme gruplarına göre üreticilerin ilgili özellikler açısından aralarında farklılık olup, olmadığı da istatistiksel olarak test edilmiştir. Çalışma sonucunda arıcılık işletmelerinde üreticilerin ortalama yaşı 50.11 yıl, ortalama eğitim süresi 6.31 yıl, arıcılık faaliyetinde ortalama deneyim süresi 25.15 yıl, ortalama aile nüfusu ise 3.78 kişi ve arıcılık faaliyetinde kullanılan toplam işgücü miktarı 295.14 EİG olarak hesaplanmıştır. İncelenen işletmelerde kovan başına bal verimi 16.51 kg, balmumu verimi 354.40 gr, polen verimi 486.10 gr, propolis verimi 18.03 gr ve arı ekmeği verimi 133.73 gr olarak hesaplanmıştır. İşletmeler genel ortalamasına göre kovan başına brüt üretim değeri 274.05 TL olarak hesaplanmıştır. İşletmelerde üretim masraflarının %43.86'sı değişken masraflardan, %56.14'ü ise sabit masraflardan oluşmakta olup, kovan başına brüt kar 157.30 TL, net kar 7.86 TL, nispi kar 1.03, 1 kg süzme balın maliyeti 12.24 TL ve 1 kg süzme balın satış karı ise 0.48 TL olarak hesaplanmıştır. İncelenen işletmelerde arıcıların en önemli karşılaştığı sorun pazarlama iken, bunu sırasıyla konaklama, tarımsal ilaçlama, tagşisli bal sorunu ve girdi maliyetlerinin yüksekliği izlemektedir. Arıcılığın karlı bir faaliyet olması için diğer katma değer yaratan arı ürünlerinin de üretilmesi gerekmektedir.

Anahtar Kelimeler: Ekonomik analiz, Arıcılık, Brüt kar, Net kar

SOCIO-ECONOMIC ANALYSIS OF BEEKEEPING FARMS IN AYDIN, İZMİR, AND MUĞLA PROVINCES

ABSTRACT

This study aims to investigate the socio-economic characteristics of beekeeping farms in the Aydın, Izmir, and Muğla provinces in the Aegean region. The data used for the study referred to the period 2018-2019 and were collected through a questionnaire from 149 beekeeping farms. The beekeeping farms surveyed in the study were grouped in two different ways, as provincial groups and farm size groups, and their social and economic characteristics were studied. In addition, an analysis of the gross profit, net profit, and relative profit of the beekeeping activities was performed to show the profitability of the farms. It was also statistically tested whether there was a difference between producers in terms of relevant characteristics by farm group. The result of the study is that the average age of producers in beekeeping farms is 50.11 years, the average period of education is 6.31 years, the average experiment period in beekeeping is 25.15 years, the average family size is 3.78 people, and the total number of workers employed in beekeeping is 295.14 EIG. The honey yield per hive was 16.51 kg, beeswax yield 354.40 g, pollen yield 486.10 g, propolis yield 18.03 g and bee bread yield 133.73 g in the studied farms. According to the general average of the farms, the gross production value per hive was calculated as 274.05 TL. 43.86% of the production costs in the farms consist of variable costs and 56.14% of fixed costs, the gross profit per hive is 157.30 TL, the net profit is 7.86 TL, the relative profit is 1.03, the cost of 1 kg of extracted honey was calculated as 12.24 TL and the sales profit for 1 kg of extracted honey was calculated as 0.48 TL. Marketing is one of the main problems of beekeepers in the beekeeping farms, it is followed by accommodation, pesticides, adulterated honey, and high input costs. It is necessary to produce other value-added bee products for profitable beekeeping activity.

Keywords: Economic analysis, Beekeeping, Gross profit, Net profit

1. GİRİŞ

Arıcılık, Dünyada kırsal toplulukların yaşam kalitesini iyileştirmek için gelir elde etmenin alternatif bir yolu olarak görülmektedir (Adgaba et al., 2014). Toprağa bağımlı olmayışı, diğer hayvancılık dallarına göre daha az bir sermaye ile yapılabilmesi ve diğer tarım kollarına oranla daha az iş gücü kullanması arıcılığı ön plana çıkartan önemli özelliklerdir (Sancak vd., 2013; Kuvancı vd, 2013). Arıcılık polinasyona olan etkileri sonucunda çevresel sürdürülebilirliğe katkı vermekle birlikte, arılar ve orman arıcılığı tozlaşma ile orman ekosistemlerinde ağaçların yenilenmesini ve ormanın biyolojik çeşitliliğinin korunmasını sağlamaktadır. Bu etkileri ile beraber arcılık, Türkiye ve dünyada her geçen gün gelişen, ekonomik getirisi ve ürün çeşitliliği artan bir sektör konumuna gelmektedir. Türkiye'de kovan sayısı ve bal üretimi her geçen yıl artmakla beraber, verimde azalma yaşanmaktadır (Çevrimli ve Sakarya, 2018; Doğan ve ark., 2020). Başta verim düşüklüğü olmak üzere Türkiye arıcılık sektörünün birçok teknik ve ekonomik sorunu bulunmaktadır. Bu sorunları; arı hastalıkları ve zararlıları, ihracat kapasitesinin istenilen düzeylere çıkarılamaması, arıcılık işletmeleri açısından ürün pazarlamada yaşanan zorluklar, örgütlenme düzeyindeki yetersizlikler, destekleme politikaları, gezginci arıcılıkta yaşanan sorunlar şeklinde sıralamak mümkündür (TRGM, 2021). Literatürde başta verim düşüklüğü olmak üzere arıcılık işletmelerinin sorunlarını ortaya koyan ve sosyo ekonomik analizini yapan çeşitli çalışmalar bulunmaktadır. Bu çalışmalardan bazıları özet olarak Çizelge 1'de verilmiştir.

Çizelge 1. Arıcılık ekonomisi ile ilgili yurtdışında yapılan bazı araştırmalar

Yazar-Yıl	Ülke	Konu	Bulgular
Folayan and Bifarin, 2013	Nijerya	Bal üretiminin karlılık analizi	Arıcıların %76'sının 5 yıldan az deneyime sahip olduğu, kovan maliyeti, finansman eksikliği, arı ölümleri, iklim koşulları ve çiçekli bitkilerin azlığının bal üretiminde karşılaşılan en önemli sorunlar olduğu bildirilmiştir.
Adgaba et al., 2014	Suudi Arabistan	Arıcılığın sosyo-ekonomik analizi	Arıcıların büyük kısmı (%93) kovanlarını yılda 2-9 defa taşıdığı, %71'nin geleneksel tipte kovan kullandığı, kutu kovanların benimsenmesinin arıcıların sosyo-demografik profillerinden önemli ölçüde etkilendiği gözlenmiştir. Ülkede arıcılığın başlıca sorunları; yağmur yokluğu, arı yemi eksikliği ve bal arısı düşmanları olduğu, arıcılık sektörünün gelişimi için güçlü bir araştırma ve yayım desteği, bitki örtüsünün korunması ile yerli bal arısı ırkının korunmasına ihtiyaç duyulduğu belirtilmiştir.
Makri et al., 2015	Yunanistan	Arıcılık işletmelerinin etkinlik ve ekonomik analizi	Çalışmada arıcılığın karlı bir sektör olarak görülmesine rağmen, sektörde önemli verimsizliklerin bulunduğu ortaya koyulmuş, arıcıların girdilerini kısa vadede % 34 ve uzun vadede %43 azaltarak aynı çıktı düzeyine ulaşabilecekleri, ayrıca arıcıların çoğunluğunun işletme ölçeğinde önemli değişiklikler yapması gerektiği bildirilmiştir. Çalışmada

			verimli arıcılığın temel özellikleri de incelenmiştir. Sonuçlara göre bu işletmelerde arıcının yaşının 40-50 yaş arasında değiştiği, ortaokul mezunu olup, 20 yıldan fazla arıcılık deneyimi olduğu, ortalama 130 arı kovanına sahip olduğu ve asıl mesleğinin arıcılık olduğu belirlenmiştir.
Dedej et al., 2015	Arnavutluk	Arıcılığın teknik ve ekonomik değerlendirilmesi	Arıcıların %76.09'ünün 30-60 yaş aralığında olduğu ve %76'sının 10 yıldan fazla arıcılık deneyimine sahip olduğu ortaya çıkmıştır. Bal verimi 19.8-34.1 kg/kovan, balmumu verimi 0.33-0.57 kg/kovan olup, arıcıların %91'inin ambalajlama ve etiketleme konusunda zorluklarla karşılaştıkları belirlenmiştir. Üretim masrafları içerisinde sırasıyla ekipman (%22-50), işçilik (%22.4-33.7), şeker, balmumu, nakliye (%20.5) ve ilaç (%18.5) masrafları yüksek paya sahiptir.
Ghaffari, 2015	İran-Hamadan bölgesi	Arıcılığın sosyal ve ekonomik etkileri	Arıcıların ortalama yaşı 39.62 yıl olup, üreticilerin %29.4'ü arıcılık, %15.9'u arıcılıkla beraber tarım ve hayvancılık, %54.7'si de arıcılıkla beraber diğer meslek gruplarında çalışmaktadır. Üreticilerin karşılaştıkları en önemli sorunlar sırasıyla kullanılan arı ırkı verim düşüklüğü, alet-ekipman fiyatlarının yüksekliği ve denetim yetersizliği olarak belirlenmiştir.
Popescu, 2017	Romanya	Bal üretim durumu analiz edilerek, geleceğe yönelik tahmin yapılmıştır.	Bal üretimini arttırmak amacıyla, arıcılar yeni teknolojiler, modern kovanlar ve verimli analar kullanmalı, bal pazarı ise, arı ürünlerinin daha yoğun tanıtımı, daha yüksek bal kalitesi, organik bal ve diğer arı ürünlerinin markalaştırılması ile geliştirilmelidir.
Shrestha, 2018	Nepal-Bardiya bölgesi	Bal üretim ekonomisi ve sorunları	Çalışmada arıcıların %94.73'ünün okur- yazar olup, deneyim sürelerinin 5 yıl olduğu bildirilmiştir. Fayda/masraf oranı 1.67 olup, en önemli üretim sorununun maliyet yüksekliği ve modern ekipmanların yetersiz kullanımı olduğu vurgulanmıştır.
Akınade, 2019	Nijerya	Araştırma bölgesinde arıcılığın zorlukları ve beklentileri	Arıcıların %51'i gelir elde etmek amacıyla,% 29'u ise tüketim amacıyla arıcılık yapmaktadır. Çalışmada arıcıların yaşadıkları sorunların sırasıyla hırsızlık (%35), yangın (%19) ve rüzgâr fırtınası (%6) olduğu belirlenmiştir. Çalışmada sorunların çözümünde üreticilere kredi olanakları (%39) ve ilaç desteği (%8) sağlanması gerektiği bildirilmiştir.
Onuç vd., 2019	Türkiye-İzmir	Arıcılık işletmelerinin ekonomik yönünün ortaya konulması	İşletmelerde en önemli sorunların arı ürünleri pazarlamasındaki zorluklar (%32.08), hastalık ve parazitlere karşı etkili ilaçların bulunmaması (%26.42), yoğun tarımsal ilaç kullanımı (%13.21) ve arı ürünlerinin faydalarının tüketicilere yeteri kadar tanıtılmaması olarak (%13.21 belirtilmiştir.

Bu çalışmada ise Ege bölgesinde yer alan Aydın, İzmir ve Muğla illerinde arıcılık yapan işletmelerin sosyo-ekonomik özelliklerinin incelenmesi amaçlanmıştır. Böylece daha sonra yapılacak çalışmalar için de yol gösterici nitelikte olabilecektir.

2. MATERYAL VE YÖNTEM

Aydın ilinde 30, İzmir ilinde 37 ve Muğla ilinde 82 olmak üzere toplam 149 arıcılık işletmesinden elde edilen 2018-2019 dönemine ait veriler çalışmanın materyalını oluşturmaktadır. Örnek hacminin belirlenmesinde oransal örnek hacmi formulu kullanılmıştır (Newbold, 1995). %95 güven aralığı ve %8 hata payı ile örnek sayısı 149 olarak hesaplanmıştır.

$$n = \frac{N.p(1-p)}{(N-1)\sigma_{p_x}^2 + p(1-p)}$$

n= Örnek hacmi, N= Araştırma bölgesinde arıcılık yapan üretici sayısı, σ p_x^2= Varyans, P= Arıcılıkta sürdürülebilir uygulamaları benimseyen üreticilerin oranı. Maksimum örnek hacmine ulaşabilmek için arıcılıkta sürdürülebilir uygulamaları benimseyen üreticilerin oranı p=0.50 olarak alınmıştır

Çalışmada işletmeler iki farklı şekilde gruplandırılarak, üreticilerin özellikleri incelenmiştir. Ayrıca bu gruplara göre üreticilerin ilgili özellikler açısından aralarında farklılık olup, olmadığı da istatistiksel olarak test edilmiştir. 1. gruplamada işletmelerin kovan sayıları dikkate alınarak, 200 kovandan az (küçük), 201-350 kovan (orta) ve 350'den fazla (büyük) kovana sahip işletmeler olmak üzere üç kategoriye ayrılmıştır. 2. gruplamada ise işletmelerin bulundukları iller dikkate alınarak, Aydın, İzmir ve Muğla illerinde bulunan işletmeler olmak üzere üç kategoriye ayrılmıştır. Bu gruplamalara ilişkin detaylar Çizelge 2 ve Çizelge 3'de verilmiştir.

Çizelge 2. İncelenen işletmelerin kovan mevcuduna göre gruplandırılması

Kovan Mevcuduna Göre İşletme Grupları	İşletme Sayısı	%	Ortalama Kovan Sayısı
1-200 kovan (küçük)	62	41.61	141.56
201-350 kovan (orta)	43	28.86	287.02
350+ kovan (büyük)	44	29.53	472.43
Toplam	149	100.00	281.25

Çizelge 3. İncelenen işletmelerin bulundukları illere göre gruplandırılması

İl Grupları	İşletme Sayısı	%	Ortalama kovan Sayısı (adet)
Aydın	30	20.13	282.60
İzmir	37	24.83	231.51
Muğla	82	55.04	303.20
Toplam	149	100.00	281.25

İşletmelerdeki mevcut işgücü belirlenirken Erkek İşgücü Birimi (EİB) esas alınmıştır. EİB'ne dönüştürmede kullanılan katsayılar Çizelge 4'te verilmiştir.

Çizelge 4. EİB'nin hesaplanmasında kullanılan katsayılar

Yaş	**Erkek**	**Kadın**
0-6	-	-
7-14	0.50	0.50
15-64	1.00	0.75
65+	0.75	0.50

Kaynak: Birinci ve Akın, 2008

Çalışmada arıcılık işletmelerinin karlılık durumunu ortaya koyabilmek için arıcılık faaliyetine ilişkin brüt kar, net kar ve nispi kâr analizi yapılmıştır. Brüt kârın hesaplanmasında, brüt üretim değerinden değişken masraflar çıkartılmıştır. Net karın hesaplanmasında brüt üretim değerinden üretim masrafları (değişken masraflar+sabit masraflar) çıkartılmıştır. Nispi kar ise brüt üretim değerinin üretim masraflarına bölünmesiyle hesaplanmıştır.

Çalışmada bal maliyetini hesaplayabilmek için öncelikle üretim masraflarından bal dışındaki diğer arı ürünlerinin değeri çıkartılmıştır. Elde edilen değerin bal üretim miktarına bölünmesiyle balın kg maliyeti hesaplanmıştır (Saner vd, 2011). Arıcılık üretim faaliyetinin brüt üretim değerinin hesaplanmasında bal, balmumu, polen, propolis, arı ekmeği değeri, koloni ve ana arı satışı, devlet desteği ve polinasyon geliri dikkate alınmıştır.

Çalışmada değişken masraflar: besleme, akaryakıt ve nakliye, geçici işçi, arıcı konaklama ve barınma masrafı, veteriner-ilaç, ana arı, pazarlama, temel petek, alet makine tamir- bakım masrafları, arılı kovan sigortası, nakil belge masrafı ve döner sermaye faizinden oluşmaktadır. Döner sermaye faizi, değişken masraflar toplamının yarı değeri üzerinden T.C. Ziraat Bankasının arıcılık üretim faaliyeti için uyguladığı tarımsal kredi faiz oranı uygulanarak hesaplanmıştır. Çalışmada sabit masraflar ise aile işgücü karşılığı, daimi işgücü masrafı, kovan amortismanı, alet makine amortismanı, arıcı kulübesi amortismanı, kovan sermayesi faiz karşılığı, genel idare giderleri ve birlik üyelik aidatından oluşmaktadır. Aile işgücü karşılığının hesaplanmasında geçici işgücüne ödenen ücret düzeyi dikkate alınmıştır. Amortisman hesaplanmasında, amortisman oranı %10 alınmıştır (Saner vd., 2005; Emir, 2015). Genel idare giderleri toplam değişken masrafların %3'ü esas alınarak hesaplanmıştır. Kovan sermayesi faiz karşılığı hesaplanırken kovan değerinin yarısı alınarak T.C. Ziraat Bankasının arıcılık üretim faaliyeti için uyguladığı tarımsal kredi faiz oranı dikkate alınarak hesaplanmıştır (Ören vd., 2010). Çalışmada uygulanan faiz oranı 2019 yılı için %10 olarak dikkate alınmıştır.

3. ARAŞTIRMA BULGULARI VE TARTIŞMA

İncelenen işletmelerde görüşülen üreticilerin tamamı erkek bireylerden oluşmaktadır. İşletmelerde üreticilerin yaşı, eğitim durumu ve deneyim süreleri ile ilgili bilgiler Çizelge 5'te

verilmiştir. Çizelgede görüldüğü gibi üreticilerin ortalama yaşı 50.11 yıl, ortalama eğitim süresi 6.31 yıl, ortalama tarımsal deneyim süresi 32.14 yıl ve arıcılık faaliyetinde ortalama deneyim süresi ise 25.15 yıl olarak hesaplanmıştır. Bu bulgular Türkiye'nin farklı illerinde yapılan çalışmaların sonuçları ile benzerlik göstermektedir. İlgili çalışmalarda arıcıların ortalama yaşının 40.85-54.71 yıl, ortalama eğitim süresinin 5.68-9.28 yıl ve ortalama arıcılık deneyim süresinin 11.08-23 yıl arası değiştiği belirlenmiştir (Saner vd., 2005; Ören vd., 2010; Saner vd., 2011; Öztürk vd., 2014; Emir, 2015; Çevrimli, 2017; Subaşı vd., 2019; Turhan, 2019; Onuç vd., 2019; Aktürk ve Aydın, 2019; Aydın vd., 2020; Balcı Gür, 2020).

Çizelge 5. Üreticilerin ortalama yaşı, eğitim durumu ve deneyim süresi

Özellikler	Kovan Mevcuduna Göre İşletme Grupları				İl Grupları				Genel (149)
	1. Grup (62) 1-200 kovan	2. Grup (43) 201-350 kovan	3. Grup (44) 350+ kovan	p	Aydın (30)	İzmir (37)	Muğla (82)	p	
Yaş	51.45	50.35	48.00	0.33	49.97	51.05	49.74	0.85	50.11
Eğitim Süresi (yıl)	6.13	6.21	6.66	0.33	6.40	5.95	6.44	0.45	6.31
Tarımsal Deneyim Süresi (Yıl)	34.65	31.17	29.88	0.15	31.94	32.21	32.19	0.98	32.14
Arıcılık Deneyim Süresi (Yıl)	23.73	26.14	26.18	0.41	21.75	24.70	26.60	0.16	25.15

(*p<0.05; **p<0.01; ***p<0.001 düzeyinde anlamlı)

İncelenen işletmelerde ortalama aile nüfusu 3.78 kişi, erkek nüfus sayısı 2.05 kişi ve kadın nüfus sayısı ise 1.73 kişi olup, toplam nüfusun %5.86'sını 0-6 yaş grubu, %13.50'ini 7-14 yaş grubu, %75.49'unu 15-64 yaş grubu ve %5.15'ini de 65 ve üzeri yaş grubu oluşturmuştur (Çizelge 6). Ortalama aile nüfusu, küçük, orta ve büyük ölçekli işletmelerde sırasıyla 3.53, 3.63, 4.27 kişi olarak hesaplanmıştır. Kruskal Wallis testi sonuçlarına göre küçük, orta ve büyük ölçekli işletmelerde ortalama aile nüfusu açısından farklılıklar istatistiksel olarak anlamlı bulunmuştur (χ^2=9.594, p=0.008).

Çizelge 6. İncelenen işletmelerde nüfusun yaş grupları ve cinsiyete göre dağılımı

İşletme Grupları			Yaş Grupları				Ort. Aile Nüfusu	
			0-6	7-14	15-64	64+	Kişi	P
Kovan Mevcuduna Göre İşletme Grupları	1. Grup (62) 1-200 kovan	E	0.13	0.26	1.50	0.15	2.03	0.142
		K	0.02	0.23	1.19	0.06	1.50[a]	0.010*
		T	**0.15**	**0.48**	**2.69**	**0.21**	**3.53[d]**	0.008**
		%	**4.11**	**13.70**	**76.26**	**5.93**	**100.00**	
	2. Grup (43) 201-350 kovan	E	0.19	0.23	1.40	0.05	1.86	
		K	0.16	0.21	1.35	0.05	1.77[ab]	
		T	**0.35**	**0.44**	**2.74**	**0.09**	**3.63[de]**	
		%	**9.62**	**12.18**	**75.64**	**2.56**	**100.00**	
	3. Grup (44) 350+ kovan	E	0.18	0.27	1.66	0.14	2.25	
		K	0.02	0.34	1.52	0.14	2.02[b]	
		T	**0.20**	**0.61**	**3.18**	**0.27**	**4.27[e]**	
		%	**4.79**	**14.36**	**74.47**	**6.38**	**100.00**	
İl Grupları	Aydın (30)	E	0.20	0.37	1.63	0.00	2.20	0.086
		K	0.07	0.23	1.57	0.03	1.90	0.406
		T	**0.27**	**0.60**	**3.20**	**0.03**	**4.10**	0.142
		%	**6.50**	**14.63**	**78.05**	**0.82**	**100.00**	
	İzmir (37)	E	0.08	0.30	1.38	0.05	1.81	
		K	0.00	0.14	1.43	0.05	1.62	
		T	**0.08**	**0.43**	**2.81**	**0.11**	**3.43**	
		%	**2.36**	**12.60**	**81.89**	**3.15**	**100.00**	
	Muğla (82)	E	0.18	0.20	1.54	0.18	2.10	
		K	0.09	0.32	1.21	0.11	1.72	
		T	**0.27**	**0.51**	**2.74**	**0.29**	**3.82**	
		%	**7.03**	**13.42**	**71.88**	**7.67**	**100.00**	
Genel (149)		E	0.16	0.26	1.52	0.11	2.05	
		K	0.06	0.26	1.34	0.08	1.73	
		T	**0.22**	**0.51**	**2.85**	**0.19**	**3.78**	
		%	**5.86**	**13.50**	**75.49**	**5.15**	**100.00**	

* İlgili değişkenler için farklı harflerle ifade edilen işletme grupları arasındaki fark istatistik olarak anlamlı bulunmuştur. (*p<0.05; **p<0.01; ***p<0.001 düzeyinde anlamlı)

İşletmelerde kullanılan aile işgücü miktarı ve bu işgücünün arıcılık faaliyeti için kullanım oranı Çizelge 7'de verilmiştir. Çizelgede görüldüğü üzere, işletmeler genelinde kullanılan aile işgücü 436.21 EİG ve arıcılık faaliyetinde kullanılan aile işgücü ise 266.46 EİG'dür. Bu değerlerde sırasıyla 1.45 ve 0.89 EİB'ne karşılık gelmektedir. Başka bir ifadeyle işletmede kullanılan aile işgücünün %61.09'u arıcılık faaliyeti için kullanılmaktadır. Arıcılık faaliyetinde toplamda 295.14 EİG işgücü kullanılmaktadır. Bu kullanımın %90.28'i (266.46 EİG) aile işgücünden, %9.72'si ise geçici işgücünden karşılanmaktadır. Yapılan diğer çalışmalar incelendiğinde İzmir ili Kemalpaşa ilçesinde yapılan bir çalışmada arıcılık faaliyetinde kullanılan toplam işgücü 224.64 EİG olarak hesaplanmıştır (Onuç vd., 2019).

Çizelge 7. Farklı kovan sayılarına sahip işletmelerde işgücü kullanım durumu

	Kovan Mevcuduna Göre İşletme Grupları								
	1. Grup (62) (1-200 kovan)		2. Grup (43) (201-350 kovan)		3. Grup (44) (350+ kovan)		Genel (149)		P Değeri
	EİG	%	EİG	%	EİG	%	EİG	%	
İşletmede Aile İşgücü Kullanımı									
İşletmede Aile İşgücü Kullanımı	368.44^{a}	100	458.73^{ab}	100	509.69^{b}	100	436.21	100	0.01*
Arıcılık Faaliyetinde Aile İşgücü Kullanımı	208.75	56.66	300.91	65.6	314.1	61.63	266.46	61.09	0.00**
Arıcılık Faaliyetinde İşgücü Kullanımı									
Arıcılıkta Aile İşgücü Kullanımı	208.75^{a}	94.27	300.91^{b}	93.11	314.10^{b}	84.53	266.46	90.28	0.00**
Arıcılıkta Geçici İşgücü Kullanımı	12.69^{a}	5.73	22.28^{b}	6.89	57.48^{c}	15.47	28.68	9.72	0.00**
Arıcılıkta Toplam İşgücü Kullanımı	221.44^{a}	100	323.19^{b}	100	371.58^{b}	100	295.14	100	0.00**

İlgili değişkenler için farklı harflerle ifade edilen işletme grupları arasındaki fark istatistik olarak anlamlı bulunmuştur. (*p<0.05; **p<0.01; ***p<0.001 düzeyinde anlamlı)

Aydın ilinde bulunan işletmelerde arıcılık faaliyetinde toplamda 273.08 EİG, İzmir ilinde bulunan işletmelerde 273.51 EİG, Muğla ilinde bulunan işletmelerde ise 312.97 EİG işgücü kullanılmaktadır (Çizelge 8)

Çizelge 8. Farklı illerde bulunan işletmelerde işgücü kullanım durumu

	İl Grupları						
	Aydın (30)		İzmir (37)		Muğla (82)		P
	EİG	%	EİG	%	EİG	%	
İşletmede Aile İşgücü Kullanımı							
İşletmede Aile İşgücü Kullanımı	415.09	100.00	432.61	100.00	445.55	100.00	0.43
Arıcılık Faaliyetinde Aile İşgücü Kullanımı	243.92	58.76	249.70	57.72	282.27	63.35	0.16
Arıcılık Faaliyetinde İşgücü Kullanımı							
Arıcılıkta Aile İşgücü Kullanımı	243.92	89.32	249.70	91.29	282.27	90.19	0.16
Arıcılıkta Geçici İşgücü Kullanımı	29.17	10.68	23.81	8.71	30.71	9.81	0.64
Arıcılıkta Toplam İşgücü Kullanımı	273.08	100.00	273.51	100.00	312.97	100.00	0.21

(*p<0.05; **p<0.01; ***p<0.001 düzeyinde anlamlı)

İncelenen işletmelerde üreticilerin %5.37'si sadece arıcılıkla, %94.63'ü arıcılıkla beraber başka meslek gruplarından en az biriyle uğraşmaktadır. Toplam üretici sayısı dikkate alındığında üreticilerin %37.58'i emekli, %11.41'i işçi, %8.05'i esnaf, %2.01'i dolmuş şöförü olup, %7.39'u da diğer meslek gruplarında çalışmaktadır (Çizelge 8). Ege Bölgesi, Muğla, Denizli ve Aydın illerinde yapılan çalışmada üreticilerin %20.5'inin sadece arıcılık yaptığı, %79.5'inin ise arıcılık dışında başka meslek gruplarında da çalıştığı belirlenmiştir (Çevrimli, 2017).

Çizelge 8. İncelenen işletmelerde arıcıların, arıcılıkla beraber uğraştıkları diğer meslekler

İşletme Grupları			Sadece arıcılık	Arıcılık ile tarım/hayvancılık	Emekli	İşçi	Esnaf	Dolmuş şöförü	Diğer	Toplam
Kovan Mevcuduna Göre İşletme Grupları	1. Grup (62) 1-200 kovan	Sayı	2	13	24	12	5	1	5	62
		%	3.23	20.97	38.71	19.35	8.06	1.62	8.06	100
	2. Grup (43) 201-350 kovan	Sayı	4	11	18	3	3	-	4	43
		%	9.3	25.58	41.86	6.98	6.98	-	9.3	100
	3. Grup (44) 350+ kovan	Sayı	2	18	14	2	4	2	2	44
		%	4.55	40.91	31.82	4.54	9.08	4.55	4.55	100
İl Grupları	Aydın (30)	Sayı	-	6	12	1	4	3	4	30
		%	-	20	40	3.33	13.33	10.01	13.33	100
	İzmir (37)	Sayı	3	10	10	7	3	-	4	37
		%	8.11	27.03	27.03	18.92	8.11	-	10.8	100
	Muğla (82)	Sayı	5	26	34	9	5	-	3	82
		%	6.1	31.71	41.46	10.98	6.1	-	3.65	100
Genel (149)		Sayı	8	42	56	17	12	3	11	149
		%	5.37	28.19	37.58	11.41	8.05	2.01	7.39	100

İncelenen işletmelerde üreticilerin %97.31'i (145 işletme) herhangi bir birliğe üye veya kooperatife ortak iken, %2.69'unun (4 işletme) üyeliği veya ortaklığı bulunmamaktadır. Birlik ve kooperatiflere üye/ortak olan üreticilerin %95.97'sinin Arı Yetiştiricileri Birliğine, %2.68'inin Bal Üreticiler Birliğine üye iken, %4.70'inin Tarımsal Kalkınma Kooperatifine, %4.03'ünün Tarım Kredi Kooperatifine ve %2.68'inin Bal ve Arı Ürünleri Üretim ve Pazarlama Kooperatife ortak oldukları belirlenmiştir (Çizelge 9). Bu bulgu yapılan diğer çalışmaların sonuçlarıyla benzerlik göstermektedir. Sinop ilinde yapılan çalışmada arıcıların %93'ünün herhangi bir birlik veya kooperatife ortaklığı bulunurken, %7'sinin herhangi bir ortaklığı bulunmadığı belirlenmiştir (Albayrak, 2019).

Çizelge 9. İncelenen işletmelerde üreticilerin ortak oldukları birlik ve kooperatifler

Birlik/Kooperatif Üyeliği/Ortaklığı*		Kovan Mevcuduna Göre İşletme Grupları						İl Grupları						Genel (149)	
		1. Grup (62) 1-200 kovan		2. Grup (43) 201-350 kovan		3. Grup (44) 350+ kovan		Aydın (30)		İzmir (37)		Muğla (82)			
		Sayı	%	Sayı	%	Sayı	%	Sayı	%	Sayı	%	Sayı	%	Sayı	%
Birlik	Arı Yetiştiricileri Birliği	58	93.55	42	97.67	43	97.73	29	96.67	35	94.59	79	96.34	143	95.97
	Bal Üreticileri Birliği	1	1.61	1	2.33	2	4.55	-	-	4	10.81	-	-	4	2.68
Kooperatif	Tarımsal Kalkınma Kooperatifi	4	6.45	3	6.98	-	-	-	-	7	18.92	-	-	7	4.70
	Tarım Kredi Kooperatifi	5	8.06	-	-	1	2.27	1	3.33	3	8.11	2	2.44	6	4.03
	Bal ve Arı Ürünleri Üretim ve Pazarlama Kooperatifi	-	-	2	4.65	2	4.55	4	13.33	-	-	-	-	4	2.68

*Birden fazla yanıt alınmıştır

İncelenen işletmelerde kredi finansman kuruluşu olarak en fazla T.C. Ziraat Bankası gösterilmiştir. Üreticilerin %53.69'ü banka kredisi kullanırken, %46.31'i kredi kullanmadığını belirtmiştir. Banka kredisinin dışında üreticilerin %2.68'inin Orköy kredisinden yararlandığı belirlenmiştir. Üreticilerin arıcılık sigortası yaptırma durumları incelendiğinde üreticilerin %47.65'i sigorta yaptırdığını, %52.35'i ise yaptırmadığını bildirmiştir. Kredi kullanırken arıcılık sigortasının zorunlu olmasına rağmen, bazı üreticilerin bu durumdan haberdar olmadıkları için kredi kullanımı ve arıcılık sigortası yaptırma oranları birbirinden farklı çıkmıştır (Çizelge 10).

Çizelge 10. işletmelerde üreticilerin kredi kullanma/ sigorta yaptırma durumları

		Kovan Mevcuduna Göre İşletme Grupları						İl Grupları						Genel (149)	
		1. Grup (62) 1-200 kovan		2. Grup (43) 201-350 kovan		3. Grup (44) 350+ kovan		Aydın (30)		İzmir (37)		Muğla (82)			
		Sayı	%	Sayı	%	Sayı	%	Sayı	%	Sayı	%	Sayı	%	Sayı	%
Banka kredisi kullanımı	Evet	29	46.77	24	55.81	27	61.36	15	50	15	40.54	50	60.98	80	53.69
	Hayır	33	53.23	19	44.19	17	38.64	15	50	22	59.46	32	39.02	69	46.31
	Toplam	62	100	43	100	44	100	30	100	37	100	82	100	149	100
Sigorta yaptırma durumu	Evet	20	32.26	22	51.16	29	65.91	10	33.33	12	32.43	49	59.76	71	47.65
	Hayır	42	67.74	21	48.84	15	34.09	20	66.67	25	67.57	33	40.24	78	52.35
	Toplam	62	100	43	100	44	100	30	100	37	100	82	100	149	100
Orköy kredisi kullanımı	Evet	3	4.84	1	2.33	-	-	-	-	-	-	4	4.88	4	2.68
	Hayır	59	95.16	42	97.67	44	100	30	100	37	100	78	95.12	145	97.32
	Toplam	62	100	43	100	44	100	30	100	37	100	82	100	149	100

İşletmelerde üreticilerin arıcılık faaliyeti ile uğraşma nedenleri incelendiğinde, üreticilerin %71.81'inin geçim kaynağı, %22.82'si ek gelir, %3.36'sı hobi amaçlı, %1.34'ü babadan gelen alışkanlık, %0.67'si de aile tüketimi amacıyla arıcılık yaptığını belirtmiştir (Çizelge 11). Yapılan diğer çalışmalar incelendiğinde, Kütahya ilinde yapılan bir çalışmada arıcıların % 5.5'inin esas geçim kaynağı, %51.2'sinin ek gelir kaynağı, %43.3'nün hobi olarak arıcılıkla uğraştıkları belirlenmiştir (Özer, 2017).

Çizelge 11. İncelenen işletmelerde üreticilerin arıcılık yapma nedenleri

İşletme Grupları			Geçim kaynağı	Ek gelir	Hobi amaçlı	Babadan gelen alışkanlık	Aile tüketimi	Toplam
Kovan Mevcuduna Göre İşletme Grupları	1. Grup (62) 1-200 kovan	Sayı	36	21	4	1	-	62
		%	58.06	33.87	6.46	1.61	-	100.00
	2. Grup (43) 201-350 kovan	Sayı	34	7	1	1	-	43
		%	79.07	16.27	2.33	2.33	-	100.00
	3. Grup (44) 350+ kovan	Sayı	37	6	-	-	1	44
		%	84.09	13.64	-	-	2.27	100.00
İl Grupları	Aydın (30)	Sayı	23	6	1	-	-	30
		%	76.67	20.00	3.33	-	-	100.00
	İzmir (37)	Sayı	23	10	2	2	-	37
		%	62.16	27.02	5.41	5.41	-	100.00
	Muğla (82)	Sayı	61	18	2	-	1	82
		%	74.39	21.95	2.44	-	1.22	100.00
Genel (149)		Sayı	107	34	5	2	1	149
		%	71.81	22.82	3.36	1.34	0.67	100.00

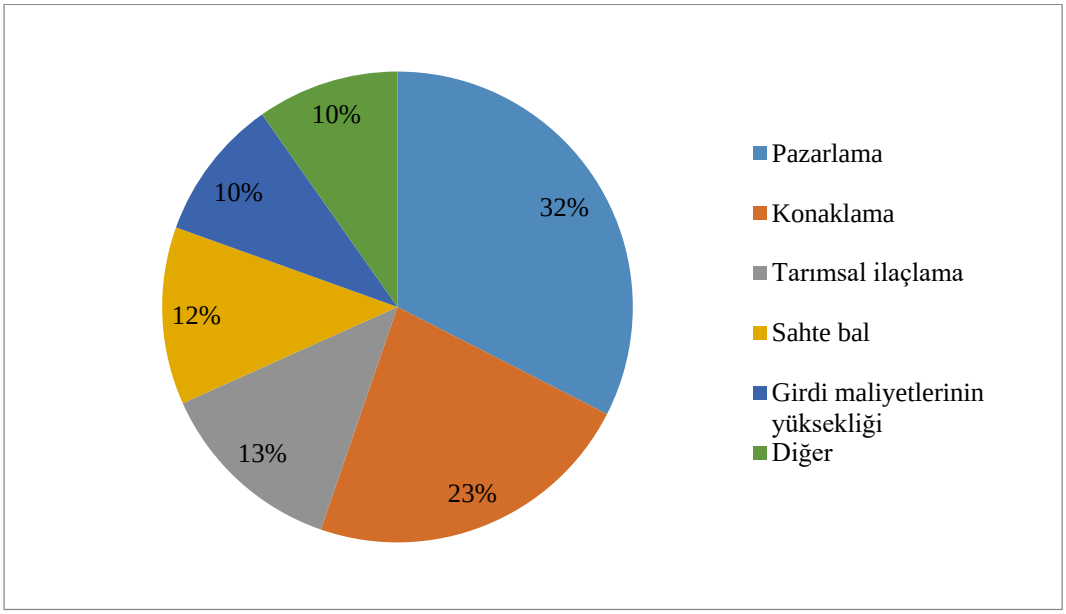
İncelenen işletmelerde arıcıların %4.70'i sabit arıcı olup, %8.05'i il içi gezginci, %87.25'i ise bölgelerarası gezginci arıcılık yapmaktadır (Çizelge 12). Akdeniz Bölgesinde yapılan bir çalışmada ise, işletmelerin %91.37'sinin gezginci arıcılık yaptığı belirtilmiştir (Öztürk vd., 2014)

Çizelge 12. İncelenen işletmelerde üreticilerin arıcılık yapma şekilleri

Arıcılık Sistemi	Kovan Mevcuduna Göre İşletme Grupları						İl Grupları						Genel (149)	
	1. Grup (62) 1-200 kovan		2. Grup (43) 201-350 kovan		3. Grup (44) 350+ kovan		Aydın (30)		İzmir (37)		Muğla (82)			
	Sayı	%	Sayı	%	Sayı	%	Sayı	%	Sayı	%	Sayı	%	Sayı	%
Sabit	7	11.29	-	-	-	-	4	13.33	2	5.40	1	1.22	7	4.70
İl içi gezginci	9	14.52	3	6.98	-	-	5	16.67	7	18.92	-	-	12	8.05
Bölgelerarası gezginci	46	74.19	40	93.02	44	100.00	21	70.00	28	75.68	81	98.78	130	87.25
Toplam	62	100.00	43	100.00	44	100.00	30	100.00	37	100.00	82	100.00	149	100.00

İncelenen işletmelerde arıcıların karşılaştıkları sorunların başında pazarlama (%32.52) gelirken, bunu sırasıyla konaklama (%22.76), tarımsal ilaçlama (%13.01), sahte bal (%12.20), girdi maliyetlerinin yüksekliği (%9.76) ve diğer sorunlar (%9.76) izlemektedir (Şekil 1).

Üreticilerin pazarlama konusunda karşılaştıkları başlıca sorunlar, bal fiyatlarının düşük kalması, kaliteli ve kalitesiz bal fiyat farkının düşük olması, bal alımında firma veya tüccar tekelleşmesinden oluşmaktadır. Konaklama konusunda karşılaşılan başlıca sorunlar konaklama yerlerinin ücreti, konakladıkları köyde muhtarla anlaşamama, konaklama yerinde altyapı yetersizlikleri, konaklama yerlerinin çok yakın olmasından oluşmaktadır.



Şekil 1. Arıcıların karşılaştıkları başlıca sorunlar

3.2. Arıcılık Faaliyetinde Yıllık Faaliyet Sonuçları

Arıcılık üretim faaliyetinin brüt üretim değeri süzme bal, petek bal, balmumu, polen, propolis ve arı ekmeği değeri, koloni satışı, ana arı satışı, devlet desteği ve polinasyon gelirinden oluşmaktadır. İncelenen işletmelerde arıcılık üretim faaliyetinin brüt üretim değeri Çizelge 13'de verilmiştir. İşletmelerin genel ortalamasına göre kovan başına brüt üretim değeri 274.05 TL olarak hesaplanmıştır. Brüt üretim değeri içinde süzme bal değeri (%76.62) ilk sırada yeralmaktadır.

Çizelge 13. Farklı kovan sayılarına sahip işletmelerde kovan başına brüt üretim değeri

Arıcılık Üretim Faaliyetinin Brüt Üretim Değeri	Kovan Mevcuduna Göre İşletme Grupları								
	1. Grup (62) 1-200 kovan		2. Grup (43) 201-350 kovan		3. Grup (44) 350+ kovan		Genel(149)		P
	TL	%	TL	%	TL	%	TL	%	
Süzme bal değeri	202.44	76.05	200.79	77.88	229.59	76.28	209.98	76.62	0.22
Petek bal değeri	20.28	7.62	14.77	5.73	19.02	6.32	18.32	6.69	0.42
Kovan satışı	13.55	5.09	7.44	2.88	14.26	4.74	11.99	4.38	0.52
Balmumu değeri	9.8	3.68	9.04	3.5	11.09	3.68	9.96	3.63	0.83
Devlet desteği	9.03	3.39	10	3.88	9.42	3.13	9.43	3.44	0.11
Polen değeri	5.61	2.11	10.27	3.98	9.9	3.29	8.22	3	0.13
Polinasyon geliri	4.85	1.82	4.27	1.65	4.8	1.59	4.67	1.7	1.00
Propolis değeri	0.49	0.19	0.61	0.24	1.12	0.37	0.71	0.26	0.18
Arı ekmeği değeri	-	-	0.5	0.19	1.79	0.6	0.67	0.25	0.26
Ana arı satışı	0.12	0.05	0.14	0.07	-	-	0.09	0.03	0.63
Toplam brüt üretim değeri/kovan	**266.17**	**100**	**257.83**	**100**	**301**	**100**	**274.05**	**100**	**0.3**

Aydın, İzmir ve Muğla illerinde bulunan işletmelerde kovan başına brüt üretim değeri sırasıyla 236.15 TL, 352.64 TL ve 252.45 TL olarak hesaplanmıştır (Çizelge 14). Kruskal Wallis testi sonuçlarına göre il grupları arasındaki farklılık istatistiksel olarak anlamlı bulunmuştur. (χ^2=14.08, p=0.00).

Çizelge 14. Farklı illerde bulunan işletmelerde kovan başına brüt üretim değeri

Arıcılık Üretim Faaliyetinin Brüt Üretim Değeri	İl Grupları						
	Aydın (30)		İzmir (37)		Muğla (82)		P değeri
	TL	%	TL	%	TL	%	
Süzme bal değeri	158.96^{a}	67.31	270.32^{b}	76.66	201.42^{ab}	79.79	0.00**
Petek bal değeri	18.92^{ab}	8.01	28.50^{a}	8.08	13.51^{b}	5.35	0.00**
Koloni satışı	26.95^{a}	11.41	17.29^{ab}	4.90	4.14^{b}	1.64	0.00**
Balmumu değeri	8.51	3.60	8.30	2.36	11.24	4.45	0.17
Devlet desteği	8.67	3.67	9.41	2.67	9.72	3.85	0.17
Polen değeri	13.55	5.74	7.05	2.00	6.80	2.69	0.86
Polinasyon geliri	-	-	10.96	3.10	3.54	1.41	0.08
Propolis değeri	0.16	0.07	0.81	0.23	0.87	0.34	0.30
Arı ekmeği değeri	-	-	-	-	1.22	0.48	0.29
Ana arı satışı	0.45	0.19	-	-	-	-	0.20
Toplam brüt üretim değeri/kovan	**236.15^{a}**	**100.00**	**352.64^{b}**	**100.00**	**252.45^{a}**	**100.00**	**0.00****

İlgili değişkenler için farklı harflerle ifade edilen işletme grupları arasındaki fark istatistik olarak anlamlı bulunmuştur. (*p<0.05; **p<0.01; ***p<0.001 düzeyinde anlamlı)

İncelenen işletmelerde üretim masraflarının %44.16'sı değişken masraflardan, %55.84'ü ise sabit masraflardan oluşmaktadır. Değişken masrafların içinde sırasıyla besleme (%12.92), nakliye masrafları (%10.22) ve geçici işçi masrafları (%4.26), sabit masraflar içinde ise aile işgücü ücret karşılığı (%44.30) en büyük paya sahiptir. Küçük, orta ve büyük ölçekli işletmelerde üretim masraflarının sırasıyla %39.64, %44.63 ve %53.37'si değişken masraflardan, %60.36, %55.37 ve %46.63'ü sabit masraflardan oluşmaktadır (Çizelge 15). İşletme büyüklüğü arttıkça değişken masrafların oranı da artmaktadır. Değişken masraflar ne kadar yüksek ise işletme o kadar entansif çalışmaktadır (Ören vd., 2010). Bu durumda büyük işletmelerin daha entansif çalıştığı söylenebilir. Küçük ölçekli işletmelerde değişken masrafların içinde sırasıyla besleme (%11.82), nakliye (%9.04) ve arıcı konaklama ve barınma masrafı (%3.81) en yüksek paya, orta ve büyük ölçekli işletmelerde ise besleme (%12.34, %15.95), nakliye (%11.07, %11.81) ve geçici işçi masrafı (%4.23, %6.00) en yüksek paya sahiptir. Sabit masrafların içersinde ise her 3 işletme grubunda da aile işgücü ücret karşılığı (sırasıyla %49.90, %43.57 ve %33.04) önemli paya sahiptir (Çizelge 15). Kruskal Wallis testi sonuçlarına göre sabit masraflar (χ^2=35.33, P=0.00) ve üretim masrafları (χ^2=28.09, P=0.00) açısından kovan mevcuduna göre işletme grupları arasındaki farklılık istatistiksel olarak anlamlı bulunmuştur.

Çanakkale ili Gökçeada ilçesinde yapılan çalışmada, değişken masrafların üretim masrafları içindeki payı %51.11, sabit masrafların üretim masrafları içindeki payı ise %48.89 olarak bulunmuştur. Bal üretim maliyetini oluşturan masraf unsurları içinde işgücü masrafları (aile+geçici işgücü) %35.38'lik pay ile ilk sırayı almaktadır. Değişken masraflar içindeki en büyük payı %12.52'lik oranla yem masraflarının aldığı, bunu sırasıyla mazot/nakliye (%11.89), petek (%6.08) ve koloni yenileme masraflarının (%4.72) izlediği görülmektedir. Aile işgücü karşılığının ise sabit masraf unsurları içinde önemli bir paya (%32.8) sahip olduğu belirlenmiştir (Özyasin ve Karaman, 2018)

Çizelge 15. Farklı kovan sayısına sahip işletmelerde kovan başına üretim masrafları

Arıcılık Üretim Faaliyetinin Brüt Üretim Değeri (Kovan başına)	Kovan Mevcuduna Göre İşletme Grupları								
	1. Grup (62) 1-200 kovan		2. Grup (43) 201-350 kovan		3. Grup (44) 350+ kovan		Genel(149)		P
	TL	%	TL	%	TL	%	TL	%	
Besleme masrafı (şeker, kek, yem vd.)	38.07	11.82	29.96	12.34	33.58	15.95	34.4	12.92	0.19
Nakliye masrafı	29.12	9.04	26.88	11.07	24.85	11.81	27.22	10.22	0.57
Geçici işçi masrafı	11.2	3.48	10.26	4.23	12.62	6	11.35	4.26	0.2
Arıcı konaklama ve barınma masrafı	12.27	3.81	8.29	3.41	7.67	3.65	9.76	3.67	0.39
İlaç masrafı	9.09	2.82	8.69	3.58	8	3.8	8.65	3.25	0.94
Ana arı masrafı	7	2.17	7	2.88	7	3.33	7	2.63	1
Pazarlama masrafı (teneke vd.)	6.36	1.97	6.32	2.6	7.1	3.37	6.57	2.47	0.31
Temel petek masrafı	4.11	1.28	1.31	0.54	1.92	0.91	2.66	1	0.11
Arı konaklama masrafı	2.63	0.82	2.41	0.99	2.16	1.03	2.43	0.91	0.96
Su masrafı	0.41	0.13	0.45	0.19	0.34	0.16	0.4	0.15	0.2
Alet-Makine tamir bakım masrafı	0.3	0.09	0.43	0.18	0.43	0.2	0.37	0.14	0.44
Nakil belge masrafı	0.47[a]	0.15	0.38[a]	0.16	0.25[b]	0.12	0.38	0.15	0.02*
Arılı kovan sigortası	0.56[a]	0.17	0.84[ab]	0.34	1.06[b]	0.5	0.79	0.29	0.00**
Döner sermaye faizi	6.08	1.89	5.15	2.12	5.34	2.54	5.6	2.1	0.58
A. Toplam Değişken Masraflar	**127.68**	**39.64**	**108.37**	**44.63**	**112.32**	**53.37**	**117.58**	**44.16**	**0.58**
Aile işgücü ücret karşılığı	160.71[a]	49.9	105.80[b]	43.57	69.54[c]	33.04	117.94	44.3	0.00**
Kovan amortismanı	13	4.04	13	5.35	13	6.18	13	4.88	1
Kovan faiz karşılığı	6.5	2.02	6.5	2.68	6.5	3.09	6.5	2.44	1
Alet-makine amortismanı	6.79[a]	2.11	3.36[b]	1.38	2.54[c]	1.2	4.55	1.71	0.00**
Genel idare giderleri	3.83	1.19	3.25	1.34	3.37	1.6	3.53	1.33	0.58
Arıcı kulübesi amortismanı	2.46[a]	0.76	1.91[a]	0.79	1.32[b]	0.63	1.97	0.74	0.00**
Birlik yıllık üyelik aidatı	1.12[a]	0.34	0.62[b]	0.26	0.37[c]	0.17	0.75	0.28	0.00**
Daimi işçi masrafı	0	0	0	0	1.51	0.72	0.44	0.16	0.3
B.Toplam Sabit Masraflar	**194.41[a]**	**60.36**	**134.44[b]**	**55.37**	**98.15[c]**	**46.63**	**148.68**	**55.84**	**0.00****
Toplam Üretim Masrafları (A+B)	**322.09[a]**	**100**	**242.81[b]**	**100**	**210.47[b]**	**100**	**266.26**	**100**	**0.00****

*İlgili değişkenler için farklı harflerle ifade edilen işletme grupları arasındaki fark istatistik olarak anlamlı bulunmuştur. (*p<0.05; **p<0.01; ***p<0.001 düzeyinde anlamlı)*

Aydın, İzmir ve Muğla illerinde bulunan işletmelerde ise üretim masraflarının sırasıyla %40.69, %38.61 ve 47.86'sı değişken masraflardan, %59.31, %61.39 ve %52.14'ü ise sabit masraflardan oluşmaktadır (Çizelge 16). Bu illerde hesaplanan değişken masrafların içinde sırasıyla besleme (%13.22, %10.14 ve %14.10), nakliye (%9.01, %7.56 ve %11.84) ve geçici işçi masrafı (%4.10, %4.62 ve %4.14). Sabit masrafların içinde ise her 3 işletme grubunda da aile işgücü ücret karşılığı (sırasıyla %47.41, %50.02 ve %40.63) önemli paya sahiptir . Kruskal Wallis testi sonuçlarına göre değişken masraflar (χ^2=9.06, P=0.01) açısından il grupları arasındaki farklılık istatistiksel olarak anlamlı bulunmuştur .

Çizelge 16. Farklı illerde bulunan işletmelerde kovan başına üretim masrafları

Arıcılık Üretim Faaliyetinin Masrafları (kovan başına)	İl Grupları						
	Aydın (30)		İzmir (37)		Muğla (82)		P*
	TL	%	TL	%	TL	%	
Besleme masrafı (şeker, kek, yem…)	32.47	13.22	27.86	10.14	38.06	14.10	0.28
Nakliye masrafı	22.14^{a}	9.01	20.79^{a}	7.56	31.97^{b}	11.84	0.00**
Geçici işçi masrafı	10.07	4.10	12.71	4.62	11.20	4.14	0.61
Arıcı konaklama ve barınma masrafı	7.15^{a}	2.91	9.53^{ab}	3.47	10.83^{b}	4.01	0.04*
İlaç masrafı	5.45^{a}	2.22	7.77^{ab}	2.83	10.23^{b}	3.79	0.00**
Ana arı masrafı	7.00	2.85	7.00	2.55	7.00	2.59	1.00
Pazarlama masrafı (teneke …)	4.93^{a}	2.01	8.15^{b}	2.97	6.45^{ab}	2.39	0.01*
Temel petek masrafı	2.68	1.09	3.73	1.36	2.16	0.80	0.32
Arı konaklama masrafı	2.09	0.85	2.08	0.76	2.70	1.00	0.29
Su masrafı	-	-	0.10^{a}	0.04	0.68^{b}	0.25	0.00**
Alet-Makine tamir bakım masrafı	0.24	0.10	0.43	0.16	0.40	0.15	0.93
Nakil belge masrafı	0.24^{a}	0.10	0.33^{ab}	0.12	0.45^{b}	0.17	0.00**
Arılı kovan sigortası	0.70^{ab}	0.29	0.53^{a}	0.19	0.93^{b}	0.35	0.02*
Döner sermaye faizi	**4.77^{a}**	**1.94**	**5.06^{ab}**	**1.84**	**6.15^{b}**	**2.28**	**0.01***
A. Toplam Değişken Masraflar	**99.93^{a}**	**40.69**	**106.07^{ab}**	**38.61**	**129.21^{b}**	**47.86**	**0.01***
Aile işgücü ücret karşılığı	116.44	47.41	137.39	50.02	109.71	40.63	0.13
Kovan amortismanı	13.00	5.29	13.00	4.73	13.00	4.81	1.00
Kovan faiz karşılığı	6.50	2.65	6.50	2.37	6.50	2.41	1.00
Alet-makine amortismanı	4.20^{ab}	1.71	6.25^{a}	2.28	3.90^{b}	1.45	0.04*
Genel idare giderleri	3.00^{a}	1.22	3.18^{ab}	1.16	3.88^{b}	1.44	0.01*
Arıcı kulübesi amortismanı	1.93	0.79	1.47	0.53	2.21	0.82	0.00**
Birlik yıllık üyelik aidatı	0.60	0.24	0.84	0.30	0.77	0.28	0.05
Daimi işçi masrafı	-	-	-	-	0.81	0.30	0.66
B.Toplam Sabit Masraflar	**145.67**	**59.31**	**168.63**	**61.39**	**140.78**	**52.14**	**0.12**
Toplam Üretim Masrafları (A+B)	**245.60**	**100.00**	**274.70**	**100.00**	**269.99**	**100.00**	**0.22**

İlgili değişkenler için farklı harflerle ifade edilen işletme grupları arasındaki fark istatistik olarak anlamlı bulunmuştur. (*p<0.05; **p<0.01; ***p<0.001 düzeyinde anlamlı).

İncelenen işletmelerin karlılık durumları Çizelge 17'de verilmiştir. İşletmelerde kovan başına brüt kar 156.47 TL, net kar 7.79 TL, nispi kar 1.03 olarak hesaplanmıştır. 1 kg süzme balın maliyeti 12.25 TL ve 1 kg süzme balın satış karı ise 0.47 TL olarak hesaplanmıştır (Çizelge 18). Çalışmada bal maliyetini hesaplayabilmek için öncelikle üretim masraflarından bal dışındaki diğer arı ürünlerinin değeri çıkartılmıştır. Elde edilen değerin bal üretim miktarına bölünmesiyle balın kg maliyeti hesaplanmıştır. Yapılan diğer çalışmalar incelendiğinde, Akdeniz Bölgesinde yapılan çalışmada, ortalama 1 kg bal maliyeti 9.55 TL, nispi kar ise 2.70 olarak hesaplanmıştır (Öztürk vd., 2014; Subaşı et al., 2019). Edirne'de yapılan bir çalışmada yapay oğullardan oluşan kovanlarda 1 kg bal maliyeti 7.39 dolar ve paket arılardan meydana gelen kovanlarda 1 kg bal maliyeti 5.65 dolar olarak hesaplanmıştır (1 dolar=2.94 TL) (Adanacıoğlu et al., 2019).

Çizelge 17. İncelenen işletmelerde yıllık faaliyet sonuçları (kovan başına)

Ekonomik analiz sonuçları	Kovan Mevcuduna Göre İşletme Grupları			İl Grupları			Genel (149)
	1. Grup (62) 1-200 kovan	2. Grup (43) 201-350 kovan	3. Grup (44) 350+ kovan	Aydın (30)	İzmir (37)	Muğla (82)	
Brüt üretim değeri (TL)	**266.17**	**257.83**	**301.00**	**236.15**	**352.64**	**252.45**	**274.05**
Değişken masraflar (TL)	127.68	108.37	112.32	99.93	106.07	129.21	117.58
Sabit masraflar (TL)	194.41	134.44	98.15	145.67	168.63	140.78	148.68
Üretim masrafları (TL)	**322.09**	**242.81**	**210.47**	**245.60**	**274.70**	**269.99**	**266.26**
Brüt kar	138.49	149.46	188.68	136.22	246.57	123.24	156.47
Net kar	-55.92	15.02	90.53	-9.45	77.94	-17.54	7.79
Nispi Kar	0.83	1.06	1.43	0.96	1.28	0.94	1.03

Çizelge 18. İncelenen işletmelerde 1 kg süzme bal üretim maliyeti

Süzme Bal Üretim Maliyeti	Kovan Mevcuduna Göre İşletme Grupları			İl Grupları			Genel (149)
	1. Grup (62) 1-200 kovan	2. Grup (43) 201-350 kovan	3. Grup (44) 350+ kovan	Aydın (30)	İzmir (37)	Muğla (82)	
Kovan başı süzme bal üretim miktarı (kg)	15.91	15.79	18.05	12.50	21.25	15.84	16.51
Süzme bal üretim değeri (TL)	202.44	200.79	229.59	158.96	270.32	201.42	209.98
Diğer arı ürünlerinin üretim değeri	63.73	57.04	71.41	77.19	82.32	51.03	64.07
Üretim masrafları (TL)	322.09	242.81	210.47	245.60	274.70	269.99	266.26
1 Kg süzme bal maliyeti (TL)	**16.24**	**11.77**	**7.70**	**13.47**	**9.05**	**13.82**	**12.25**
Üretici eline geçen ortalama fiyat (TL/Kg)	13.72	12.04	11.98	11.78	13.89	12.53	12.72
Satış karı (TL/Kg)	**-2.52**	**0.27**	**4.28**	**-1.69**	**4.84**	**-1.29**	**0.47**

4. SONUÇ

Bu çalışmada Ege bölgesinde yer alan Aydın, İzmir ve Muğla illerinde arıcılık yapan işletmelerin sosyo-ekonomik özelliklerinin incelenmesi amaçlanmıştır. Aydın ilinde 30, İzmir ilinde 37 ve Muğla ilinde 82 olmak üzere toplam 149 arıcılık işletmesinden derlenen 2018-2019 dönemine ait veriler kullanarak gerçekleştirilen bu araştırmada, değerlendirmeler ve analizler işletmelerin kovan sayıları ve bulundukları iller itibariyle gerçekleştirilmiştir. Sonuçlara göre İzmir ilinde bal verimi, Aydın ve Muğla illerinden daha yüksek hesaplanmıştır. İllerdeki arıcılık üretim faaliyetinde brüt üretim değerinin büyük kısmı bal üretim değerinden oluştuğu için İzmir ilindeki yüksek bal verimi bal üretim değerine yansımakta olup, bu ilin brüt üretim değeri diğer iki ilden daha fazla olarak hesaplanmıştır. İzmir ilinde brüt üretim değerinin yüksekliği, işletmenin karlılık durumuna olumlu yansımıştır. Diğer taraftan İzmir ve Aydın ilinde bölgeler arası gezgincilik oranı birbirine yakın rakamlardan oluşurken, Muğla ilinde üreticilerin büyük çoğunluğu bölgeler arası gezgincilik yapmaktadır. Bölgeler arası gezginciliğin artması katedilen toplam mesafeninde artışına neden olmaktadır. Mesafeye bağlı koloni kayıpları, hastalık ve zararlılar artmakta olup, arı refahı olumsuz etkilenmektedir. Diğer taraftan işletme büyüklüğü arttıkça üretim masrafları düşmektedir, bu da karlılık durumunu olumlu etkilemektedir. Ancak diğer taraftan işletme büyüklüğü arttıkça bölgeler arası gezgincilik oranı da artmaktadır. Bu da daha fazla miktar bal elde etmek için kovanların daha uzun mesafelere taşındıkları anlamına gelmektedir Böylece arı refahı olumsuz etkilenmektedir.

Elde edilen sonuçlar ışığında arıcılık sisteminin devamlılığı için kovan sayısını arttırma ve yeni

arıcılık işletmesi oluşturma yerine güdümlü olarak kalite, hijyen, çeşitlilik, yüksek katma değerli arıcılık ürünleri ve etkin arıcılık uygulamaları geliştirilmeli ve desteklenmelidir. Öte taraftan kovan başına bal veriminin artırılması için, sektöre verilen doğrudan destekleme modeli yerine üretimi arttırıcı ve kaliteyi yükseltici yeni destekleme politikalarının uygulanması gerekmektedir.

İncelenen işletmelerde arıcıların sorunlarının başında pazarlama gelmektedir. Onu sırasıyla konaklama, tarımsal ilaçlama, sahte bal ve girdi maliyetlerinin yüksekliği izlemektedir.

Arıcılığın karlı bir faaliyet olması için diğer katma değer yaratan arı ürünlerinin üretilmesi ve etkin bir pazarlama yönetimi çerçevesinde satışlarının gerçekleştirilmesi gerekmektedir. Ayrıca arıcılıkta sözleşmeli üretim koşullarının her iki tarafında menfaatini koruyucu şekilde düzenlenmesine ivedilikle ihtiyaç bulunmaktadır. Bunun dışında arı ürünlerinin pazarlanmasında kooperatif ve birliklerin güç birliği yaparak, kooperatiflerin arı ürünleri pazarlanmasındaki payını artırması son derece önemlidir.

Arıcılıkta özellikle taşıma esnasında deneyimli yardımcı personel temininde büyük zorluklar yaşanmaktadır. Bu durum maliyeti arttırarak işletme etkinliğini ve karlılığını azaltmakta ve operasyonel kısıtlamalar oluşturmaktadır (Yeninar, 2018). Bu yüzden kırsal alanda gençlere yeterince ekonomik, sosyal ve kültürel olanaklar sağlanarak onların arıcılık faaliyetine kazandırılması ve arıcılığın böylelikle sürdürebilirliğinin sağlanması gerekmektedir. Öte taraftan yeni başlayan arıcıların deneyim eksikliği, bilinçli ve deneyimli arıcılar yanında çalışarak usta-çırak ilişkisi çerçevesinde tamamlanabilecektir.

AÇIKLAMA: Bu çalışma "Ege Bölgesinde Arıcılık Yapan İşletmelerin Sürdürülebilirlik Yönünden Değerlendirilmesi" başlıklı doktora tez çalışmasından üretilmiştir.

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METAL ACCUMULATION IN FORAGES: A REVIEW

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ABSTRACT
Dietary intake of plant-derived foods accounts for a significant portion of potentially harmful human exposure of hazardous metals. In last decades, trace metal pollution in the environment is a major problem. A high rate of trace element transfer via forage could become toxic, with negative consequences for grazing animals. Because of heightened hazardous metal concentrations, using forages grown on metal-contaminated soil can raise the danger of heavy metals entering the food chain and damaging human health. The majority of heavy metals and metals/metalloids are released into nature as a result of natural or anthropogenic events. Contaminated soil cleanup is an expensive and time-consuming operation that takes a long time to complete. Use of plants and their associated rhizosphere microorganisms, in combination with the application of organic or inorganic amendments, to reduce metal mobility and bioavailability is an environmentally friendly promising phytotechnology for the remediation of metal-polluted soils.

Keywords: Forage, forages, metal, metals

INTRODUCTION

Forage plants are important because they support wild and domesticated herbivores, as well as meat, milk, and other commodities delivery. Fibre, lignin, minerals, and protein content vary among forage plants, as does the proportion of tissue that can be digested by herbivores. Consumer growth rates, reproductive success, and behavior are all influenced by these nutritional components (Lee, 2018). Because of anthropogenic influences, hazardous metals such as arsenic, cadmium, lead, and mercury are virtually ubiquitously present at low levels in the environment. Dietary intake of plant-derived foods accounts for a significant portion of potentially harmful human exposure, particularly to arsenic and cadmium. It is critical to prevent hazardous element accumulation in crops in order to improve food safety (Clemens & Ma, 2016). In last decades, trace metal pollution in the environment is a major problem. The exhaust gases emitted by automobiles on the road are one of the major sources of trace metal contamination. These dangerous gases pose life-threatening effects on the forage plants grown along the roadside as these plants are at direct risk to these trace metals (Khan et al., 2019). A high rate of trace element transfer via fodder could become toxic, with negative consequences for grazing animals (Khan et al., 2016). Irrigation with wastewater has the potential to boost crop yields while reducing reliance on freshwater supplies. Heavy metal concentrations in wastewater, on the other hand, may pose a health risk (Gharaibeh et al., 2015). Contamination of agricultural soils with heavy metals is a major source of worry around the world. Heavy metals can enter plants through their roots and cause biomagnification in plant tissues such as roots, stems, and leaves. These metals are transmitted from plants to animal and human systems, causing major health issues. Various physical and chemical methods are available for heavy metal removal from soil but phytoremediation is considered as one of the most sustainable and cost-friendly method (Bhatti et al., 2018). Because of heightened hazardous metal concentrations, using forages grown on metal-contaminated soil can raise the danger of heavy metals entering the food chain and damaging human health. In metal-contaminated soils, signaling molecules such as hydrogen sulfide (H_2S) and nitric oxide (NO) have been shown to encourage plant growth (Fang et al., 2019). Heavy metals have a substantial impact on crop growth and quality in nature. Copper (Cu) is one of several heavy metals that is both essential and toxic to plants, depending on the concentration and complicated homeostatic networks. The Cu transporter family (COPT) is involved in maintaining Cu homeostasis (Wang et al., 2021).

4. Phytoextraction

The majority of heavy metals and metals/metalloids are released into nature as a result of natural or anthropogenic events. Plants are continually exposed to heavy metals in the environment since they are sessile organisms. Plants that do not hyperaccumulate metals are vulnerable to high metal concentrations. As a detoxifying approach, they tend to trap metals in their root vacuoles by creating complexes with metal ligands. Metal-hyperaccumulating plants, on the other hand, have evolved intrinsic regulatory mechanisms that allow them to hyperaccumulate or sequester excess heavy metals in their above-ground tissues rather than accumulating them in their roots. Unlike metal non-hyperaccumulators, they have the unusual ability to successfully carry out regular physiological activities without displaying any evident stress symptoms. The ability of hyperaccumulators to accumulate excess metals is due in part to constitutive overexpression of metal transporters and their ability to rapidly translocate heavy metals from root to shoot. Metal ligands play an important role in metal hyperaccumulating plants. These metal hyperaccumulating plants can be used to clean up metal-contaminated soils. In the future, combining knowledge about natural populations of metal hyperaccumulators with cutting-edge biotechnological technologies could prove beneficial (Sytar et al., 2021). Contaminated soil cleanup is an expensive and time-consuming operation that takes a long time to complete. As a result, direct use of contaminated lands combined with proper management is frequently a more efficient use of such land (Eissa et al., 2016). Phytoremediation is a good technique for metal-contaminated soils where contaminant removal is not an option (Eissa & Almaroai, 2019). Phytoextraction is a method that uses hyperaccumulator plants to remove elements from contaminated soils. For successful phytoextraction in the field, selecting proper plant materials is critical. Amaranth has a lot of potential for removing Cd from contaminated soils by phytoextraction. Furthermore, in practice, the double harvesting procedure is expected to improve phytoextraction efficiency (Ningyu et al., 2016). In addition, it has been reported that Sorghum cultivars are promising in terms of phytoremediation because they remove large amounts of Cd from the soil (Yilmaz and Kokten, 2021). After phytoremediation, metal-contaminated plants offer organic matter and trace metals for anaerobic fermentation (Zhang et al., 2021). Cultivation of halophyte and conventional fodder plants in contaminated soils is good ecosystem management, and the resulting plant can be utilized to feed animals or recycled into soil organic amendments due to its low pollutant concentration. Compared to pearl millet and cowpea, *Atriplex* plants are more resistant to metal toxicity. Cowpea and pearl millet exhibited little capacity to reduce metal bioavailability (Ding et al., 2021). Soil pollution is a global

environmental issue, and during the last decade, many efforts have been undertaken to identify effective remediation strategies. Furthermore, rehabilitation of mixed polluted soils is more challenging (Zhang et al., 2013). Increased concentrations of potentially harmful materials in soil can result from mining and geogenic operations. Biochar amendment to soil is a cost-effective and environmentally benign method of reducing soil pollution, improving phytoremediation, and reducing health hazards associated with agricultural products. Biochar made from rice husks can be used to improve contaminated soil (Ibrahim et al., 2016). Mycorrhizal alfalfa in symbiosis with *Glomus mosseae* can be used to effectively remediate heavy metal-polluted soils (Zaefarian et al., 2013). Because of its advantageous activity in symbiotic nitrogen fixation, the Legume-*Rhizobium* symbiosis has been recommended as a viable approach for phytoremediation of contaminated soils. Excessive heavy metals, on the other hand, have been demonstrated in multiple studies to diminish the efficacy of symbiotic nodulation with *Rhizobium* and to impede plant growth. Under Cu/Zn stress, coinoculation with *Sinorhizobium meliloti* and *Agrobacterium tumefaciens* increases plant growth and antioxidant activities, enhancing metal phytoextraction and providing a new strategy for bioremediation in heavy metal-contaminated soil (Jian et al., 2019). This symbiotic interaction combines the advantages of rhizoremediation and soil nitrogen enrichment (Navarro-Torre et al., 2019). Soils are vital to the ecosystem's functions and goods. Unfortunately, mining activities have contributed to soil metal contamination, a well-known global environmental problem, over the previous century. Chemophytostabilization (the use of plants and their associated rhizosphere microorganisms, in combination with the application of organic or inorganic amendments, to reduce metal mobility and bioavailability) is an environmentally friendly phytotechnology that has a lot of promise for the remediation of metal-polluted mine soils. However, lack of knowledge about the interactions between the soil matrix, metal contaminants, additives, plants, and rhizosphere microbial communities limits this remediation technique. In any event, the goal of a chemophytostabilization method must be to restore soil health as well as limit metal mobility and bioavailability (Galende et al., 2013). Chemophytostabilization is a valuable alternative to many traditional methods of reducing the concentration of heavy metals in soil affected by industrial activity. Bentonite and compost effectively reduce the mobility of heavy metals in soil (Wasilkowski et al., 2019).

5. Accumulation in forage crops

Bhatti et al. (2018) examined several Berseem tissues from agricultural fields for metal buildup. Berseem's roots gathered the highest levels of Cd, Co, Fe, and Pb. In Berseem leaves, the highest concentrations of Cr, Cu, Mn, and Zn were found (Bhatti et al., 2018). It is suggested that heavy metal-contaminated water be used in combination with freshwater (50 or 75 percent FW) or with biochar and bacterial biosorbent to reduce the concentration of heavy metals in forage maize shoot (below the permissible limits for livestock feed), avoiding human/animal health risks (Abedinzadeh et al., 2020). Plant biomass can be increased while heavy metal buildup is reduced by intercropping. Pb concentrations in ryegrass and alfalfa shoots and roots were substantially lower in the intercropping than in the monoculture. The intercropping treatment can help plants become more resistant to heavy metals by reducing oxidative damage and increasing antioxidant activity. It could offer us with a strategy for increasing biomass and reducing Pb absorption on forage plants by intercropping ryegrass and alfalfa (Cui et al., 2018). When metals accumulate in the food chain, they are poisonous and can harm human health. In the Rio Doce basin, Vasconcelos et al. (2011) measured Al, As, Ba, Br, Ca, Ce, Cl, Co, Cr, Cs, Eu, Fe, Hg, K, Mg, Mn, Na, Rb, Sb, Sc, Ta, Th, Ti, U, V, and Zn in surface waters, margin sediments, forages, and cow hairs. The samples were taken in two seasons: July 2009 (dry season - winter) and February 2010 (wet season - summer) (rainy season - summer). Because P1 is a pollution-free zone, these spots were intentionally picked. P2, on the other hand, is situated in an industrially dense area. Results showed higher concentrations of the elements in P2 riverside area of livestock production and subject to flood. As soil additives, poultry litter and fertilizers are commonly used. To better understand growth dynamics, metals, and nutrient uptake, researchers evaluated the impacts of chicken litter and inorganic fertilizers on three mixed-season perennial forages in the field for two years. Jaja et al. (2022), compared the heavy metal and nutrient contents, biomass production, and forage potential of stinging nettle (*Urtica dioica* L.) to warm-season forages bermudagrass (*Cynodon dactylon* (L.) Pers.) and switchgrass (*Panicum virgatum* L.). For the first year, switchgrass and bermudagrass yielded 66 percent and 50 percent more total biomass than stinging nettle, respectively. While warm-season forages provided greater biomass than cool-season forages, metal concentrations in the cool-season forage were considerably higher for all elements. Stinging nettle showed greater macro-nutrient uptake with 103.20 kg ha^{-1}, 0.87 kg ha^{-1}, 27.49 kg ha^{-1} and 32.08 kg ha^{-1} for Ca, Fe, Mg, and P, except for K with 223.51 kg ha^{-1} compared with 267.29 kg ha^{-1} and 283.96 kg ha^{-1} for switchgrass and bermudagrass, respectively. Heavy metal levels were also greater in stinging

nettle, but they were within acceptable limits for forages, showing its potential as a forage and nutrient cycling resource, especially when double-cropped with warm-season forages. Ali et al. (2022) measured the concentrations of copper (Cu), manganese (Mn), zinc (Zn), iron (Fe), lead (Pb), and cadmium (Cd) in water, forage, and buffalo hair in order to compare the concentrations of the metals in the forage between residential and grazing areas and to assess relationships between age and heavy metal concentrations in buffalo hair. Mineral concentrations were Fe > Mn > Zn > Pb > Cu > Cd in the water, Fe > Mn > Zn > Pb > Cu > Cd in the fodder, and Fe > Mn > Cu > Zn > Pb > Cd in the buffalo hair. Cu-Mn and Fe-Pb were substantially associated in the forages, while Cu, Zn, and Pb were strongly connected in the hair. Heavy metals pose poisonous effects on the health of ruminants and hence it is very important to analyze the heavy metal profile of plants consumed by these species (Khan et al., 2016). Because copper mine tailings represent numerous risks to the environment and human health, their cleanup is critical. Coal spoil is a waste by-product of coal mining that has low metal levels, a high organic matter content, and numerous important microelements. Through changing the physiological properties of the plant produced in copper mine tailings, coal waste has the ability to stabilize most metals in copper mine tailings and mitigate the adverse effects on *Lolium perenne* L. (Chu et al., 2018). A field experiment in Greece looked into the effects of treated wastewater and biosolids on accessible soil metal levels. The addition of reclaimed wastewater and biosolids to the biomass yields and crude protein content boosted the biomass yields by up to 25%. The biomass yields were statistically related to the height of the Ryegrass plants. The treatment dramatically enhanced the amount of metals and important nutrients in the soil. Metals and critical nutrients reacted synergistically with the physical and chemical features of the soil. Significant elemental interactions contributed metals and nutrients in the soil and plant tissues, respectively. Ryegrass plants accumulated relatively high Cd levels, suggesting that they may act as toxic metal accumulators (Demitrelos et al., 2022). Tall fescue (*Festuca arundinacea*), an accumulator that can accumulate and excrete cadmium (Cd), has received much interest for its potential application in heavy metal phytoremediation (Dong et al., 2019).

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DEVELOPMENT OF DESIGN DOCUMENTATION FOR A MODEL OF WOMEN'S OUTERWEAR

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ABSTRACT
Central Russia has a temperate continental climate, which means a wide range of temperature changes throughout the year. Therefore, winter outerwear for residents of Moscow and nearby cities is necessary not only from an aesthetic point of view, but also for a comfortable stay outside at subzero temperatures. It is worth noting that nowadays, with an abundance of different brands, it is very difficult to find really relevant outerwear that will look beautiful, match the style of the buyer and perform its main function well – protection from the cold. Comfortable, lightweight jackets, which are combined with both rough boots and trousers, as well as multifunctional products with removable elements, have become fashionable. The purpose of the work is the development of modern model design and the formation of design documentation for a women's jacket. The article presents research of the target audience using the site "Anketolog", which showed what the target consumer wants as outerwear in the winter-spring and autumn period. Also considered are analog models of women's jackets, which are superimposed on the graphic image of the customer. As well as luxury collections of Maison Margiela and Dolce & Gabbana brands. Since it is luxury clothing that creates trends for the coming years.
Based on the research, a model of a women's jacket was designed that meets all the stated requirements, is comfortable and cost-effective.

Keywords: women's jacket, transformer clothing, faux fur.

INTRODUCTION

Central Russia has a temperate continental climate, which means a wide range of temperature changes throughout the year. Therefore, winter outerwear for residents of Moscow and nearby cities is necessary not only from an aesthetic point of view, but also for a comfortable stay on the street at sub-zero temperatures [1, 2]. It should be noted that in our time with an abundance of different brands, it is very difficult to find really relevant outerwear that will look beautiful, fit the style of the buyer and perform well its main function - protection from the cold [3, 4]. Based on this, it was decided to develop a product related to women's outerwear. Recently, comfortable, light jackets have come into fashion, which are combined with both rough boots and a dress, as well as multifunctional products that have removable elements [5, 6]. The aim of the work is the development of a modern model design and the formation of design documentation for a women's jacket.

In order to correctly create a product design, a portrait of the target consumer was created. This is a young girl from 14 to 30 years old, living in a large city, with a modern outlook on life and ready for bold and bright combinations in images. Figure 1 shows the mood-bord of the target consumer, which embodies his belonging to the sport-chic style. To study the relevance of the developed model, a survey was conducted, an analysis of analog models and collections of the luxury segment.



Figure 1 - MOOD-bord of the target consumer

A questionnaire was compiled using the Anketologist website. In the process of questioning 146 people were interviewed. Of these, representatives of the primary target audience were selected. The results are presented in the form of pie and column charts, some of which are shown in Figure 2.

As a result of the survey, the following was determined:

- The target consumer is ready to spend from 6 to 15 thousand rubles on outerwear;
- In the autumn period, in the choice of clothing, preference is given to jackets and down jackets;

- The presence of a hood is not required, but welcomed;
- The length of the coat should be to the knee or to the hips;
- The type of down jacket insulation is not important, both natural down and synthetic winterizer are welcome;
- The decor of the down jacket is either missing or fur;
- Consumers prefer down jackets of exaggerated sizes.



а б

в

Figure 2 - Results of the survey: a) the preference of respondents when choosing outerwear in the cold season, b) the preferred length of outerwear, c) preferences for the presence of decor in outerwear

An analysis of the luxury collections of Maison Margiela and Dolce & Gabbana was also carried out, with the help of which it is possible to predict fashion trends, since it is this segment that sets the direction of the fashion vector in the entire light industry. Clothing silhouettes are invariably presented as oversize products. The volume of the upper body can also be achieved by expanding the shoulder girdle, including overhead elements or internal shoulder pads [7, 8]. The shape of outerwear is predominantly trapezoid with sloping shoulders; with its help, the figure of the consumer is harmonized [9]. Also, there was a tendency to fill jackets with insulation [10], shown in Figure 3. This method retains air inside the stitch sector, which increases the volume of the product and retains heat as much as possible.

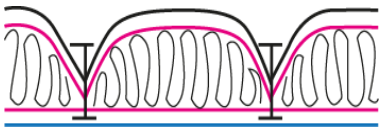
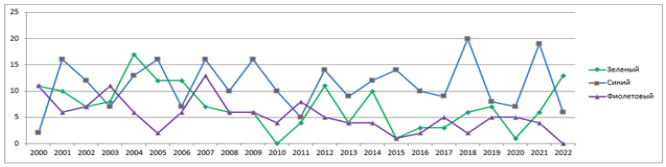
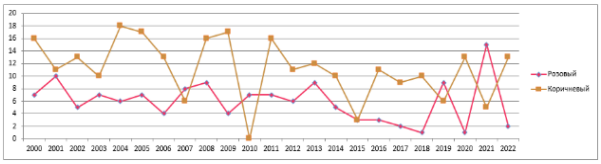


Figure 3 - Scheme of sectoral filling of the jacket

It was also revealed that upcycling is gaining popularity, which will not only be fashionable, but also save the environment [11]. And since upcycling is the recycling of products by combining parts from different models of clothing, the fashion for a combination of different materials in one product will linger in trends for a long time.
In order for the product to remain popular for several more years, the analysis of luxury collections for the presence of color combinations in the image was carried out [12]. Based on the analysis, graphs of changes in the availability of colors from 2000 to 2021 were compiled, some of which are shown in Figure 4. Based on the data obtained, the main colors for the product were chosen: chocolate and bright green.



а



б

Figure 4 - Graphs of changes in the availability of flowers for 2000-2021: a) the presence of green, gray, purple in the collections by year; a) the presence in the collections of pink and brown colors over the years

Also, using the photogrammetry method, photos of the customer and analogue models were combined, subsequently this information was used to build a virtual model [13]. With the help of a group of respondents, harmonized models of jackets were identified, on the basis of which artistic and technical sketches of the product were created.
Also, all the necessary documentation was developed for launching the product at a large enterprise: technical and artistic sketches, a confection map, BC and MK, working patterns, layout schemes and technological maps for processing jacket knots [14].
It is worth noting that the percentage of inter-pattern waste is less than 13%, which means that the layouts are economical. The cost of the product is 5,460 rubles, taking into account that the material for the sample was purchased at a retail price. As part of large-scale production, the cost will be lower by 40%. Correlating the average cost of analogue models and the estimated cost, it was concluded that the model is cost-effective for production.
As a result, a sample of the jacket was sewn off, the photo of which is shown in Figure 5. The sample has already been tested in wear, performs all the declared functions, is comfortable

and, most importantly, very warm. It is worth noting that due to the detachable elements, the jacket can be used in 6 different versions and suits different styles of clothing.



Figure 5 - Photo of the finished product on the customer

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ESTIMATION OF SOIL PROPERTIES IN HARIR REGION IN ERBIL GOVERNORATE OF IRAQUSING GEOSTATISTICAL AND SPECTRO RADIOMETER TECHNIQUES

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ABSTRACT
Soil properties are important indicators for soil health and productivity. The aim of this study is to determine and map the spatial distribution of soil properties and made a correlation with reflectance spectroscopy in Hariir region of Erbil governorate in the north of Iraq. The study area was divided into 500 m x 500 m square grids and 65 soil samples were collected in the sampling sites from a 0 – 30 cm depth in December 2021. The coordinates of each location were recorded by geographic position system (GPS). Soil samples were analyzed for soil organic matter (SOM), texture, Soil reaction (pH), electric conductivity (EC) and calcium carbonate ($CaCO_3$). Visible-near infrared reflectance spectroscopy (VNIR) and geostatistical techniques were used for assessment of diverse soil properties.Geostatistical methods were used to determine spatial structure for each of soil properties. Interpolation methods ordinary kriging (OK) and inverse distance weighting (IDW) were used to estimate the spatial analyze of each soil properties. As a result the amount of sand %, Clay %, Silt % and $CaCO_3$ were significantly affected with soil reflectance. Strong and moderate spatial dependence in soil parameters might be explained using an exponential model as a best fit in semivariogram. Interpolation methods indicated that OK more accurate than the IDW for interpolating of SOM %, Sand %, Silt %, Clay %, pH and CaCO3 and IDW was better than the ordinary kriging in estimating of EC.

Key words: Estimation, soil properties, geostatistical analysis, spectroradimeter, Hariir region, Erbil

1. INTRODUCTION

The process of measuring and evaluating soil components and qualities is typically time-consuming and expensive. The absence of sample data is frequently made up for by the outcomes of modeling or forecasts. To estimate the geographical distribution of soil characteristics, a variety of modeling techniques known as predictive soil mapping have been developed. The majority of them use geographic databases to build predictive maps or to calculate the values of soil properties at unmeasured sites using field-collected data. They are based on numerical or statistical models of relationships between other environmental variables and soil properties. (Burrough P. v., Continuous classification in soil survey: spatial correlation, confusion and boundaries, 1997).Techniques like diffuse reflectance spectroscopy (visible-near and mid-infrared) and geostatistics are being used more and more in precision agriculture to characterize within-field spatial variation and predict soil characteristics at unexplored locations (Ben-Dor, 1995, Chang at al, 2001). Using a technology called visible-near-infrared reflectance spectroscopy; it is possible to quickly estimate a variety of soil parameters. It has been applied to assess soil quality, pollution, and degradation as well as to classify soil and quantify its spatial variation. (Wu et al, 2005, Chang et al, 2001) This method's utility may depend on how widely it is used (Shepherd, 2002)utilized VNIR spectroscopy based on samples taken from a variety of soil types across a wide geographic area. This kind of sampling typically offers a broad range of soil indicator values, which encourages favorable regressive outcomes. However, a large variety of soils in a sample set is a challenge to the methodology because it necessitates a greater universality in the statistical prediction relations, especially when taking into account various constituent materials (Reeves, 1999, Shepherd, 2002). Although the ranges of soil parameters are typically narrow, the prediction equation might simply need to be applicable locally. With VNIR, a monochromator is used to evaluate the properties of soil reflectance over the full visible (350-700 nm) and near infrared (700-2500 nm) spectrum. When reviewed alone or in combination with one another, raw data, first- and second-derivatives all offer useful information that may be examined. Due to overtones associated with stretching and bending vibrations in chemical bonds such C-C, C-H, N-H, and O-H, soil constituents exhibit distinctive absorption characteristics in these wavelength areas (Dalal and Henry, 1986). The intercorrelation between soil attributes and between soil constituents and spectra, the methods of chemical analysis employed for training data sets, and the existence of outliers are all aspects that have an impact on the accuracy and robustness of VNIRRS predictions. Generally speaking, better outcomes were obtained when calibrations were created for samples from similar parent materials (Shepherd, 2002). However, their value at intermediate and lower scales is less evident. Geostatistical methods for quantitative soil surveys have shown to be useful at large scales (Webster, 1997). Geostatistics offers the tools for describing and quantifying spatial variability, using this data for logical interpolation, and calculating the variance of the values that

were interpolated. Variance estimation offers useful details on the setup and sampling density required to estimate a property to a given precision. A technique known as geostatistics is used to estimate the soil property values in places that haven't been studied or have had few samples taken. (Yao LX, 2004) Deterministic and geostatistical interpolation were separated into two primary categories. Inverse Distance Weighting (IDW), Radial Basis Function (RBF), Global Polynomial Interpolation (GPI), Local Polynomial Interpolation (LPI), and Splines are examples of deterministic techniques. On the other hand, the category of geostatistical techniques includes kriging and its variations, such as ordinary, simple, empirical, universal, etc. However, in recent years, so-called hybrid techniques—such as Regression Kriging (RK) or Geographically Weighted Regression (GWR)—have been developed, which combine a linear model and a non-linear interpolation model (Shi & Tian, 2006; Zhang, & Zhang, 2019). It is clear that there haven't been many studies done on the mapping of soil qualities at regional levels. This demonstrates the requirement for accurate soil mapping methods. Determination of soil properties by laboratory analysis and estimation of each parameters via spectroradiometer. The aim of this study is to estimate of soil properties in Harir region in Erbil governorate of Iraq Using both of ordinary kirging and inverse distance wight (IDW) , measuring unsamped location.Assuming the goodness of both calibration and valedation in PLSR model to make a correlation between soil parameters and spectral reflectance Asuuming the accurate of interpolation methods by calculating mean error (ME), root mean square error (RMSE) and coeficint of determination (R^2).

2. MATERIAL and METHODS

2.1 Study area

The study was performed in the north of Iraq in Harir region of Erbil governorate in the north of Iraq. The geographical location is betweden 492500 to 493500 latidude and 437500 to 438500 longtude as shown in figure 1.

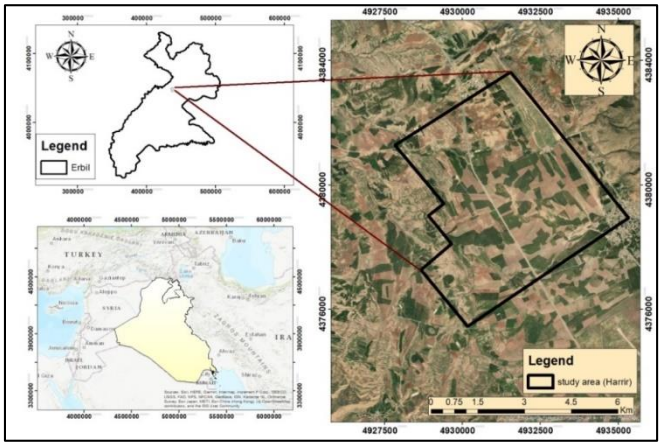


Figure 1. Study area area

2.2 Soil Sampling and Laboratory Analysis

The study was carried out in December 2021. Soil samples were collected in Hariir region of Erbil governorate. The study area was divided into 500 x 500 m square grids and 65 soil samples were taken around from the center of each grid point. Soil samples were air-dried and passed through a 2 mm sieve. Particle size distributions were determined by the hydrometer method (Bouyoucos, 1926); organic matter content by the Walkley– Black method (Nelson and Sommers, 1982);. Carbonates using a calcimeter (Kacar, 1994); soil pH with a 1:2 soil/water suspension using a glass electrode pH meter (McLean, 1982); electrical conductivity (EC) in soil extraction using conductivity meter (Janzen, 1993). Using a Field Spec Pro, hyperspectral sensor (Boulder, Colorado: ASD., 1997), soil samples were scanned and Absolute Reflectance (decimal percent) of samples was recorded for 350-2500 nm at 1 nm spectral resolution, providing a total of 2150 data points per spectrum. Air-dried soil samples were put into 4 cm diameter optical grade petri dishes, and a Tungsten Quartz halogen lamp light source contained inside a Muglight sensor accessory was used to illuminate the samples. At a distance of 4 cm from the sensor, reflection was measured through the glass bottom of each dish at a fixed angle (55 degrees from horizontal).To prevent any spectral changes resulting from variances in particle size within soil samples, the sample was rotated 90 degrees and five further readings were taken after five consecutive readings, each average of ten sequential reflectance spectra. A Spectralon standard was used to calibrate the accuracy and detector responses and optimize the signal. The instrument was reset if the white (Spectralon) measurement was unstable.

2.3 Processing data

Using ViewspecPro (Analytical Spectral Devices, Inc., Boulder, CO, 80301), reflectance data were converted from binary to ASCII and exported in batches. Splus was used to average the 10 successive reflectance readings from each sample (a total of 10 scans), resulting in a master data file with one representative reflectance spectrum for each soil sample.

2.4 Statistical analysis

The prediction method involved applying cross-validation with all of the calibration sample subsets first, and then testing the precision of the forecast using different validation sample sets. Partial least square (PLSR) regression was used to calibrate the relationship between soil reflectance and soil characteristics utilizing Unscrambler program (CAMO Process, Oslo, Norway, 2003).

2.5 Partial least square regression

It is common practice to employ partial least square regression, a technique for connecting two data matrices (X and Y) using a linear multivariate model. The latent variables discovered by PLSR are orthogonal and weighted linear combinations of X variables. They are created by decomposing both the X and Y variables. Then, with X being soil reflectance and Y being a

measured soil characteristic, these new X variables are utilized to predict Y variables. In contrast to multiple linear regression, it is capable of handling data with significant co-linearity in independent (X) variables, which may also have a larger number of observations. The column averages are subtracted from each observation in the column prior to the analysis to center variables X and Y. To avoid overfitting or underfitting the data in PLSR, which would result in models with low predictive power, the number of latent variables must be carefully chosen. The models were built repeatedly using cross-validation, leaving some samples from the calibration data set to be used in the validation process until all samples or groups were evaluated. UnscramblerV.8.0.5 software was used to conduct PLSR.

2.6 Prediction accuracy

The root mean square error of prediction (RMSEP) and coefficient of determination (R2) of measured and forecasted values of samples were used to assess each VNIR technique's capacity to predict a soil attribute**.**

$$\mathbf{RMSEP} = \sqrt{\frac{\sum_{i=1}^{n}\left(Y_{\text{pred.}} - Y_{\text{meas.}}\right)^2}{n-1}}$$

2.7 Statistical analysis

The mean, minimum, maximum, standard deviation (SD) and coefficient of variation (CV), values of soil properties were determined at 0-30 cm depth using SPSS ver. 20.0 (IBM Corp., Armonk, NY, USA). To investigate the correlations between soil qualities and sample geographic information, Pearson's correlation analysis was used. A semi-variogram was created in this study to describe the variability of the soil properties . The model with the lowest residual sum of squares (RSS) and the highest coefficient of determination (R2) performed best. To establish the spatial structure of the soil properties at a particular scale, the semi-variogram model parameters (nugget variance (C0), structural variance (C), sill variance (C0 + C), and the spatial autocorrelation range) were utilized. To assess the degree of geographical dependence, the nugget to sill variance ratio (C0/(C0 + C)) was computed; a ratio of 0.25 reflects a significant degree of spatial autocorrelation; 0.25–0.75, medium autocorrelation; and >0.75, moderate autocorrelation. (Equation (3)) was used to calculate the semi-variogram model.

$$\gamma(h) = \frac{1}{2N(h)}\sum_{1}^{N(h)}[z(xi) - z(xi+h)]^2,$$

(h) is the experimental semi-variogram, h is the lag distance, N(h) is the number of sampling point pairs separated by h, and z (xi) and z (xi + h) are the paired data values separated by h. Inverse distance weighting (IDW) and ordinary kriging (OK) interpolation techniques were used to designate the spatial distribution of soil properties. The interpolation performance was tested by a leave-one-out cross-validation approach. The root mean square error (RMSE), mean error (ME), and coefficient of determination (R2) were used to determine the prediction accuracy of the spatial interpolation as follows

$$\mathrm{RMSE} = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(Pi - Mi)^2},$$

$$\mathrm{ME} = \frac{1}{n}\sum_{i=1}^{n}(Pi - Mi),$$

$$\mathrm{R}^2 = 1 - \frac{\sum_{i=1}^{n}(Pi - \overline{M})^2}{\sum_{i=1}^{n}(Mi - \overline{M})^2},$$

Where Pi and Mi. represent the predicted measured values, respectively; $\overline{M}$ and $\overline{P}$ are the average of measured and predicted values, while n is the number of sample.

2.8 Terrain variable

Digital elevation model (DEM) was used to create maps for surface elevation, aspect and slope for topographical describing the study area. Landsat 8 was utilized to make the map normalized deference vegetation index NDVI, the ecological indicator NDVI was calculated depending on Red and NIR reflectances for the spectral reflectance measurements acquired in the red (visible) and near-infrared regions, The value is deferent between -1 to +1 from non-vegetation cover to dense vegetation, expressed by this equation NDVI = NIR - Red / NIR + Red, NDVI = band 5 – band 4 / band 5 + band 4.

3. RESULT AND DISCUSSION

3.1 Environmental variables

The variation in elevation values within a region is known as topographic heterogeneity. Specific indices describing the rate of elevational change in response to changes in can be quantified. Topographic variables for aspect, slope, elevation, And ecological NDVI parameter are Shown in figure 2. The directions of study area were expressed in aspect map, is started from the flat area -1 to the north 337 degree. The topographical of entire study area with elevation ranging from low (483– 731 m) The grade of slope was started starting 0 to 66.89, slope value was classified of different variety of the most of zone has a flat and moderate elevation with a verity from 0 – 8 is flat to 8 -15 slopping, 15 – 25 rather steep, 25 – 40 steep and >40 is very steep slope, the value ecological parameter NDVI from 0.0072 to 0.38 this value indicate that there wasn't any water sheet in the study area, While the whole area was used for agriculture practices. The biggest portions of the study area had been planted with wheat, and remain part of with wheat, rice

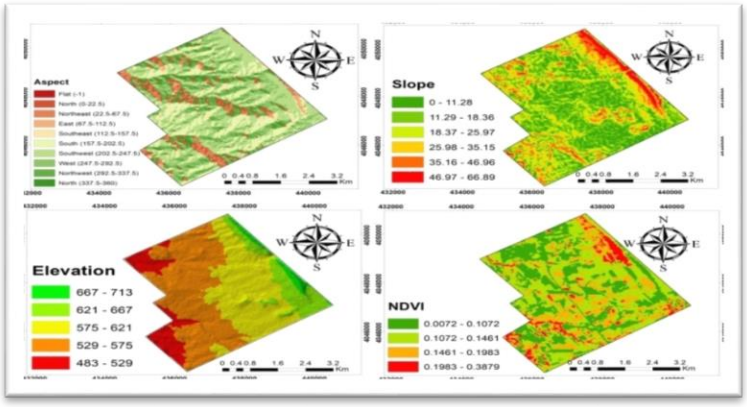


Figure 2. Topographical variable of aspect, slope, elevation and NDVI

3.2 Assessment of soil properties

Descriptive statistic of soil properties (organic matter, soil texture (sand%, silt %, clay %), pH, EC and calcium carbonate (CaCO3) for 65 soil sampling at 0- 30cm depth across the study area were given in table.1, the soil texture of sand, silt and clay ranged from 13.44 to 75.44, 9.28 to 43.28 and 13.28 to 61.28 respectively, with the mean value 26.94, 27.64 and 45.40 respectively. SOM, pH, EC and CaCO3 were from 0.049 to 5.197, 6.91 to 7.61, 170.8 to 804 and 15.2 to 34.96 respectively, with the mean value 1.74, 7.30, 341.95 and 24.44. The coefficient of variance (CV) % was calculated to know the variability of each soil properties. CV ≤15% is low, 16-30% is medium; and ≥30% is high variability (Wilding et al, 1984). CV indicate low variation of soil PH (1.84 %), therefore the medium variation of soil clay %, silt % and $CaCO_3$ (26.01 %, 25.28 % and 20.30) respectively, compared to the high variation of SOM, sand % and EC (68.84%, 50.21 % and 37.90 %) respectively,

Table 1. Descriptive statistic of laboratory analysis of soil properties

	OM %	Sand %	Clay %	Silt %	pH	EC µS/cm	CaCO3 %
Minimum	0.049	13.44	13.28	9.28	6.91	170.8	15.2
Maximum	5.197	75.44	61.28	43.28	7.61	804	34.96
Mean	1.74	26.94	45.40	27.64	7.30	341.95	24.44
Standard Deviation	1.201	13.53	11.81	6.99	0.13	129.60	4.96
CV %	68.84	50.21	26.01	25.28	1.84	37.90	20.30
Skewness	0.90	2.13	-1.03	-0.13	-0.11	1.62	0.020
Kurtosis	0.36	4.48	0.30	0.64	0.66	3.32	-0.58

To assess how soil nutrients are related each other and with environmental variables, a correlation matrix was created (Table 2). The correlation between training variable and soil properties there isn't any related between soil properties and topographical variable because the entire area is used for agriculture practices, and it has already amended and supplemented by fertilizer, NDVI have weak positive correlation with slope (r =0.263), SOM concentration and EC showed a substantial and positive correlation. Consequently, there was a negative connection between SOM and pH.

EC value and concentration had a substantial link (r = 0.502, p 0.05), although EC value and sand, silt, and clay had weak and negative correlations. CaCO3 and SOM had minor correlations as well. Additionally, sand and clay, silt, and CaCO3 exhibited substantial negative correlations with one another, while clay and silt and CaCO3 have positive correlations with one another (r=0.207, r=0.351, respectively). Then, EC and PH show a substantial negative connection (r=0.64).

The both of statistic parameter (kurtosis and skewness) are used to assess the normal distribution of symmetry. A negative kurtosis of CaCO3 indicated that the distribution has lighter tails than the normal distribution and sand have positive kurtosis. Higher kurtosis value of Sand % indicates that the distribution has more outliers falling relatively far from the mean. A negative skewness of Clay %, Silt % and pH implied that a distribution has its tail on the left side of the distribution, whereas a positive skewness value of OM%, Sand %, EC and $CaCO_3$ indicated that the tail on the on the right side of the distribution. A soil data's skewness value can be taken into account while determining the distribution tendency. If the data's skewness value is less than 0.5, no transformation is needed before geostatistical analyses; if it is between 0.5 and 1.0, a square root transformation is performed; and if it is greater than 1.0, a log transformation is used to restore the data's distribution to the normal distribution (Webster, 2001). Skewness sand value (2.13) revealed that the data did not follow a normal distribution. Before conducting the statistical and geostatistical studies, the some data underwent log transformation

Table 2. Correlation coefficients between soil properties and environmental parameters

	Aspect	**Elevation**	**Slope**	***NDVI***	***OM (%)***	***Sand (%)***	***Clay (%)***	***Silt (%)***	***pH***	***EC(µs/cm)***	***CaCO3***
aspect	1										
elevation	-0.099	1									
slope	-0.198	0.139	1								
NDVI	-0.113	-0.051	0.263	1							
OM (%)	0.017	0.032	0.075	0.131	1						
Sand (%)	0.082	-0.212	-0.012	-0.184	0.061	1					
Clay (%)	0.008	0.139	0.026	0.156	-0.052	-0.856	1				
Silt (%)	-0.173	0.175	-0.019	0.091	-0.029	-0.488	-0.031	1			
pH	-0.100	-0.252	0.008	-0.071	-0.377	0.017	-0.080	0.103	1		
EC(µs/cm)	0.042	0.235	0.009	0.157	0.502	-0.070	0.114	-0.057	-0.642	1	
CaCO3	0.054	0.394	0.086	-0.193	-0.159	-0.363	0.207	0.351	0.0132	-0.155	1

3.3 Soil reflectance

Figure.3. shows raw reflectance spectra and their first derivatives for all soil samples. Soil reflectance was generally lower in the visible range (Islam, 2003) and higher in the near infrared with specific absorbance bands around 1400, 2200 and 2400 nm. These are strongly associated with OH features of free water at 1400 and 1900 nm and clay lattice OH features at 1400 and 2200 nm (Hunt, 1980). Basic soil constituents with soil water, clay type and content, organic matter, and Fe-Al all have an influence on how the soil reflects light (Bowers et al., 1965). The correlation between soil properties and reflectance spectroradiometer was calculated. Table 3 showed that both positive and negative correlations at several wavelengths through the spectrum. The positive correlation was found between reflectance and soil properties of sand, silt and $CaCO_3$ while negative correlation with clay. However there weren't any association between soil reflectance and soil variables of SOM, pH, and EC according our study.

Table 3.Correlation between soil variables and reflectance

Wavelength (nm)	OM (%)	Sand (%)	Clay (%)	silt (%)	pH	EC(µs/cm)	CaCO3
350-450	0.157	.357**	-.450-**	0.068	-0.080	0.101	0.077
451-550	0.082	.379**	-.540-**	0.178	-0.014	-0.006	0.107
551-650	-0.046	.305*	-.521-**	.290*	0.090	-0.167	0.211
651-750	-0.033	.277*	-.505-**	.317**	0.089	-0.173	.250*
751-850	0.005	.278*	-.517-**	.335**	0.070	-0.144	.255*
851-950	0.052	.274*	-.520-**	.349**	0.041	-0.099	.263*
951-1050	0.078	.258*	-.522-**	.382**	0.028	-0.076	.290*
1051-1150	0.090	.250*	-.528-**	.408**	0.027	-0.070	.306*
1151-1250	0.089	.266*	-.548-**	.412**	0.032	-0.075	.295*
1251-1350	0.089	.290*	-.574-**	.409**	0.032	-0.075	.275*
1351-1450	0.098	.332**	-.621-**	.406**	0.015	-0.061	.245*
1451-1550	0.093	.352**	-.638-**	.396**	0.020	-0.068	0.235
1551-1650	0.092	.355**	-.639-**	.392**	0.028	-0.071	0.235
1651-1750	0.093	.366**	-.649-**	.389**	0.029	-0.069	0.228
1751-1850	0.098	.378**	-.663-**	.389**	0.022	-0.062	0.220
1851-1950	0.107	.415**	-.711-**	.397**	-0.014	-0.042	0.182
1951-2050	0.105	.426**	-.716-**	.384**	-0.011	-0.048	0.177
2051-2150	0.096	.411**	-.697-**	.382**	0.018	-0.067	0.199
2151-2250	0.110	.412**	-.699-**	.383**	0.009	-0.051	0.198
2251-2350	0.104	.412**	-.704-**	.392**	0.009	-0.061	0.184
2351-2450	0.116	.431**	-.725-**	.391**	-0.010	-0.043	0.176
2451-2500	0.112	.446**	-.742-**	.390**	-0.018	-0.043	0.154

The highest positive correlation was found at 2400, 1200 and 1100 nm for sand, silt and $CaCO_3$ respectively. And, the highest negative value was revealed at 2400 nm for clay.

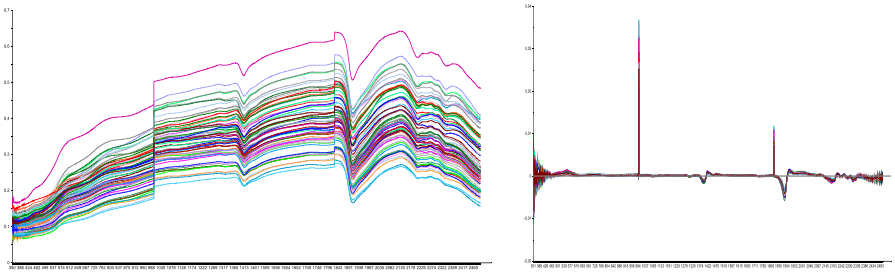


Figure 3.raw spectra and first derivative equivalents for all soils of the study area

3.4 Prediction of soil properties

To assess the soil variable prediction accuracy based on the whole sample data set (n = 65), the ten-out cross-validation strategy was performed with PLSR. For a variety of soil parameters, methods were contrasted using cross-validation R^2 and RMSEP. Table 4 use raw and first derivative spectra independently (2150 data points), to calculate PLSR cross-validation and calibration statistics for physiochemical indicators. Good correlations between soil spectra and other soil parameters were provided by PLSR. By merging first derivatives and raw spectra with a bigger data collection, no notable improvement was made. According to Reeves et al. (2002), the prediction outcomes could vary depending on various mathematical processing techniques and derivatives of spectra, Scanned by rotating the sample 90 degrees after ten readings with an illuminating source that was essentially constant. The most accurate models were found for Clay (R^2 = 0.0.79), sand (R^2 = 0.65), $CaCO_3$ (R^2 = 0.46), and Silt (R^2 = 0.32)

Table 4. Calibration and validation between reflectance and soil variable

	Calibration		**Validation**	
Soil variable	RMSEP	R^2	RMSEP	R^2
Sand	7.85	0.65	9.42	0.51
Silt	5.69	0.32	6.12	0.24
Clay	5.32	0.79	6.24	0.73
$CaCO_3$	3.61	0.46	4.35	0.24

Then-out calibration method may produce too optimistic forecasts for brand-new untested samples. Are observed, it is best to calibrate them using alternative sample sets that are unrelated to the validation data set. Figure 4 and Table 4 display indicator parameters for the VNIR spectroscopy prediction performance using PLSR. Although the RMSEP values were lower and the R2 values were higher in the calibration set compared to the validation set, statistical performance was not significantly different. Although the data sets came from the same spatial domain, it is difficult to obtain comparable prediction values when independent samples are used for validation (Dardanne et al., 2000).

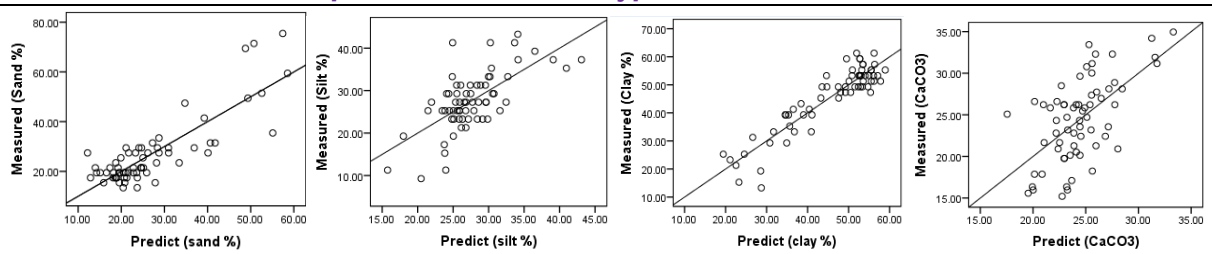


Figure 4. Regression between measured values and VNIR predictions for all soil variables

3.5 Spatial analysis of soil properties

Although the fundamental properties of the change in soil variability content are well shown by the standard statistical techniques, so, using GS+ software, we conducted experimental semi-variogram evaluations of the soil parameters shown in figure 5. The findings demonstrated that an exponential model had the lowest root mean square errors (RMSE) and highest coefficients of determination (R2), and that it was this model that best fit the semi-variograms. Table 5, Indicating a moderate degree of spatial dependence between the CaCO3, Sand%, and Clay%, the ratios of the nugget to the sill were 36.49%, 28.82%, and 34.12%, respectively. While OM%, pH, EC, and Silt% had high auto correlation and were, respectively, 10.7%, 18.26%, 9.40%, and 1.27%, these values suggest less than 25% in the other soil variable (Cambardella, et al., 1994). Previous research demonstrated that intrinsic factors, such as topography, soil texture, and parent material, controlled the strong spatial dependence of the soil variables (C0/(C0 + C) 25%), while extrinsic factors, such as land use management, fertilization, and cultivation practices, simultaneously affected the moderate spatial dependence (25% C0/(C0 + C) 75%).(Cambardella et al., 1994. Liu & Wang., 2014).

Table 5. Geostatistical parameters of soil properties

Soil variable	Model	Nugget(C_0)	Sill (C_0 + C)	Range(m)	RSS	SD % C_0/C_0 + C
OM	Exponential	0.165	1.541	400	0.0171	10.70
$CaCO_3$	Exponential	17.03	46.67	6328.55	5.48	36.49
pH	Exponential	0.00339	0.01856	426.05	1.440E-05	18.26
EC	Exponential	1720	18280	543	6366125	9.40
Sand%	Exponential	127.7	443	10110	2226	28.82
Silt %	Exponential	0.60	46.97	246	22.1	1.27
Clay %	Exponential	104.3	305.6	10112	850	34.12

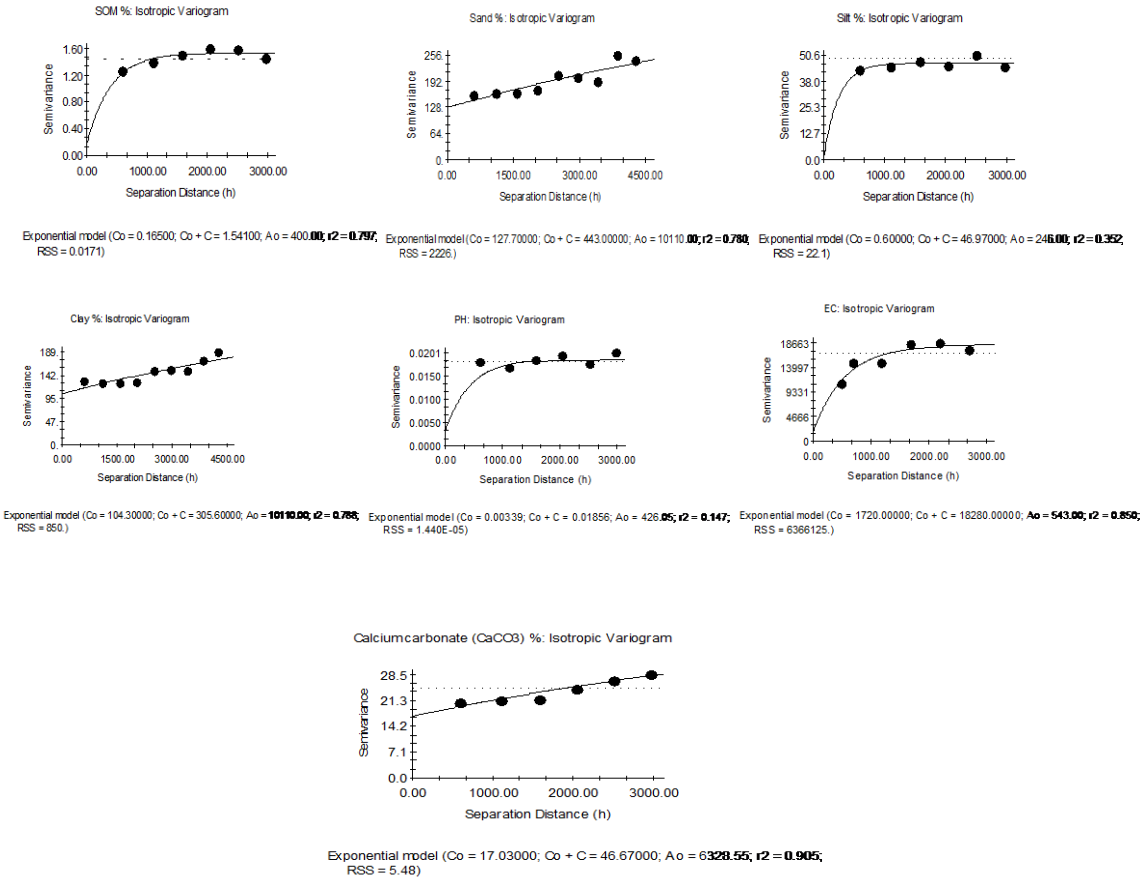


Figure 5.Experimental semivariograms of soil properties (0 - 30 cm)

3.6 Estimation of soil properties

Inverse distance weighting (IDW) and ordinary kriging (OK) interpolation techniques were used to create spatial distribution maps of the soil properties were shown in figure (6), in order to further highlight the geographic diversity of each soil variable. SOM content generally rose with decreasing latitude and increasing of vegetation cover across the whole study region. This increase was progressive from the south east and North West decertified district area with hills and gullies. Generally speaking, terrain, height, climatic conditions, and soil texture all have an impact on SOM (Luo, Feng, Luo, Baldock, & Wang, 2017). The amount of sand was decreased from the North West to south east, while silt was high in north east and south east, in addition that the amount of clay content was increased from the north to the south, parent material and elevation was controlling the formation of soil texture. The spatial map of soil pH indicated the pH value was high in the north and west south portion and low in the southwest, and although EC is high in the east, Since pH and EC are inversely correlated, areas with high pH also tend to have low EC. As a result, low soil pH values, which are present in all stations, should have large levels of soluble salts and, consequently, high levels of electrical conductivity. Lower pH values for the soil, according to (Wang YQ et al., 2013) imply that there are more hydrogen ions present. The level of electrical conductivity can be impacted by the presence of hydrogen ions, which might be present in variable amounts in the soil environment. Electrical conductivity will increase if there

are more hydrogen ions present in the soil. Soil electrical conductivity may be facilitated by low soil pH caused by a high concentration of hydrogen ions in the soil. Then, $CaCO_3$ was high in the east and low in the west area.

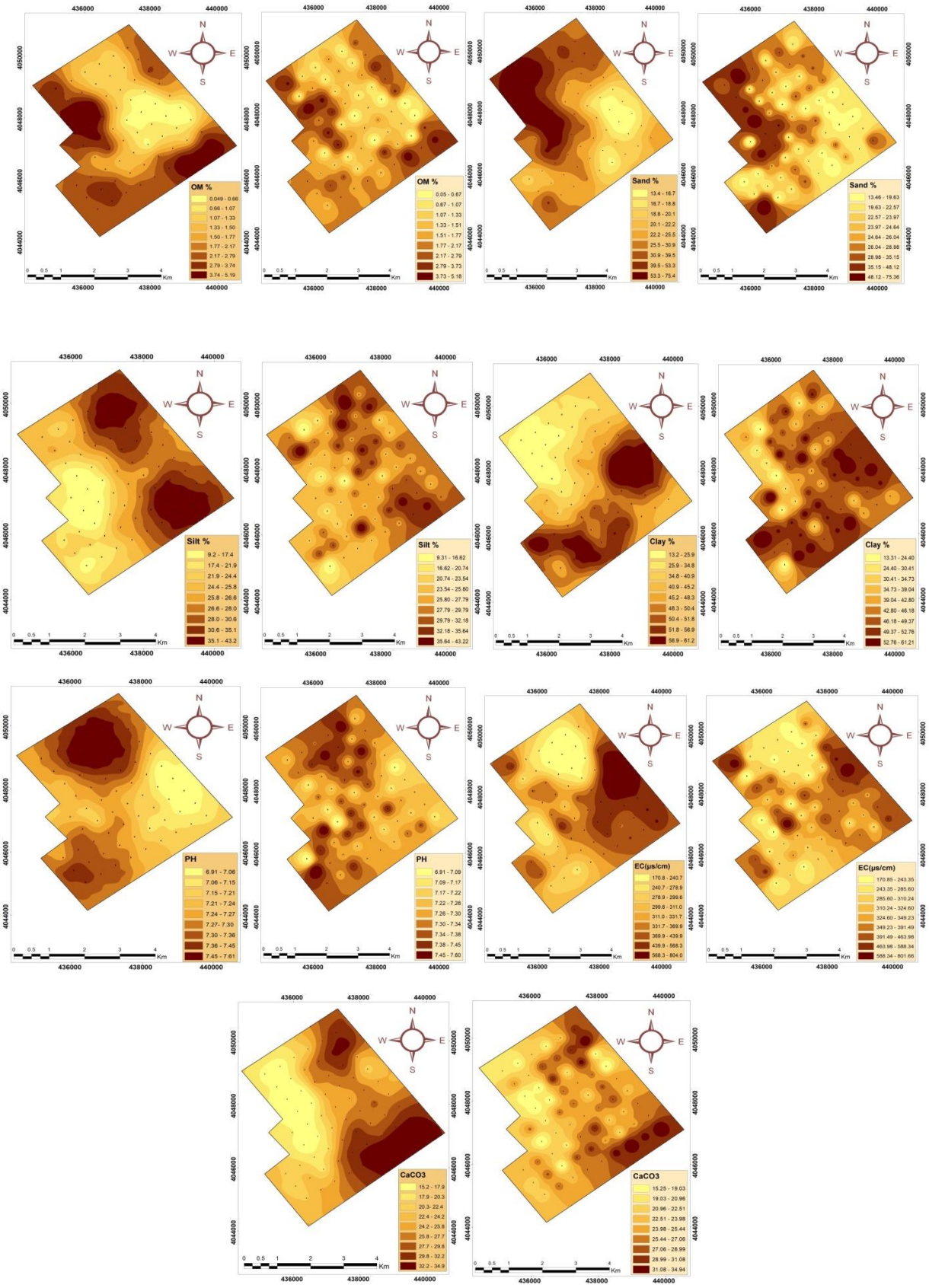


Figure 6. Spatial distribution maps of soil properties

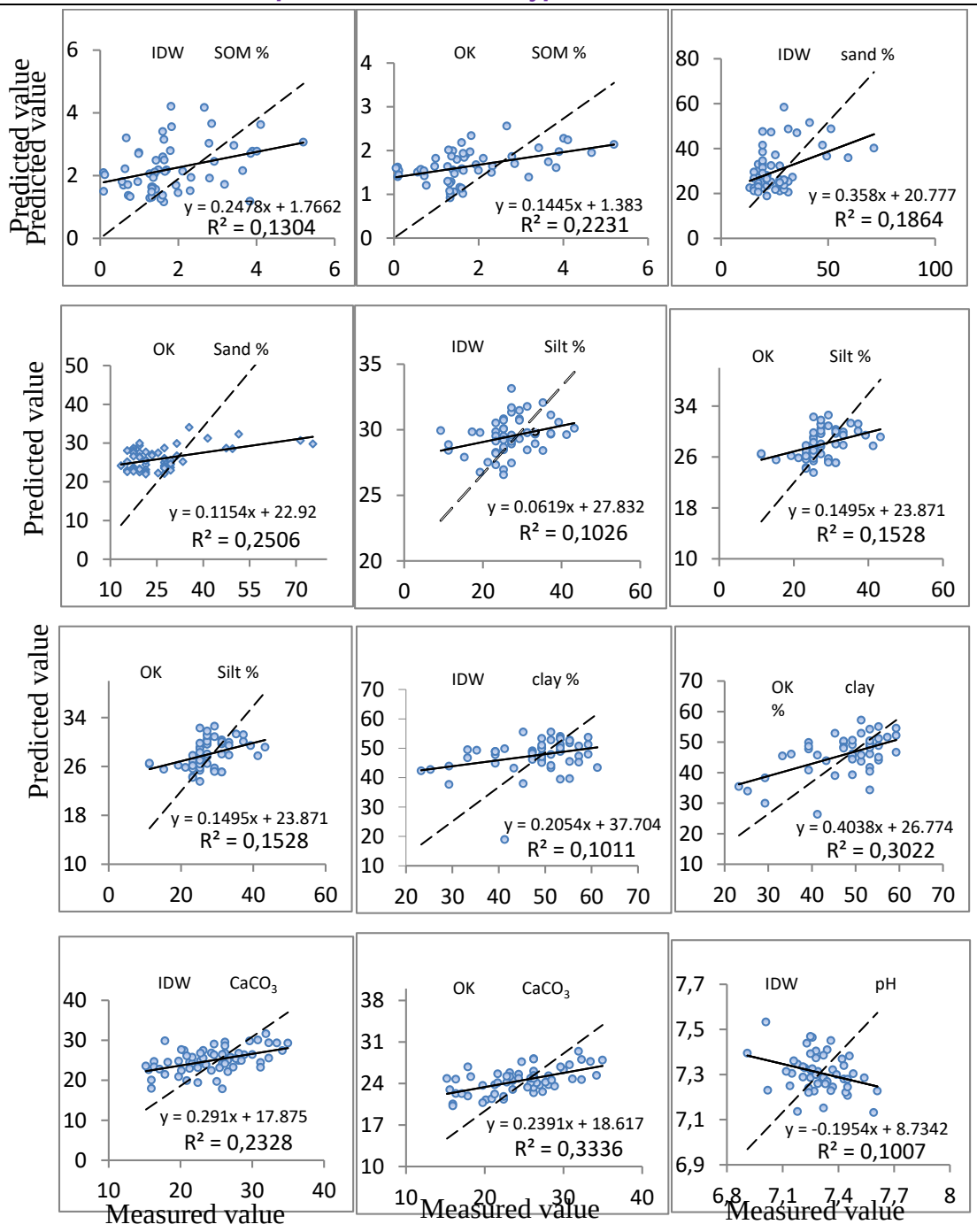
3.7 Assessing the accuracy of interpolation methods

Cross-validation indices for mean error (ME) and root mean square error (RMSE) were produced to evaluate the effectiveness of the interpolation techniques were shown in Table 6. The IDW and OK values for SOM, sand, silt clay, pH, EC and $CaCO_3$ content's ME values in the current study varied from -0.05, -0.38, 0.18, 0.19, 0.004, -5.6 and -0.01 to -0.02, -0.18, 0.11, 0.25, 0.0009, -1.9 and 0.05 respectively, which showed that the IDW and OK interpolations of soil properties contents were largely objective.

Table 6. Cross validation data of inverse distance weighting (IDW) and ordinary kriging (OK)

		IDW			**Ordinary kirging**	
soil variables	RMSE	ME	R^2	RMSE	ME	R^2
SOM	1.196990	-0.05967	0.13	1.186390	-0.02905	0.22
Sand	13.40463	-0.38105	0.18	13.94111	-0.18950	0.25
Silt	7.137663	0.18544	0.10	7.198315	0.11619	0.15
Clay	12.02058	0.19560	0.10	11.95589	0.25201	0.30
pH	0.142131	0.00472	0.10	0.134417	0.00096	0.20
EC	126.3248	-5.68329	0.30	126.2819	-1.96626	0.15
$CaCO_3$	4.516395	-0.0178	0.23	4.360255	-0.05591	0.33

The R^2 values of the OK method were slightly higher than those of the IDW method, indicating that the OK method was superior to the IDW method for the spatial interpolation of each soil properties except EC, even though there were no appreciable differences the RMSE values between the IDW and OK for each soil attributes. The R^2 values of the OK method were slightly higher than those of the IDW method, indicating that the OK method was superior to the IDW method for the spatial interpolation of each soil properties except EC shown in figure 7. The accurate for predicting of SOM, sand, silt, clay, pH and $CaCO_3$ were OK , showing R^2value were (0.22, 0.25, 0.15, 0.30, 0.20 and 0.33) respectively, and RMSE value were (1.18, 13.94, 7.19, 11.95, 0.13 and 4.36), however the IDW is the more accurate for EC (R^2 = 0.30 and RMSE = 126.32). The sampling allocations and the soil attributes' autocorrelation may be to blame for these conflicting results. It has been found that sample density, distribution, and applicability, as well as the validation procedure, had an impact on the R2 values of the predicted and measured values (Yao et al , 2019, Ye, et al., 2017). To the leave-one-out cross-validation method's design, additionally, we discovered that both interpolation techniques overestimated low measured values and underestimated high measured values. A regression created curve between measured values and predicted values from IDW and OK interpolation spanning 0-30 cm.


Predicted value
IDW SOM %
y = 0.2478x + 1.7662
R² = 0,1304
OK SOM %
y = 0.1445x + 1.383
R² = 0,2231
IDW sand %
y = 0.358x + 20.777
R² = 0,1864
OK Sand %
y = 0.1154x + 22.92
R² = 0,2506
IDW Silt %
y = 0.0619x + 27.832
R² = 0,1026
OK Silt %
y = 0.1495x + 23.871
R² = 0,1528
OK Silt %
y = 0.1495x + 23.871
R² = 0,1528
IDW clay %
y = 0.2054x + 37.704
R² = 0,1011
OK clay %
y = 0.4038x + 26.774
R² = 0,3022
IDW CaCO3
y = 0.291x + 17.875
R² = 0,2328
OK CaCO3
y = 0.2391x + 18.617
R² = 0,3336
IDW pH
y = -0.1954x + 8.7342
R² = 0,1007
Measured value
Measured value
Measured value

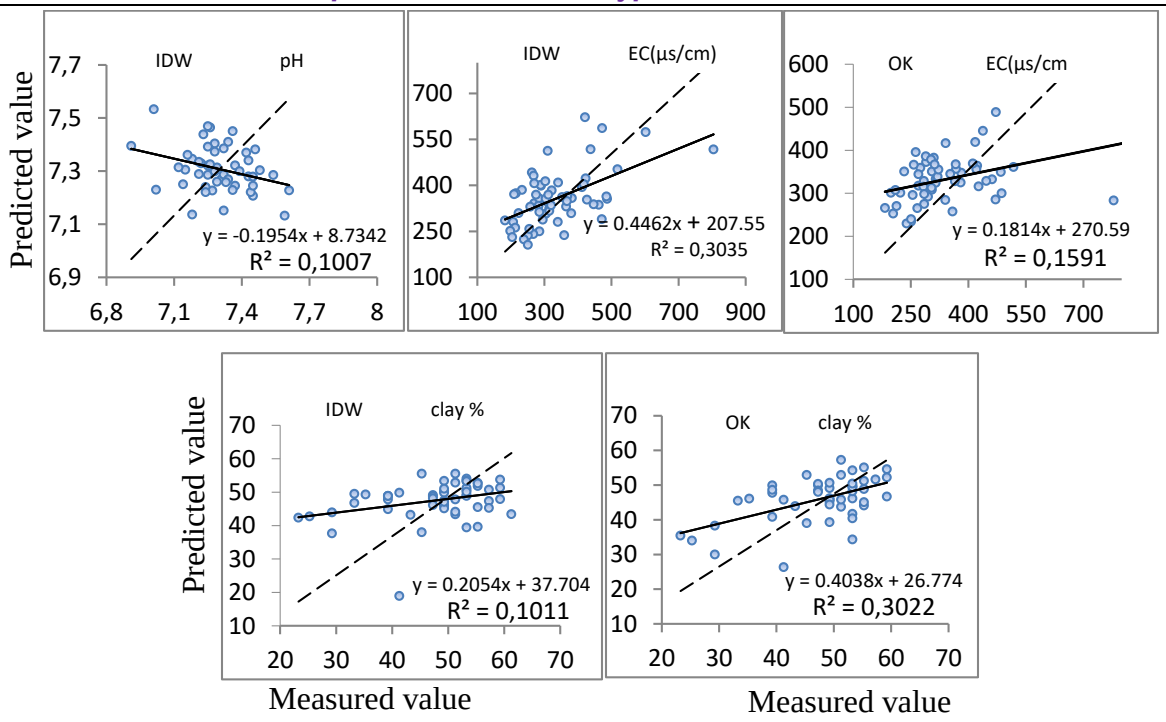


Figure 7.Scatterplots of the measured and predicted soil variables from validation sites using ordinary kriging (OK) and inverse distance weighting (IDW).

4. CONCLUSION

This study showed various approaches such as spectral processing and data analysis with an emphasis on the application of VNIR and geostatistical analysis for forecasting soil properties. Using hyperspectral VNIR spectroscopy, significant environmental soil factors as clay and sand concentration could be accurately predicted. Even though they were carried out at different scales and in different geographical areas, the results were generally consistent with those of the other investigations. In the case of calibration, PLSR was better for prediction results for almost all variables. However, when employing sample sets for calibration and validation, the outcomes of calibration were significantly different from validation. The range of data values and the degree of autocorrelation appear to have a greater impact on the validation models' accuracy than model choice or spectral preprocessing of the reflectance data. Strong and moderate spatial dependence in soil parameters might be explained using an exponential model as a best fit in semivariogram. However, the interpolation maps obtained from IDW were characterized by tiny patches, whereas those from OK were smoother. The spatial distributions of SOC derived from IDW and OK exhibited similar patterns, with a diminishing tendency from the southwest to the northeast. The derivation predicted by OK is more accurate than the IDW in all soil parameter except EC.

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ÖZET
Mercimek zengin protein içeriğine sahip önemli baklagil bitkisidir. Bu nedenle, araştırmacılar tarafından pek çok özelliği incelenmektedir. Bu çalışma 2022 yılında Bingöl Üniversitesi Ziraat Fakültesi Biyosistem Mühendisliği Bölümü ile Gaziantep Üniversitesi Islahiye Meslek Yüksekokuluna ait labaratuarlarda kontrollü şartlar altında gerçekleştirilmiştir. Çalışmada aynı yıl hasadı gerçekleşitirlmiş üç farklı mercimek çeşidine (Çağıl, Fırat87, Tigris) ait tohumların bazı fiziksel (uzunluk, genişlik, yüzey alan, ortalama aritmetik ve geometrik çap, küresellik, bin tane ağırlığı) ve fizyolojik (tohum nemi, çimlenme hızı (mean germination time), çimlenme gücü (germination percentage), çıkış hızı (mean emergence time), çıkış gücü (field emergence percentage), fide kök uzunluğu ve fide sap uzunluğu) özellikleri incelenmiştir. Elde edilen verilere göre tohumların ortalama 4.363 mm uzunluk, 4.167 mm genişlik, 14.874 mm^2 yüzey alan, 0.054 mm aritmetik çap, 1.075 mm geometrik çap, 0.155 küresellik ve 4.866 g bin tane ağırlığına sahip olduğu belirlenmiştir.

Anahtar Kelimeler: Mercimek, Tohum Özellikleri, Tohum Boyutları.

SOME FEATURES OF LENTILS VARIETIES

ABSTRACT
Lentil is an important legume plant with rich protein content. For this reason, many of its properties are being studied by researchers. This study was carried out under controlled conditions in the laboratories of Bingöl University Faculty of Agriculture Biosystem Engineering Department and Gaziantep University Islahiye Vocational School in 2022. In the study, seeds of three different lentil cultivars (Çağıl, Fırat87, Tigris) harvested in the same year, some physical (length, width, surface area, average arithmetic and geometric diameter, sphericity, thousand-seed weight) and physiological (seed moisture, mean germination time, germination percentage, mean emergence time, field emergence percentage, seedling root length and seedling stem length) were investigated. According to the data obtained, it was determined that the seeds had an average length of 4.363 mm, a width of 4.167 mm, a surface area of 14,874 mm2, an arithmetic diameter of 0.054 mm, a geometric diameter of 1.075 mm, a sphericity of 0.155 and a thousand grain weight of 4.866 g.

Keywords: Lentil, Seed features, Seed size.

INTRODUCTION

With the increase in the world population and the progress of industrialization, the food problem continues. In all developed and developing countries, food is mostly derived from plant sources. Among these sources, legumes are of great importance in nutrition, especially due to their high protein content (Uçar, 2021).

Legumes are defined as the *Leguminosae* family, which was first cultivated by humans 3000 years ago and consists of 650 genera and more than 18000 species. Commonly consumed legumes may vary from region to region or country to country, but most can be grown under a wide variety of ecological conditions, even in poor soils, without the application of fertilizers (Tiwari *et al.*, 2011). Turkey, on the other hand, is among the important producer countries in world pulses production and grows the most chickpeas and red lentils among legumes. Since the shape of lentil seeds resembles a lens, its Latin name (*Lens culinaris*) is inspired by this (Şahin, 2016). Shelled lentils; It is the dried grains of cultivated plants of the species *Lens esculenta, Moench* (*Lens culinaris,* Medic) from the legumes (*Leguminosae*) family. On the other hand, lentil kernels are defined as lentil grains that have been peeled, separated from each other and cleaned from their shells (Vavilov, 1951). Lentil varieties have a wide range of colors such as yellow, green, red, brown and black. However, approximately 80% of world lentil consumption is red cotyledon lentils, and 95% of consumers prefer to consume by separating the shelled part (Asif et al., 2013). The origin of lentils (*Lens culinaris* Medik.), which has been cultivated since ancient times (*var. macrosperma Bamg*.), is the Mediterranean Region; medium sized grains (*var. syriaca Bar*.) are from the mountainous regions in the interior of our country; It is stated that the origin of the small grains (*var. afganica Bar*.) is the high regions of Afghanistan, the Himalayan and Hindu Kush mountains (Vavilov, 1951).

Lentil in terms of botanical properties; It is an annual, multi-branched and long-day plant in the form of a bush. It is a pile rooted plant with developed lateral roots. In lentils with an average of 1 to 4 flowers, the colour of the flowers in clusters is usually pale blue - lilac veins, white in colour, very rarely light bluish and pink. Lentil, which is a compound-leaf plant, has an average of 10 – 16 leaflets. Hairless and roughly oblong, each pod (pouch) contains 1 to 2 (rarely 3) seeds. The seeds in question can be green, yellow, red, black in colour, or they can be speckled (spotted) grains. Lentil grain; the edges are thin, the middle is thick, and it has a unique flattened structure. The diameters of the grains vary between 2-9 mm and their thickness varies between 1.9-3.4 mm. Coloration is mostly brown or black with spots and speckles on the floor. While the surface of the grains is usually smooth, it is wrinkled in some coarse-grained varieties. The colour of the cotyledons in lentils is orange, red or green (Sharma and Emami, 2002; Biçer and Şakar, 2007). Each seed has its own characteristics. Even if it is the same seed, many environmental features such as climate and geographical features, soil and water quality affect these values. For this

reason, knowing the general characteristics of seeds (such as length, width, thickness), especially in processing with the help of mechanization, helps to choose the tools-machines or systems to be used correctly and thus to prevent product losses (Dumanoglu, 2020). In this study, it was aimed to determine some physical and physiological properties of lentils (*Lens culinaris* Medik.) seeds, which are important for our country.

In this study, some physical properties of Lentils seeds were determined. In plant production, the properties of the seed are used even in the stages of product processing from planting to harvest and afterward. Changes in seed properties were examined comparatively. The data obtained is intended to assist producers and researchers in production, storage, breeding research and mechanization applications.

MATERYAL VE METHOD

This study was carried out in the laboratories of Bingol University Faculty of Agriculture, Biosystem Engineering and Gaziantep University Islahiye Vocational School in 2022. In the study, seeds of three different lentil cultivars (Çağıl, Fırat87, Tigris) harvested in the same year, some physical (length, width, surface area, average arithmetic and geometric diameter, sphericity, thousand-seed weight) and physiological (seed moisture, mean germination time, germination percentage, mean emergence time, field emergence percentage, seedling root length and seedling stem length) were investigated.

Table 1. Classification of seeds according to their geometric and shape features

Seeds geometric features	**Grain width / Grain length (b/a) (mm)**	**Seeds shape characteristics**	**Length (a), Width (b), Thickness (c) (mm)**
Long	< 0.6	Round	a ≈ b ≈ c
Middle	0.6 – 0.7	Oval	a/3 < b ≈ c
Short	> 0.7	Long	c < b < a/3

In this study; 100 seeds were sampled randomly within these seeds of the examined species and the length, width and surface area properties of the seeds were determined with the help of the Nikon SMZ 745T stereo microscope, which has its own software. (Dumanoğlu & Geren, 2020; Dumanoğlu & Ekren, 2021; Dumanoğlu & Öztürk, 2021). Then, the characteristics of the seeds were determined according to the data obtained in Table 1. Then, the values obtained from here were placed in the formulas of average arithmetic and geometric diameter (mm) ((D:L+W)/2), sphericity (Φ: Do/L) and these data of seeds were determined (Alayunt, 2000; Kara, 2012; Mohsenin, 1970) (L: Seed length, W: Seed width, D: Average arithmetic diameter; Do: Average geometric diameter, Φ: Seed Sphericity). In addition, the counting and weighing processes of the seeds were completed in a way that the thousand grain weights were randomly.

Seed Moisture Content (SMC): Seed moisture content (mc) was determined by low constant temperature oven method. ISTA (2006) on two replicates of the seeds held at 103°C for 17 h, and expressed on a fresh weight basis.

Germination tests. Four replicates of 50 seeds per lot were placed in petri dishes on germination paper (Whatman No: 5, 9 cm) moistened with 5 ml distilled water. The petri dishes were then placed in polyethylene bags to prevent water loss during the test and held at 20 ± 1°C germinator. At the final count, (10 days) normal and abnormal seedlings were counted in the final count based on ISTA rules (ISTA 2020). Seed germination percentage was calculated by following equation (1).

$$\mathbf{SG = NS/TS \times 100} \quad (1)$$

Where, SG refers to standard germination percentage, NS refers to number of normal seedlings and TS refers to number of total seeds (Hu et al., 2015).

Mean Germination Time: During the germination test, radicle emergence (2 mm) was recorded every 24 hours until the end of the experiment (10^{th} day). The mean germination time (MGT) was calculated by (Ellis and Roberts, 1980).

$$\mathbf{MGT = (\sum (nd))/(\sum n)} \quad (2)$$

Where, "n" represents the number of newly germinated seeds having a 2 mm radicle; and "d" is the number of days, when the seeds were set to germinate.

Seedling Shoot/Root Length: At the end of the 10th day, ten seedlings are randomly selected from the seedlings representing the colony, the root and stem length (cm) of these seedlings are measured and the average seedling root and stem length is obtained.

Field Emergence Percentage (%): 50 seeds on a sandy-loam soil at a depth of 5 cm. Number of emerged seedlings in each plot were counted every day until the stable seedling establishment. At the end of test (40^{th}) day; seedling emergence was calculated.

Mean Emergence Time: In all four emergence experiments seedlings were assessed as emerged when the cotyledons had unfolded above the surface and the counts were made daily. This enabled the calculation of Mean Emergence Time (MET), using the same formula as for MGT above.

Seed Moisture Content (SMC): Seed moisture content (mc) was determined by the low constant temperature oven method. ISTA (2006) was expressed on a fresh weight basis and on two replicates of seeds kept at 103°C for 17 hours.

Germination Tests: Four replicates of 50 seeds per lot were placed in petri dishes on germination paper (Whatman No: 5, 9 cm) moistened with 5 ml of distilled water. Petri dishes were then placed in polyethylene bags to prevent water loss during testing and kept in a germinator at 20 ± 1°C. At the last count (day 10), normal and abnormal seedlings were counted according to ISTA rules (ISTA 2020). Seed germination percentage was calculated by the following equation (1).

$$SG = NS/TS \times 100 \quad (1)$$

SG stands for standard germination percentage, NS stands for normal seedling number, and TS stands for total seed number (Hu et al., 2015).

Mean Germination Time: During the germination test, radicle emergence (2 mm) was recorded every 24 hours until the end of the experiment (day 10). The mean germination time (MGT) was calculated by (Ellis and Roberts, 1980).

$$MGT = (\sum (nd))/(\sum n) \quad (2)$$

where "n" represents the number of newly germinated seeds with a root of 2 mm; and "d" is the number of days the seeds are set to germinate.

Seedling Shoot/Root Length: At the end of the 10th day, ten seedlings were randomly selected from the seedlings representing the colony, the root and stem length (cm) of these seedlings were measured and the average seedling root and stem length was obtained.

Field Emergence (%): 50 seeds sown in sandy-loam soil at a depth of 5 cm. The number of seedlings in each plot was counted every day until stable seedling formation. At the end of the test (40th day); seedling emergence was calculated.

Mean Emergence Time: In all four emergence experiments, seedlings were evaluated as revealed when the cotyledons opened above the surface and counts were made daily. This was used to calculate the Mean Emergence Time (MET) using the same formula as the MGT above.

RESULTS AND DISCUSSION

In this study, the seeds of three different lentil cultivars were examined. According to the data obtained; the average length of the tree lentil varieties is 4,363 mm; 4,215 mm width, 14,874 mm2 surface area, 4,264 mm arithmetic diameter, 26,800 mm geometric diameter and 6,090 sphericity values were determined. The average thousand grain weight of lentil varieties was measured as 36,340 g. When we examine the lentil varieties among themselves; ıt was found that the values were close to each other. Cagil variety in terms of length (4,373 mm), width (4,215 mm) and sphericity (6,175); Fırat variety stood out with its surface area (15,270mm2), average arithmetic diameter (4,297 mm), average geometric diameter (27,581 mm) and a thousand grain weight (41.560 g) (Figure 1).

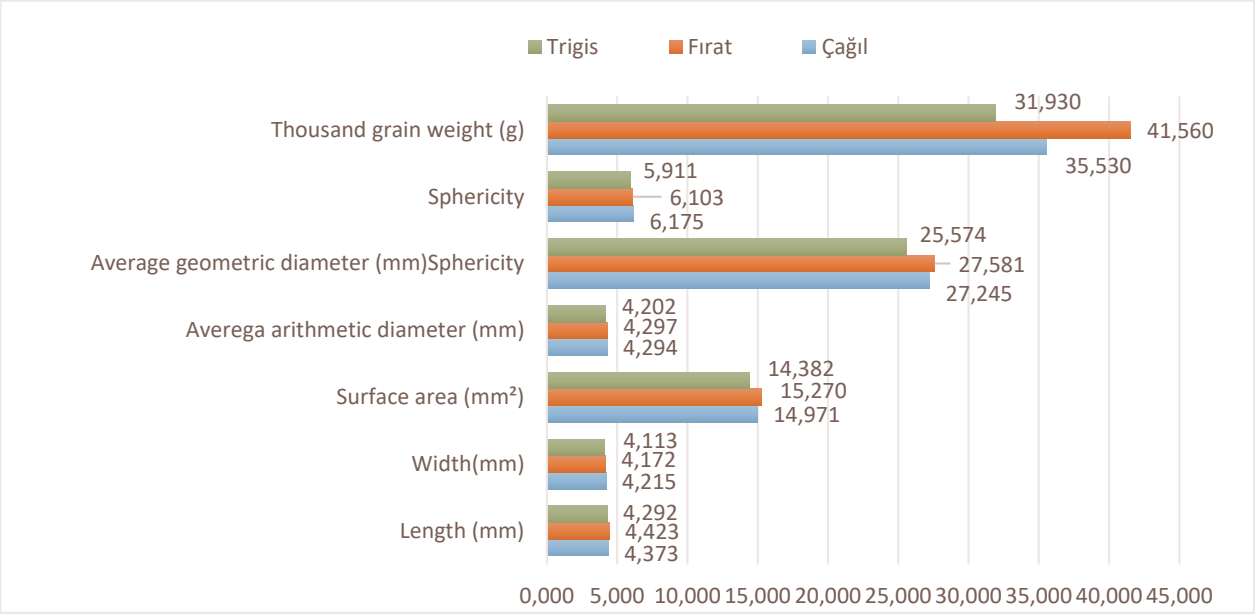


Figure 1. Values of some physical properties of seeds of *Lentil cultivars*

Table 1. Values of 1000 seed weight (g), seed moisture content, germination percentage, mean germination time (d), Emergence time (d) and field emergence

Seed lot Number	Variety	Year of Production	1000 seed weight (g)	Seed Moisture Content (%)	GP (%)	MGT (d)	MET (d)	FE (%)
1	TİGRİS	2014	31.93	7.17	100	1.28	12.54	89,00
2	FIRAT -87	2014	41.56	6.85	99,5	2.34	13.84	77,00
3	ÇAĞIL	2014	35.53	7.31	100	1.65	13.24	84,00
Mean			**36.34**	**7.11**	**99.83**	**1.75**	**13.54**	**88.33**

According to the Table 1; the average of 1000 seed weight of three lentil varieties is 36.34 g; 7,11% in seed moisture content, 99,83 in seed germination percentage, 1,75 day in mean germination time, 13,54 in mean emergence time and 88.33 in field emergence. When we examine the lentil varieties among themselves; It was found that the values were close to each other. Especially Tigris and Çağıl cultivars showed similar characteristics to each other.

As a result, in this study, some physical and physiological properties of the seeds of three different varieties of lentils, which have an important place in our diet, were investigated. It was determined that the seeds of these plants, which were harvested in the same year, obtained physical values close to each other. For this reason, it will be possible to grow these three different types of lentils by choosing the appropriate planting unit, especially in the lands to be planted with the help of mechanization. In addition, the evaluation of the data obtained in the breeding studies will be beneficial to the researchers who will work on this subject.

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İKTİSADİ PERSPEKTİFTEN ULUSLARARASI GÖÇ VE EKONOMİK ETKİLERİ

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ÖZET

Göç çok eski yıllardan beri insanların karşı karşıya kaldığı bir olgudur. Göçün dinamik yapıya sahip olması ve birçok faktörden etkilenmesi, çeşitli teorilerin inceleme konusu olmasına neden olmuştur. Başlangıçta hayat idamesi için göçle yüzleşmek zorunda kalan bireyler günümüz dünyasında daha iyi yaşam standartları elde etmek gibi çeşitli amaçlarla göçe başvurmaktadır. Zamanla yaşanan bu hareketlilik ülkelerde de birtakım değişim ve dönüşümleri beraberin de getirmektedir. Göç hareketlilikleri sonucu ortaya çıkan gelişmeler hem göç veren (kaynak) hem de göç alan (hedef) ülkelerin sosyo-kültürel, politik yapısından ekonomik unsurlara kadar birçok alan üzerin etkiler yaratmaktadır. Kuşkusuz göçün beraberinde getirdiği bu gelişmeler günümüz dünyasının kritik gündem maddeleri arasında yer alan sürdürülebilir kalkınmanın sağlanmasında da yadsınamaz bir önem taşımaktadır. Bu bağlamda ilgili çalışma kapsamında öncelikle göç olgusu iktisat temelli teoriler çerçevesin de incelenmektedir. Ardından söz konusu teorilerin içinde bulunduğumuz göç dalgası ekseninde değerlendirilmesi amaçlanmaktadır. Son olarak çalışmada, göçün kaynak ve hedef ülke ekonomilerinde neden olduğu faktörler olumlu ve olumsuz yönleri ile tartışılarak sürdürülebilir kalkınma hedefleri çerçevesinde çeşitli politika önerileri sunulmaktadır.

Anahtar Kelime: Göç Teorileri, Sürdürülebilir Kalkınma, Ekonomik Etkiler

INTERNATIONAL MIGRATION FROM AN ECONOMIC PERSPECTIVE AND ECONOMIC EFFECTS

ABSTRACT
Migration is a phenomenon that people have faced since ancient times. The fact that migration has a dynamic structure and is affected by many factors has caused various theories to be examined. In the beginning, individuals who had to face migration for their survival resorted to migration for various purposes such as obtaining better living standards in today's world. This mobility experienced in time brings with it some changes and transformations in countries. Developments resulting from migration movements have effects on many areas, from the socio-cultural, and political structure of both the sending (source) and receiving (target) countries to economic factors. Undoubtedly, these developments brought about by immigration are also of undeniable importance in ensuring sustainable development, which is among the critical agenda items of today's world. In this context, within the scope of the relevant study, firstly, the phenomenon of migration is examined within the framework of economics-based theories. Then, it is aimed to evaluate the aforementioned theories in the axis of the migration wave we are in.Finally, in the study, the factors caused by migration in the source and destination economies are discussed with their positive and negative aspects, and various policy recommendations are presented within the framework of sustainable development goals.

Keywords: Theories of Migration, Sustainable Development, Economic Effects

1. GİRİŞ

Küresel ekonominin önemli problemlerinden biri olan göç (Tutar, vd., 2012, s.108) insanlık tarihi kadar eski bir geçmişe sahiptir. Bireyi göçe zorlayan çeşitli faktörler zamanla yerini insanların özgür iradeleriyle yapmış oldukları seçimlere bırakmıştır. Örneğin ülke de meydana gelen savaş, kıtlık gibi problemlerle göç etmek zorunda kalan birey günümüzde daha iyi şartlarda çalışmak, kaliteli eğitim almak, çeşitli sosyal imkanlar elde etmek gibi yüksek refah seviyesine ulaşabilmek için göç etmeye başlamıştır. Ayrıca teknolojide yaşanan gelişmeler de küreselleşmeye hız kazandırarak Dünya'yı küçük bir köy haline getirmiş ve içerisinde bulunduğumuz 21. yy'ın göçler çağı olarak nitelendirilmesine neden olmuştur. Küresel entegrasyon süreçleri sonucu büyük çaplı insan hareketlerinin meydana gelmesi (Miller,1998, s.3) ülkeleri ekonomik, politik, sosyal ve kültürel yönden etkileyerek göç ve kalkınma olgusunu karşı karşıya getirmiştir. Uzun yıllar akademik camianın da tartışma konularından biri olan göç-kalkınma ilişkisi çeşitli kuruluşların devreye girmesi ile daha fazla gündem olmaya başlamış ve göçün meydana gelmesindeki temel faktörler hakkında bazı teorik modellerin oluşmasına neden olmuştur.

İnsanların kurulu düzenlerini terk etmek istemelerindeki nedenleri araştıran bu teoriler bireylerin göç güzergahları ve elde ettikleri kazançlarıyla da ilgilenmektedir (Akyıldız, 2016). Aynı zaman da bireyi göçe tetikleyen fırsatlar ile engeller kapsamında meydana gelip her disiplinin kendine özgü sınırlarını taşımaktadır (Özcan, 2017, s. 187). Ancak zamanla yaşanan gelişmeler birçok iddia ortaya atan bu teorilerin göç serüvenini açıklamada yetersiz kalmasına neden olmuş ve yeni teoriler gündeme getirmiştir.

Bu noktadan hareketle ilgili çalışmada öncelikle göç teorilerine kısaca yer verilerek ekonomik temelli teorilerin neler olduğuna değinilmektedir. Ardından göç olgusunun ekonomik yansımaları geniş bir çerçevede tartışılmaktadır. Gelecek nesillere yaşanılabilir bir ortam bırakmak adına verilen mücadelede sürdürülebilir kalkınma planlarına ulaşılmasında göç dalgaları değerlendirilecektir. Son olarak göç-kalkınma ilişkisinin pozitif dışsallık yaratabilmesi için bir takım politika önerilerine yer verilerek ilgili çalışma tamamlanacaktır.

2. EKONOMİK TEMELLİ GÖÇ TEORİLERİ

Her disiplinin farklı sınıflandırılmasına tabi olan teoriler genel çerçevede benzer olguları tartışmıştır. Ravenstein'ın çalışmasıyla başlayan açıklamalar günümüzde yeni göç teorileri kapsamında şekillenmeye başlamıştır. Göç hareketlerinin kökenini inceleyen bu teorilerin ortak paydası da insanların daha iyi şartlar da yaşama arzusudur (Akyıldız, 2016, s.132). İktisat disiplinin göçe ilişkin kurgulamış olduğu modeller ise genel çerçevede öngörüye dayalı olmaktadır (Özcan, 2017, s. 187).

Açıklamaların tamamen rasyonel birey odaklı olduğu iktisat temelli yaklaşımlara göre göç kararı mikro düzeyde yani birey ekseninde gerçekleşmektedir (Akyıldız, 2016, s.167-168). İnsanlar

daima kendileri için en iyi olanı tercih edip minimum maliyetle maksimum fayda peşinde koşmaktadır. Bu sebeple göç hareketlerinin referans noktası da göç maliyetinin getirisinden az olmasıdır. Rasyonel birey için emeğin kıt olduğu bölgelerdeki ücret yükseklikleri her zaman cazip fırsat olmaktadır. Çıkarcı kişi daha yüksek kazanç elde etmek için göç harekâtına katılmaktadır (Akyıldız, 2016, s.167-168). Bu noktada iktisatçılar için esas olan da göçün bireylere yüklemiş olduğu hem mali hem de beşerî sermayenin fayda ve maliyetlerinin araştırılmasıdır (Brettell ve Hollfield, 2000, s.8). Ayrıca çalışmalar da genellikle faydasını maksimize eden rasyonel bireyden hareketle incelenme eğilimindedir (Özcan, 2017, s. 187). Bu kapsam da yer alan seçilmiş ekonomik temelli göç teorileri;

2.1. Neoklasik Teori

Makro ve mikro perspektifte incelenen yaklaşım emek faktörünün hem arz hem de talep değişkenleri üzerinden şekillenmiştir. Makro ekonomik gelişmişlik teorisinde göç eyleminin temel sebebi ülkelerdeki sermaye ve emek dengesizliklerinden kaynaklanmaktadır (Görgün, 2018, s.1157). Ücretlerin düşük olması bireyleri daha iyi yaşam koşullarına sahip olabilmek için yeni yurt arayışına sokmuştur. Teoriye göre göçün kalkınma üzerindeki etkisi ise faktör hareketliliği sonucu dengeli büyüme ekseninde açıklanmıştır (Murat, 2020, s. 36). Mikro teori ise, bireyin kendisini esas almaktadır. Rasyonel bireyin göç kararı fayda ve maliyet hesaplamaları sonucu kişinin kendisi için en yüksek ücret düzeyinin söz konusu olduğu yerleri tercih etmeleri şeklinde gerçekleşmektedir (Sever, 2022, s. 227).

2.2. İkili Emek Piyasası Teorisi

Sanayileşmiş modern toplumlar da yerli halkın düşük ücretler nedeniyle işgücüne katılmamaları işçi taleplerini arttırmaktadır. Bu sebeple teori artan taleplerin göçle karşılanarak göç olgusunun meydana geldiğini savunmaktadır (Piore, 1980). Göç olgusu emek piyasası unsurları ile ilişkilendirilmekte ve göç eyleminin belirleyicisi ise emek arzının özellikleri üzerinde duran neoklasiklerin aksine emek talebiyle açıklanmaktadır (Murat, 2020, s. 39).

2.3. İtme-Çekme Teorisi

Ekonomik temellere dayanan bu yaklaşıma göre bireyi göçe tetikleyen unsurlar ülkelerdeki istihdam koşulları ve elde edecekleri kazanç faktörüdür. Bu unsurların olumlu olması bireyi göçe çekerken ülkelerdeki işsizlik, yüksek vergi gibi ekonomik açıdan olumsuzlukların yaşanması göç için itici faktör olmaktadır (Sever, 2022, s. 227) Ayrıca olumsuz çevre koşulları, sosyal ve siyasal nedenlerde göç serüvenini başlatan diğer itici unsurlar arasında yer almaktadır (Akyıldız, 2016, s. 141).

2.4. Yeni Emek Göçü Ekonomisi Teorisi

Neoklasik teorinin aksine göç hareketinin kararı yalnızca birey tarafından değil hane halkının da söz sahibi olarak müdahale etmesiyle verilmektedir. Bu nedenle aile bağlarının yanı sıra medeni

durum, çocuk sayısı, aile üyelerinin eğitim ve yaş seviyeleri gibi demografik faktörler de bireylerin göç eylemleri üzerinde doğrudan bir etkiye sahiptir (Görgün, 2018, s.1158).

2.5. İki Sektör Analizli Göç Teorisi

John Harris ve Micheal Todaro tarafından geliştirilen model de tarım sektöründe pozitif marjinal ürünler söz konusu iken bireylerin neden işsizlik seviyesi yüksek olan kente göç ettikleri sorgulanmıştır. İkili beklenen gelir farkından hareketle kırsal-kentsel göç sürecini değerlendirmiş ve kırsal bölgelerdeki beklenen gelirin kentlerden daha az olduğu süre zarfı boyunca göç hareketlerinin devam edeceği belirtilmiştir (Harris ve Todaro, 1970, s. 126-127).

3. GÖÇ HAREKETLERİNİN EKONOMİK YANSIMALARI

Göç yalnızca nüfus hareketi olmayıp birey ve toplum üzerinde büyük değişim ve dönüşümlere neden olan bir olgudur. Bu değişimler hem göç alan hem de menşei ülkenin demografik yapısı başta olmak üzere sosyo-kültürel, ekonomik ve siyasi kurumlarını etkilemektedir (Aldemir, 2008, s. 8). Ayrıca bu ülkeler arasında köprü görevi gören transit bölgelerde yaşanan hareketliliklerden etkilenen üçüncü bir kanal olmaktadır. Meydana gelen bu çift taraflı dönüşümler birçok fayda maliyet analizleri ile söz konusu ülkelerde farklılıklar yaratmaktadır (Yıldız, 2017, s.1832).

İktisadi bakış açısında göçün ülkelerde yarattığı ettiler değerlendirildiğinde her ne kadar göçün beraberinde bazı sorunlar getirdiği tespit edilse de etkili politikalar sayesinde ülkelerin kalkınmasında da önemli faktör olabileceği düşünülmektedir. Öncelikle söz konusu olumsuzluklar değerlendirildiğinde en büyük problemin iş gücü piyasasında olduğu görülmektedir. Hedef ülke de işgücü arzında yaşanan artışlar piyasa ücretlerinde düşüşlere neden olmaktadır. Ülkede ucuz işgücü arzı kayıt dışı işçi sınıfını meydana getirmekte böylece işletmelerde haksız rekabet olgusu gündem olmaya başlamaktadır (Arslan vd., 2016, s. 131). Kayıt dışı çalışmanın söz konusu olması ise ülkenin vergi oranlarındaki düşüşlerin tetiklenmesine neden olmaktadır. Bu sebeple maliyetlerde ortaya çıkan oynaklıklar fiyatlar genel seviyesine yansıyarak piyasalarda bozulmalar meydana getirmektedir (Altunç vd., 2017, s. 201). Diğer taraftan göçle birlikte yaşanan hızlı nüfus artışları domino etkisi yaratarak ülkeye kalabalıklaşma maliyetine mal olmaktadır. Nüfusun hızlı yükselişi sonucu bir taraftan tüketim artışları tetiklenirken diğer taraftan tasarruf düşüşleri yaşanmaktadır (Tutar, vd., 2012, s. 109). Aynı zaman da bu artışın konut kiralarına yansıması enflasyon olgusunu tetiklemektedir. Ayrıca iç talep seviyelerindeki hızlı artış ve talebin kısa vadede karşılanamaması da fiyatlar genel seviyesinin yükselişe geçmesine neden olmaktadır (Ünsal, 2019, s. 55). Ev sahibi ülkenin enflasyon olgusunu çözüme kavuşturamaması uzun vadede ülke parasının değersizleşmesini gündeme getirmektedir. Nüfustaki hızlı yükselişler zamanla kaynakların yetersiz kalmasına neden olup konut, hastane, okul gibi ihtiyaçları doğurarak devlet harcamalarında yeniden düzenleme yapılmasını mecbur kılmaktadır. Böylece sosyal sabit

sermaye yatırımlarının ihtiyaçları karşılayamaması da yeni harcama kalemleri meydana getirmektedir (Babacan, 2019, s.48).

Göçün kaynak ülke açısından meydana getirmiş olduğu olumsuzluk ise kaybetmiş olduğu iş gücüdür. Göçmenlerin geri ülkeye dönmeyecek olmasıyla yaşanan sermaye transferi kalkınma sürecini sekteye uğratmaktadır. Üretim de yaşanan aksaklıklar sonucu gelir düşüşleri ülke ekonomisin de olumsuz etkiler ortaya çıkartmaktadır (Kılıçaslan, 2016, s. 14). Göçle beraber nüfusun azalması yatırım seviyelerin de de durgunluğa neden olup zamanla vergi oranlarında düşüşler meydana getirmektedir (Ünsal, 2019, s.58). Ayrıca geri de kalanlar için büyük bir gelir kaynağı olan yurt dışı havalelerinden her ailenin eşit pay alamaması ülke de gelir dağılımı adaletsizliklerine neden olmaktadır (Üzümcü, 2020, s. 192).

Diğer taraftan göçle beraber ülke ekonomilerinde birtakım iyileşmeler yaşanarak sürdürülebilir kalkınma sürecine katkı sağlanabilmektedir. Özellikle yüksek sermaye sahibi olup emek kıtlığı yaşan ülkeler için göç, işgücü arzında artış sağlanması adına büyük bir avantajdır (Bayraklı, 2007, s. 41). Bu iyileşmeler göç alan ülkede görülebileceği gibi göç veren ülke ekonomileri içinde söz konusu olmaktadır. Örneğin göç veren ülkelere sağlanan döviz girişlerinin yatırıma dönüştürülmesi istihdam olanaklarını arttırmaktadır. Üretim de yaşanan artışlar milli gelir seviyesine yansıyarak ülkelerin büyüme süreçlerini desteklemektedir. Ayrıca döviz girişlerinin sağlanması ülkelerin dış ticaret politikalarında da olumlu iyileşmelere neden olmaktadır (Yıldız, 2017, s 1832). Göç hareketine katılan bireylerin işsizlik sınıfında yer alıyor olması ülkedeki bu göstergede düşüşlerin yaşanmasını meydana getirmektedir. Bu sayede işsizlik probleminin kısmen de olsa azalması kişi başına düşen gelirlerde bir miktar artışla sonuçlanmaktadır (Bayraklı, 2007, 42). Göçmenlerin donanımlı işgücü haline gelmesi göç veren ülkeler için beşerî sermaye kazancı olmaktadır. Bu sayede nitelikli işgücü kazanımı ülkede çıktı artışlarında olumlu sonuçlar doğurmaktadır (Yıldız, 2017, s. 1832). Ancak göçmenlerin yurtlarına geri dönmemeleri tam tersi bir süreci başlatarak göç ettikleri ülke ekonomileri için kazanımlar meydana getirmektedir. Çünkü göçmenlerin hedef ülke de kalıcı olması uzun vadede kaynaklarını yatırıma dönüştürerek kalkınma süreçlerini desteklemektedir. Aynı zamanda göç alan ülkelerde arz yönünden dar boğaz yaşanmaması talep artışları sonucu büyüme oranlarında yukarı yönlü hareketlilikler meydana getirmektedir (Üzümcü, 2020, s.194).

Öte yandan göç eylemine misafirlik eden transit ülke ekonomilerinde de birtakım değişmeler yaşanmaktadır. Jeopolitik konumu nedeniyle Türkiye de bu göç harekatlarında köprü vazifesi gören bir ülkedir. Özellikle Avrupa hayalleri ile yola çıkan göçmenler gerekli işlemleri yapmak, para biriktirmek gibi nedenlerle kısa süreli de olsa Türkiye başta olmak üzere geçiş ülkelerinin iş piyasalarında aktif rol oynamaktadır. Bu durum bir taraftan transit ülke ekonomilerinde işsizlik olgusunu tetiklerken diğer taraftan da kayıt dışı istihdamları gündeme getirmektedir. (Ünsal, 2019, s.58). Ayrıca gelirin kaçak yollarla elde edilmesi vergi kayıpları meydana getirerek ülkenin mali

yükünü arttırmaktadır. Zamanla göçmen kaçakçılığının yaşanması beraberinde güvenlik problemleri oluşturarak ülkenin harcama kalemlerinde artışlara neden olmaktadır (Aktaran: Yılmaz, 2014, s. 1697). Öte yandan göçmenlerle beraber talep artışlarının yaşanması da piyasaların hareketlenmesini tetikleyerek büyüme sürecine olumlu etki yaratmaktadır (Ünsal, 2019, s.58).

4.SÜRDÜRÜLEBİLİR KALKINMA EKSENİNDE GÖÇ DALGALARININ DEĞERLENDİRİLMESİ

Kalkınma ülkenin ekonomik yönden büyümesine ek olarak çevresel ve sosyo-kültürel yönden de gelişim göstermesidir. (Genç vd., 2019, s. 489). Kuşkusuz bu gelişmelerin temel kaynaklarından olan insan oğlunun kitlesel hareketleri ülkelerde yaşanan değişim ve dönüşümleri beraberin de getirmektedir. Bu bağlamda göç literatüründe önemli bir yeri olan kalkınma konusu uzun yıllar akademik araştırmaların tartışma konularından birisi olmuştur (Memişoğlu ve Yiğit, 2019). Özellikle iktisat alan yazında Lewis dönemine kadar uzanan tartışmalar 1990lı yıllardan itibaren gerek küreselleşme gerekse de dijitalleşme çağının etkisiyle akademik camianın yeniden önemli gündem maddelerinden birisi olmayı başarmıştır (Çelikkaya ve Atilla, 2020, s. 81). Tarihi serüven içerisinde ise göç-kalkınma ilişkisinin farklı kulvarlarda tartışıldığı tespit edilmiştir. Özellikle kırılma noktası olarak kabul edilen 1973 öncesi hâkim olan neoklasik göç teoriler bu ilişkiye yönelik iyimser bir bakış açısı sergilemiştir. İyimser yaklaşıma göre göç hem menşei hem de hedef ülke de optimal kaynak dağılımın gerçekleşmesini sağlayarak dengeli büyüme meydana getirmektedir (Haas, 2010). İşlevselciliğin yanı sıra beyin göçü, menşei ülkeye aktarılan döviz ve sermaye gibi çift taraflı transferler ülkelerin kalkınmasında çok önemli potansiyel unsurlar olarak kabul edilmektedir (Haas, 2010; Gökbayrak, 2008, s.67). Ancak 1973-1990 dönemi iyimserliğin yerini alan karamsar yaklaşımlar ortaya çıkmış ve göç hareketlerinin nitelikli iş gücü kaybına neden olacağı gerekçesi ile kalkınma üzerinde negatif etki yaratacağı gündeme gelmiştir (Gökbayrak, 2008, s. 67). Bu dönemde hâkim olan yapısalcı görüş göçü kaçış olarak değerlendirmiştir. Ayrıca teoriye göre göç olgusu az gelişmişliğin bir göstergesi olup menşei ülkenin içinde olduğu bataklığa saplanmasına neden olmuştur (Memişoğlu ve Yiğit, 2019, s.47). Ülkelerin gelişmesini engelleyen temel faktörün beyin göçü olduğunu kabul eden yaklaşım nitelikli işgücü kaybının azgelişmişliği besleyerek istikrarsız büyümeye neden olduğunu kabul etmiştir (Aktaş, 2014, s. 38). Sosyal eşitsizliğin hızla artış gösterdiği belirtilerek işçi havalelerine yönelikte zıt görüşler yaygınlaşmış bu durumlarda kalkınmanın önündeki en büyük engellerden biri olarak değerlendirilmiştir. Çünkü işçi havaleleri menşei ülkede bağımlılık olgusunu ortaya çıkartarak insanları tüketime bağımlı hale getirmektedir. Böylece artan tüketim harcamaları ülkelerde enflasyon olgusunun körüklenmesine neden olmaktadır (Haas, 2010). 90lı yıllara gelindiğinde ise gerek işçi havalelerindeki artışlar gerekse de uluslararası siyasette yaşanan

gelişmeler iyimser bakış açısının tekrardan yeşermesine neden olmuştur (Memişoğlu ve Yiğit, 2019, s.47). Küreselleşmenin hızla artış göstermesi ve dijital çağın tüm dünyayı ele geçirmesi alan yazında göç kalkınma ikilisini yeniden tartışma maddesi yapmıştır (Çelikkaya ve Atilla, 2020, s. 81). Ayrıca uluslararası arenada meydana gelen sosyo-ekonomik hareketlilik göç olgusunun küresel ortamda kalkınma ile ilişkilendirilmesine neden olmuştur (Memişoğlu ve Yiğit, 2019, s.40).

2009 yılında Birleşmiş Milletler Kalkınma Programı (UNDP) ve Dünya Bankası tarafından göçün kalkınma üzerinde yarattığı pozitif faktörlere yer verilmiştir (Genç vd., 2019, s.493). Aynı zaman da New York Bildirisinde de göçün olumlu etkiler yaratacağına dair açıklamaların yapılması konunun önemini daha da arttırmıştır (Memişoğlu ve Yiğit, 2019, s.40). Diğer taraftan Birleşmiş Milletler tarafından yürürlüğe konulan "2030 Gündemi" nde ilk kez göçün sürdürülebilir kalkınmadaki öneminin altı çizilmiştir. Örgüt gelecek nesillere elverişli bir çevre bırakmak için belirlemiş olduğu amaçlarda göç etkisine de yer vermiştir. Çünkü bireylerin göç etme nedenleri yoksulluktan, doğal felaketlerden kurtulmak gibi kalkınmanın bel kemiği olan konuları kapsamaktadır. Bunun üzerine yapılan çeşitli teorik ve ampirik incelemeler de göçün temel hedeflerinin sürdürülebilir kalkınma amaçları ile eşleştiğini ortaya çıkartmıştır. Göçle beraber beşerî sermayenin gelişmesi, sağlık sektöründeki iş gücü açığının giderilmesi, işçi dövizleri ile ülkelerdeki eşitsizliğin azaltılması da sürdürülebilir kalkınma amaçlarına ulaşılmasına büyük katkı sağlamaktadır. Bu sayede göç yalnızca hedef ülkenin kalkınma politikasını olumlu etkilememekte menşei ülkenin de kalkınmasına aracı olmaktadır (Kayaoğlu, 2022, s. 52-53) Ancak göçün kalkınmaya katkı sağlayabilmesi için her iki ülke de de bazı düzenlemelerin yapılması gerekmektedir. Örneğin işçi dövizlerinin yatırım amaçlı kullanılmaması, kaynak ülkede insanları tembelliğe itmesi ülkenin kalkınmasından ziyade fakirleşmeye doğru gitmesine neden olmaktır. Bu konuda yetkili kişilerin devreye girerek gerekli yaptırımlarla olaya müdahale etmesi sonucu göç, sürdürülebilir kalkınma hedeflerine ulaşma sürecine katkı sağlayacaktır.

SONUÇ

Sürdürülebilir kalkınma tüm dünyayı ilgilendiren evrensel bir meseledir. Ülkelerin bu hedeflere ulaşması temel iktisadi problemlerden olan kıt kaynakların en verimli şekilde değerlendirilmesiyle gerçekleşecektir. Göç olgusu da hedeflere ulaşma noktasın da rol oynayan önemli bir faktördür. Kuşkusuz göçle beraber ekonomik, sosyo-kültürel ve çevresel yapı da birtakım değişiklikler gündeme gelir. Ancak insan hareketliliğinin kontrol altın da olmaması dengesiz kalkınma problemlerine neden olabilir. Özellikle göçmenlerin menşei ülke için gerek finansal gerekse de bilgi, tecrübe, deneyim gibi finansal olmayan aktarımlarını sekteye uğratması ülkelerde dengesiz büyüme, eşitsizlik ve fakirleşmeyi tetikler. Ayrıca ulusal kalkınmanın sağlanması için göçmen

havalelerinin de tek gelir kaynağı olarak görülmesi bireylerin üretim sürecinde aktif rol almasını engelleyebilir.

Öte yandan hedef ülkenin iş gücü açığını kapatan, beyin göçleri ile teknolojik gelişimlere aracı olan göçmenler doğru politika uygulamaları sayesinde menşei ülkelerde bir takım gelişim yaratabilir. Böylece kaynakların yatırıma dönüştürülmesi için gerek menşei gerekse hedef ülkelerdeki yetkili kişilerin alt yapı destekleri sağlamaları uzun vadede her iki ülke için de önemli çıktılar meydana getirerek kalkınma sürecine destek olabilir.

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DETERMINANTS OF PROVINCIAL DIFFERENCES IN AVERAGE LIFE SATISFACTION: CASE OF TURKEY

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ABSTRACT
Welfare measurement is always a central issue in economics, but traditional urban economic theory, which focuses on housing costs in city centers, real estate pricing and accessibility to market, ignores many factors that affect welfare in urban life. At this point, the happiness economics provides a more favorable ground for searching social welfare, by emphasizing the effects of non-market factors and externalities that are important to welfare. In this study, "life satisfaction" is chosen as the measure of welfare and the factors determining the differences in the average life satisfaction levels of the cities in Turkey are investigated. For this purpose, provincial average life satisfaction data obtained from the Life Satisfaction Survey in Turkey, and the other provincial level data collected from the Regional Statistics Module of TURKSTAT are used. Model 1 is created to look at the effects of the variables on life satisfaction on their own, and Model 2 is created to see the effects of the interactions of some variables. Results of least squares estimations reveal that the level of life satisfaction in a city is determined by demographic, economic, social and environmental factors and by their interactions. The city's size, security, social life, degree of hope, distribution of age groups, infrastructure, noise level and the amount of green spaces are found to be important factors in determining life satisfaction. On the other hand, among economic factors, while the per capita income is found to be insignificant, the unemployment rate and the ratio of those who cannot meet their basic needs have a negative and significant effect on the average life satisfaction of the city.

Keywords: Life satisfaction, basic needs, urban theory, happiness economics, urban life, wellbeing, quality of life

1. INTRODUCTION

Maximizing happiness is at the core of economic thought, part of a long philosophical tradition that begins with the works of old hedonist philosophers. This idea is found primarily in the basis of modern economists' models that maximize utility and social welfare functions. Today, economists are trying to directly predict utility, rather than using consumption as a sign of welfare. The happiness economy comes into play here as an approach that combines the techniques used by economists with the more commonly used techniques by psychologists for the evaluation of welfare. The happiness economics is a field that is concerned with determining the sources of happiness of individuals and in particular determining how economic values are effective among these determinants. Econometric analysis is used to discover which factors increase and decrease human well-being and quality of life. The data is based on the happiness data reported by hundreds of thousands of people in a country. In this way, happiness economics rests on the broader utility concepts as compared to the conventional economy, emphasizing the role of non-income factors affecting welfare.

Welfare measurement is always a central issue in economics, but in recent years a wider perspective for welfare measurement has emerged. As a welfare measure, income and growth are insufficient because it ignores many non-market factors that could explain individual and social well-being, including quality of life in urban areas (Deaton, 2008). The quality of life can be defined as the sum of the biological states, lifestyles, associations, and all quantitative and qualitative values of the environment they are in. While the traditional urban economic theory emphasizes the balance between housing costs in the city center and accessibility to the market (employment and the like), the other aspects of city life that are ignored such as environmental quality, open spaces and the externalities like congestion and agglomeration are important factors determining welfare (Brereton and others, 2008). At this point, the happiness economy offers a suitable instrument for exploring the effects of externalities and other factors important to welfare. The subjective approach to utility provides an efficient complementary way to study the world. The corresponding term in the psychology literature to the concept known as happiness among the people is subjective well-being. The notion of subjective well-being is a very broad concept that encompasses development including the environment, health, shelter, leisure time, income, social relations, marriage and family life. (Van Praag & Carbonell, 2004). First, subjective well-being is a far more comprehensive concept than decision-utility; it contains both experienced utility and procedural utility, and is the ultimate goal for many people. This is not the case for job security, status, power, and other things we can ask for, especially money (income). We want them not for their own sake, but to give ourselves more happiness. Second, the concept of subjective happiness allows us to capture the welfare of people directly. This provides a basis for explicit testing of fundamental assumptions and propositions in economic theory. (Frey and

Stutzer, 2002) Direct reporting of subjective well-being can play a beneficial role in measuring consumer preferences and social well-being if it can be done reliably. (Kahneman and Kruger, 2006)

The increasingly precise credibility of experimental psychology has helped to create a measurable utility idea which is acceptable for economists (Ferrer-i-Carbonell and Frijters, 2004, Frey and Stutzer, 2002). Methods have been developed, tested and calibrated to accurately measure happiness levels among individuals and even cultures. According to Ng (1999), we are now closer than we could imagine to developing a cardinal benefit meter like Bentham's hedonometer. The existence of robust, scientific utility measures that accompany increasing social, environmental and economic indicators make it possible to identify economic policies that will directly develop social welfare. (Gowdy, 2005)

In the First World Happiness Report, five main factors were found to account for more than 80% of differences in terms of average happiness (measured by individual assessments of human quality of life) between countries. Two of them - average per capita GDP and average healthy life expectancy - are also in the United Nations Development Program (UNDP) Human Development Index. But the other three which are being free to take key life decisions and the absence of corruption in the business world and in the state are more important when describing happiness differences. (Helliwell, 2014: 2) Apart from the studies on the differences between the countries, there are also considerable differences in the level of happiness among the regions and cities in the same country. Investigation of the causes of these differences can play an important role in determining the policies that will improve the welfare of the society. With this in mind, it is investigated which factors determine the differences between the happiness levels of the 81 provinces in Turkey and which factors determine the quality of life in a city.

2. LITERATURE REVIEW

One of the studies investigating regional happiness level differences, Moro et al. (2008), proposed an alternative set of indices based on subjective well-being (SWB) data, depending on the facilities at the regional level. SWB indicators provide a self-reported, direct assessment of life satisfaction and can be used to rank the quality of life in places where housing prices and wages are unavailable or unreliable. Using the SWB data from Ireland, they rated the quality of life in the region in three different ways: by using a simple average of the SWB levels of the regions, by using a conditional average of SWB based on individual characteristics and the environmental conditions of the region, by using the weighted average of the environmental assets per locality based on the marginal rate of substitution between income and facilities. The results show that there is a very high correlation between the three indices and that the differences between life satisfaction levels in different locations are not random, but are driven by specific features in that location.

According to Brereton et al. (2008), by the help of geographical information systems (GIS), taking into account characteristics such as climate, environment and urban conditions at individual and local level, is crucial in analyzing subjective well-being. It has shown that factors specific to location have a direct effect on life satisfaction. However, most importantly, the explanatory power of the happiness function increases significantly when spatial variables are included, and this emphasizes the importance of spatial dimension in determining welfare.

Aslam and Corrado (2011) present a regional study on subjective well-being in Europe and find a statistically significant relationship between subjective well-being and regional factors. Sanders (2011) tried to predict the impact of living in an urban area on happiness. In the study conducted by US GSS data, higher happiness levels were observed in the states with less urban areas. Moreover, participants in the northern regions have been shown to be less happy. Similarly Okulicz-Kozaryn (2017) again using GSS data, investigated the relation between the subjective well-being or happiness and the size of a place. According to this, the proportion of people who say that they are unhappy increases with the size of a place, and this increase reaches a significant level when the population exceeds a few hundred thousand.

Ferraira et al. (2013) analyzes the relationship between air quality and subjective well-being in Europe. They concluded that SO2 concentrations had a strong negative impact on self-reported life satisfaction, using a unique data set that combined the three waves of the European Social Survey with a new set of data on environmental quality, including SO2 concentrations in Europe and regional climate at a regional level.

Węziak-Białowolska (2016) investigated aspects of urban living quality in European cities. For this purpose, the Flash Eurobarometer quality of life questionnaire in European cities was used. The survey presents the opinions of 41 thousand residents from 79 European cities and analyzes the mutual relationship between citizen characteristics, neighborhood and city contexts, and life satisfaction in a city. The study analyzed the following potentially relevant dimensions of life in the city: (1) availability of services and social aspects in the cities and in the periphery; (2) demographic factors, and (3) urban characteristics such as economic development, labor market pressure, size, location, quality and safety of institutions. Finally, it is seen that in a city with a high percentage of those who are satisfied with the safety of the city, citizens are happier.

Most people in Europe live in urban areas. For these people, the urban green space is an important element of welfare, but often it is inadequate. Bertram and Rehdanz (2015) used life satisfaction and the two separate measures of green areas to discover how urban green space affects the welfare of the German inhabitants of Berlin. Spatially, they have combined open survey data with spatially fragmented GIS data on the urban green space and observed that the distance to the urban green space is a significant inverted U-shaped effect on life satisfaction.

Brown et al (2016) analyzed the relationship between factors such as population density and land use and life satisfaction in 33 cities scattered in five OECD countries. They have created a unique data set that combines a household survey of environmental attitudes and behaviors in these countries and geographical data on a number of indicators related to the urban area. In support of the standard urban economic theory, the household size of households and distances to the urban core were found to be important for life satisfaction. A new finding of analysis is that households' disintegration of local land use in housing is strongly and negatively related to life satisfaction. In addition, there is clear evidence that city centering (the relative proportion of population living in the nucleus) reduces the average life satisfaction of individuals residing inside and outside the core.

Köksal and Şahin (2015) study's data was obtained from the Life Satisfaction Survey conducted in Turkey in 2012. The sample of the research is composed of 7956 people participating in this research. Hierarchical regression analysis was used to determine the individual and co-effectiveness of income and income comparisons on individual happiness. According to the results of the analysis, the effect of income on happiness is weakening as individuals increase their perception of their level of welfare according to others. These findings are important in terms of revealing that individuals are not happy even in situations of high welfare perception.

Eren and Aşıcı (2016) examined the factors determining happiness in Turkey between 2004 and 2013 based on TURKSTAT Life Satisfaction Survey. The findings obtained by using a data set obtained from city-level surveys in 2013 are as follows: degree of hope that was not evaluated in previous studies is found to be the strongest determinant of happiness. According to this study, job satisfaction is as important as employment. Similarly, being married makes people happy only if they are satisfied with their marriage. Education only brings more happiness if it helps to increase income. Moreover, the results support the Easterlin Paradox. Eren and Aşıcı (2016) concentrated on individual characteristics rather than regional characteristics by analyzing individual happiness data. This study focuses on the regional factors that determine the average life satisfaction in the provinces.

3. DATA AND METHOD

In this study, provincial level of happiness data obtained from the Life Satisfaction Survey conducted in Turkey in 2013 and the provincial level data collected from the Regional Statistics module of TURKSTAT were used. In previous studies, all of the variables that were proven significant and likely to affect life satisfaction are tried to be included in the model. In the micro-econometric function, the individual's true utility is unobservable; hence we use self-reported well-being as a proxy. In this study, life satisfaction data is used instead of instant happiness as

the measure of happiness. Life satisfaction is a concept based on more concrete principles than happiness, by comparing the feelings of quality of life faced by a person and his expectations. In order to measure life satisfaction, the question of "How happy are you when you think of your life as a whole" was asked to the participants of the questionnaire to make a choice from 5 (very happy) to 1 (very unhappy). For the level of happiness in the city, the average of life satisfaction scores of those living in the city who participated in the questionnaire is taken. Hence, "Happiness" measured by average life satisfaction in the city as dependent variable, econometric model is given below.

$Happiness_i = \beta_0 + \beta_1 \log(GDP_i) + \beta_2 Gini_i + \beta_3 Unemployed_i + \beta_4 Income_i + \beta_5 Needy_i + \beta_6 0_14_i + \beta_7 65upper_i + \beta_8 Life_i + \beta_9 College_i + \beta_{10} Murder_i + \beta_{11} Internet_i + \beta_{12} Social_life_i + \beta_{13} Politic_i + \beta_{14} Hope_i + \beta_{15} Noise_i + \beta_{16} Green_i + \beta_{17} Metropol_i$ .....(Model 1) i=1,2…..81

In order to control the robustness of Model 1, Model 2 was created by including the interactions of some of the variables.

$Happiness_i = \beta_0 + \beta_1 \log(GDP_i) + \beta_2 Gini_i + \beta_3 Unemployed_i + \beta_4 Income_i*Needy_i + \beta_5 Income_i*Unemployed_i + \beta_6 0_14_i + \beta_7 65upper_i + \beta_8 Life_i + \beta_9 College_i + \beta_{10} Murder_i + \beta_{11} Internet_i + \beta_{12} Social_life_i + \beta_{13} Politic_i + \beta_{14} Hope_i + \beta_{15} Noise_i + \beta_{16} Green_i + \beta_{17} Green_i*Metropol_i$ .....(Model 2) i=1,2…..81

The descriptions of the variables in the model are given in Table 1. Average life satisfaction level in the city, which is called "Happiness", is the dependent variable in the model.

Table 1 Description of the variables

VARIABLE	DESCRIPTION
Happiness	Average Life Satisfaction level in city i
Log(GDP)	Per capita GDP in city i
Gini	Gini coefficient
Unemployed	Unemployment rate in the city i (%)
Income	Percentage of households in middle or higher income groups (%)
Needy	Percentage of households declaring to fail on meeting basic needs (%)
0_14	0-14 age population (%)
65upper	65 and upper age population (%)
Life	Life expectation at birth in city i
College	Percentage of higher education graduates in city i (%)
Murder	Murder rate (per million people)
Internet	Number of internet subscriptions (%)
Social_life	Satisfaction rate with social life (%)
Politic	Rate of membership to political parties (%)
Hope	Rate of people who are hopeful about future (%)
Noise	Percentage of households having noise problems in city i (%)
Green	Percentage of people who are satisfied with green spaces (%)
Metropol	City has a population more than 500.000 (0-1)

4. ESTIMATION RESULTS

The estimates of the coefficients of the variables determining the overall happiness level by using the least squares method, are as shown in Table 2 for Model 1 and Model 2, using provincial level data of 81 cities. Interactions of variables are not included in Model 1. According to the estimation results of Model 1, the effect of provincial level economic factors such as per capita GDP, Gini coefficient, unemployment rate and the percentage of households in middle or higher income groups on happiness is insignificant. In addition, no significant relationship is found between perceived welfare level and happiness. Only the rate of those who say that they cannot meet their basic needs has a negative and significant influence on the level of happiness. While other economic variables related to income are insignificant, the rate of people stating that they cannot meet their basic needs being significant indicates that there is no definite positive relationship between income level and happiness in general and meeting basic needs is essential for happiness, supporting the Easterlin paradox.

Table 2 Estimation Results of Model 1 and Model 2

	MODEL 1		MODEL 2	
Variable	Coefficient	T stat	Coefficient	T stat
C	3.455995***	4.284320	3.334682***	4.575287
LOG(GDP)	-0.027549	-0.770637	-0.015023	-0.463252
GINI	-0.360664	-1.048790	-0.385536	-1.241675
UNEMPLOYED	0.232474	0.886576	-3.039229***	-3.497367
INCOME	0.051397	0.294197	-0.823004***	-3.008994
NEEDY	-0.570843***	-3.466676	-0.575279***	-3.870002
INCOME*UNEMPLOYED			10.04731***	3.912840
METROPOL	0.154534***	3.260004	0.146432***	3.417983
0_14	2.206233***	4.004833	2.147030***	4.315378
65UPPER	3.323079***	4.199158	2.870870***	3.967104
LIFE	-0.007823	-0.777273	-0.001392	-0.150808
COLLEGE	-0.206881	-0.329677	-0.659800	-1.141161
MURDER	-0.164759**	-2.020961	-0.181096**	-2.456785
INTERNET	1.412262**	2.410639	1.263795**	2.383566
SOCIAL_LIFE	0.355850***	3.307503	0.335337***	3.447714
POLITIC	-0.327519	-1.610150	-0.485240**	-2.581162
HOPE	0.801607***	3.396902	0.759099***	3.558809
NOISE	-0.670080***	-2.769298	-0.751241***	-3.423904
GREEN	-0.376862***	-4.053567	-0.323492***	-3.804581
GREEN*METROPOL	0.154534***	3.260004	0.146432***	3.417983
Number of observations: 81			Number of observations: 81	
R^2 : 0,78			R^2 : 0,82	

Note: *significant at 10% level; **significant at 5% level; ***significant at 1% level.

In Model 2, estimates are made by including the interaction terms of the different variables in the model to observe their effects together beside individual effects on happiness. As a result, among economic variables, the interaction of “Income” and “Unemployed” variables is found to be significant and adding this interaction term into model increases the R^2 value. The unemployment

rate has been observed to have a negative and significant effect, as it is expected, after the inclusion of Income*Unemployed interaction term to the model. Happiness level becomes lower as the unemployment rate gets higher. However, Income*Unemployed interaction has been found to have a positive and significant effect on happiness level, implying that when both ratio of upper income groups and the unemployment rate is high, negative influence of unemployment on happiness will be lower. The reason for this is probably the fact that when majority of the population has middle or upper income, those who have higher income supports the unemployed household members, decreasing the negative effect of unemployment on happiness. In the literature, it is also stated that the negative effect of unemployment on happiness diminishes as the ratio of unemployed increases.

Following Eren and Aşıcı (2016), the degree of hope is also included as an important variable that determines the level of happiness, as it is a sign of mental well-being. Again parallel to this study, it is seen that the proportion of those who are hopeful about future, has a positive and significant effect on the happiness level of the province.

Among the city specific factors, "Metropol" showing that the population of the city is over 500.000 is found to have a positive and significant effect on the happiness level. This seems to contradict the findings of earlier studies in the literature. However, it is expected that such a difference will be observed because the studies in the literature are generally done in developed countries. It is also understandable that the "Metropol" variable has a positive effect on happiness, when we think a large number of facilities found even in small cities in developed countries, are found only in metropolis in developing countries like Turkey. Apart from that, demographic variables like the proportion of 0-14 age group and the over 65 age group have a positive and significant effect on the general happiness level. The expectation of a higher level of happiness in places where children and elderly populations are high can be explained by the U-shaped relationship, which is generally found in the literature between age and happiness. If people are happier in childhood and older ages compared to middle age, the happiness level will increase as the proportion of children and elderly population increases.

“Life” and “College” variables, which are modeled in terms of showing the level of health and education in the city respectively, have negative sign but they are found insignificant. It has been observed that there is generally a negative relationship between education and happiness in previous studies. Some studies state that education only rises happiness if it rises the income.

Feeling safe in the living environment is a necessary condition for happiness. Murder rate, which is one of the data showing the safety level of the city, has a negative and significant relationship with the happiness level in the city as expected. As Węziak-Białowolska (2016) has shown, happiness is expected to be higher in a city where the rate of people feeling safe is higher.

Therefore, we can say that making city a safer place is one of the ways to increase happiness in a city.

In addition to safety, facilities of the city related to social life are also expected to have an impact on happiness. The ratio of those who state that they are satisfied with the social life have a positive and significant relationship with the level of happiness. Therefore, it can be an effective option to invest in developing the social life in order to increase the happiness of the people living in a city. "Politic", another variable that indicates the social structure of the city, shows the proportion of political party members and has a negative and significant influence.

The only variable related to infrastructure of the city is "Internet" variable which shows the proportion of internet subscribers. Other variables related to infrastructure like access to sewerage and access to waste services are found insignificant, so they are not included in the model. The "Internet" has a positive and significant relation to the happiness of the city, implying as the infrastructure of the city improves, happiness level increases.

Another variable associated with city life, "Noise" shows the proportion of people who have a noise problem and is negatively associated with happiness as expected. Green, which shows the proportion of those who are satisfied with green areas in the city, is another environmental variable. However, Green has a negative and significant effect on happiness level as opposed to what is expected. This may be due to the fact that the amount of green space is found sufficient in small cities, in more rural areas. So Green may not indicate the satisfaction level with the green spaces in the city by itself. For this reason, model is estimated by adding interaction of "Metropol" and "Green" variables and the coefficient of Metropol* Green is found to be positive and significant. For large cities, as the satisfaction rate from the green areas increases, the level of happiness also increases. This finding is parallel to the findings of Bertram and Rehdanz (2015) on urban green space.

CONCLUSION

In this study, investigating the factors determining the general happiness level in different cities of the same country, provincial data of 81 provinces in Turkey is used. As a result of regression to determine the effect of different demographic, economic, social and environmental factors on the happiness of the city, it has emerged that all these factors individually and interactively determine the level of happiness in a city.

GDP per capita was found to be insignificant for happiness, as opposed to what is expected. Furthermore, it has been observed that rate of the population found in the middle and upper income classes and the perceived welfare level is insignificant in terms of happiness. The main finding is that while all these economic variables do not affect the level of happiness, the proportion of those who cannot meet their basic needs is decisive on the happiness level of the city. This indicates

that meeting basic needs is essential for happiness, beyond that, differences in income level between cities are insignificant in explaining differences in happiness levels. Therefore, rather than policies focused on increasing average income level, it is more important to provide everyone being able to meet their basic needs for increasing social welfare.

When the interaction term of "Income" and "Unemployment" is added to model, unemployment emerges as a factor having negative and significant effect on the happiness level. However, interaction term shows that when both ratio of middle or higher income group and unemployment rate is higher, this positively affects the happiness level of the city.

From the features of the city, "Metropol" dummy showing city is a major city has emerged as a factor having a positive effect on the level of happiness, for Turkey, which is a developing country. Safety level of the city has also positive influence on happiness. The satisfaction rate from the city's social life is also an important factor in explaining the happiness level in the city. The most basic steps will be to increase the happiness level in the city by spreading the facilities peculiar to the big cities, into small cities, decreasing the crime rate by effectively providing the security of the city and improving the city's social life. In terms of environmental factors, the noise level and the amount of green areas emerged as factors to be considered in order to increase the level of happiness in the city.

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YER FISTIĞI YETİŞTİRİCİLİĞİNDE HERBİSİTLERE DAYANIKLILIK GENLERİNİN ETKİLERİ

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ÖZET
Yer fıstığı (Arachis hypogaea), tek yıllık ve yazlık olarak yetiştirilen sıcak iklim bitkisidir. Baklagil familyasında olup meyvelerinin toprak altından oluşumuyla diğer bitkilerden farklılık göstermektedir. Besin değerlerinin üstün ve tüketim çeşitliliğiyle yağlı tohum bitkileri arasında farklı yeri olan yer fıstığı insan beslenmesinde de enerji ve protein açıklığının karşılanmasında gıda maddelerinin en başında kullanılanlardan biridir. Tohumunda %45-55 yağ oranına sahip olup birim alanda yağ verimi tarla ürünlerine göre daha yüksektir. Yağında tokoferol bulunması ve yüksek oleik asit içerdiğinden yağının stabilitesi ve raf ömrü yüksektir. İçerdiği yağ, protein, vitamin, karbonhidrat ve madensel maddelerle insanlar ve hayvanlar için değerli besin kaynağıdır. Bitki üretiminde hastalık ve zararlılar gibi yabancı otlar da büyük ölçüde ürün kaybı yaşandığından verimi düşürebilmektedir. Yabancı otların kontrolünde kullanılan ve bitkiye etki eden kimyasal maddeler olan herbisitler uygulanabilirliği ve az iş gücü gerektirdiğinden dolayı çok fazla tercih edilmektedir. Sunulan bu derleme çalışmasında, yer fıstığı yetiştiriciliğinde herbisitlere dayanıklılığın ve etkisi olan genlerin üzerine durulmuştur. Elde edilen bilgiler doğrultusunda herbisitlere dayanıklı yerfıstığı bireylerin geliştirilmesi yönünde yapılacak çalışmalara ve bu alanda çalışan araştırmacılara ışık tutması amaçlanmıştır.

Anahtar Kelimeler: yer fıstığı, herbisit, yabancı ot,üretim.

EFFECTS OF HERBİCİDE RESİSTANCE GENES İN PEANUT CULTİVATİON

ABSTRACT
Peanut (*Arachis hypogaea* L.) is an annual and summer hot climate plant.Peanut, which is in the legume family, differs from other plants in that it forms fruit under the ground.In addition to having a high nutrient content, peanuts, which have a different consumption potential and have a different place among oilseed plants, are among the most preferred foodstuffs in human nutrition because they meet the energy and protein deficit.It has 45-55% oil content in its seed and the oil yield per unit area is higher than field products.The stability and shelf life of peanuts are high since the oil contains tocopherol and has a high oleic acid content.Despite all these important features, the presence of pests such as diseases and weeds hinders the production of peanuts and causes a large amount of product loss.It is important to control weeds to prevent reductions in crop yield, and chemicals called herbicides are often used for this purpose.Herbicides are highly preferred because of their applicability and low labor requirement.However, as a result of herbicide applications, the plant desired to be grown as well as weeds may also be affected by this chemical application.To prevent this situation, it has become possible to develop new varieties resistant to herbicides by using biotechnological methods as well as classical breeding.This review focused on the mechanism of resistance to herbicides in peanut cultivation and the genes that play a role in this mechanism.In line with the information obtained, it is aimed to contribute to the improvement studies to be carried out for the development of herbicide-resistant peanut lines and varieties and to contribute to the technical capacity of the researchers working in this field.

Keywords: Gene, herbicide resistance, breeding, weed, peanut

GİRİŞ

Yerfıstığı (Arachis hypogaea L.), Dünya genelinde ve Hindistan' da en çok yetiştirilen ve yağ üretiminde kullanılan en önemli bitkilerden biridir. 1980'lerde Hindistan'da yer fıstığının %80'i petrolün çıkarılması için kullanılmış olup son zamanlarda elde edilen ürünlerin %49'u yağ için ezilmekte geri kalanı ise doğrudan tüketim ve ihracatta kullanılmaktadır. [1] İçinde bulunan çok sayıda yararlı bileşenlerin kanıtlanmasıyla çiğ fıstık tüketimi artmış ve sağlık için fonksiyonel gıda olarak dikkat çekmeye başlamıştır. [2,3]

Baklagiller (Faboceae) familyasından olan tek yıllık yerfıstığı bitkisi, Dünya genelinde olduğu gibi ülkemizde de yağlı tohumlar kategorisinde ele alınır. Tohumların çeşidine bağlı olarak %44 ila %56 oranında yağ içermektedir. Ayrıca %25 oranında protein içermesi, minerallerce zenginliği, vitamin, amino asitler ile insan sağlığı açısında önemli bir bitkidir. Besin değeri oldukça yüksek olan meyveleri toprağın altında oluşturması yerfıstığının en karakteristik özelliğidir. Havadaki serbest haldeki azotu toprağa bağlama özelliğine sahip baklagil bitkisi olmasının sebebi köklerinde bulunan nodüllerde yaşayan bakteriler sayesinde gerçekleşir. Yerfıstığının kendine has bakterisi ise Rhizobium japonikum'dur. Türkiye'de en fazla yetiştirildiği yerler Osmaniye, Adana, Kahramanmaraş ve Aydın'dır. Yerfıstığı yetiştiriciliği yapılan bu bölgeler ideal sıcaklık şartlarını sağlamaktadır. Yerfıstığı toprak açısından çok seçici olmamakla beraber yetiştiriciliği için gevşek yapılı, alüvyal topraklar ve kumlu – tınlı topraklar uygundur. Türkiye'de yetiştirildiği bölgelerde toprak özelliklerinin elverişli olduğu görülmektedir. [4–6]

YERFISTIĞI'NDA HERBİSİTLER

Son 15 yılda Virginia ve diğer eyaletlerde yabancı ot kontrolünü sağlamak üzere herbisitlerin kullanımı evrensel mahsul yönetimi uygulaması haline almıştır. [7] Herbisidal etkiye karşı toprak kaynaklı bitki patojenleri ve diğer mikroorganizmalar hassastır. [8] Yerfıstığı bitkisiyle ilişkili olarak herbisitlerin patejonik ve patojenik olmayan mikroflorayı nasıl etkilediği konusunda çok az şey bilinmektedir. Yabancı otlara ek olarak herbisitlerin, bitki ve mikroorganizmaları da etkilemesi neredeyse kaçınılmazdır. [7] Herbisitlerin belirli hastalığı etkileme şekilleri bitki türü, herbisit ve patojenin bulunduğu türle çok az ilişkili olduğu savunulmaktadır.[9] Herbisitlerin kullanımında çok fazla faktör bulunmasından ötürü spesifik suseptif patojen etkileşimi etkilerinin saptanmasının oldukça zor olduğu da düşünülmektedir. [10]

Ülkemizde yerfıstığı tarlalarında yaygın görülen kanyaş (Sorghum halepense), darıcan (Echinochloa colonum, Echinochloa cruss-galli), pıtırak (Xanthium strumarium) ve horozibiği (Amaranthus albus) gibi otlarla iyi mücadele edilmelidir. Çünkü bu otlar yerfıstığından daha boylu oldukları için diğer yaygın görülen topalak (Cyperus roduntus) ve semizotu (Portulaca oleracae) gibi küçük boylu otlara göre zararları daha fazla olur. [11]**AGROBACTERIUM ARACILI**

FISTIĞINDA (ARACHIS HYPOGAEA L.) EPSPS HERBİSİT DİRENÇ GENİNİN GENETİK DÖNÜŞÜMÜ VE TRANSGENİK BİTKİLERİN ETKİLİ CANLANMASI

Yapılan bir çalışmada Agrobacterium aracılı yer fıstığı genetik transformasyonuna ve transgenik bitkilerin etkili iyileştirilmesine dayanıyordu. Agrobacterium tumefaciens suşu LBA4404'ün bir ikili PxCSG m-YFP 5-enolpiruvilshikimat-3-fosfat sentaz (EPSPS) geni vektörü ile etkisi, iki ticari çeşit ve her biri bir içeren iki eksplant kaynağı (Embriyo ve kotiledon) üzerinde değerlendirilmiştir. EPSPS gen kalıtımının iki nesil boyunca fenotipik ve genotipik izlenmesi, istenen 3:1 kalıtımı sergilediği gözlemlenmiş olup bu doğrultuda bulgular, yabancı DNA'yı çok çeşitli bitki türlerine transfer etmek için yaygın kullanılan ve etkili bir yöntem olan Agrobacterium aracılı transformasyonun yer fıstığı ıslahı ve fonksiyonel genomik araştırmaları için uygun ve değerli bir araç olduğunu gösterdiği yöndedir. [12–14]

HERBİSİT DİRENÇ GENİ OLAN FOSFİNOTRİSİN ASETİL TRANSFERAZ (BAR) KULLANILARAK YER FISTIĞININ TRANSFORMASYONU

Genetik transformasyon uygulaması için güvenilir protokoller geliştirilmesine ihtiyaç vardır. Yapılan çalışmada hem partikül bombardımanı hem Agrobacterium aracılı dönüşüm parametreleri optimizesi için deneyler yapılmış. Yer fıstığının transformasyonunda parçacık bombardımanı yaklaşımı,seçilebilir işaretleyici olarak herbisit direnç geni olan Fosfinotrisin asetil transferaz (BAR) kullanımıyla gerçekleştirilmiş. L-Phosphinothricin (PPT) seçilebilir belirteç olarak kullanılmak üzere optimal dozun standardizasyonu bu çalışmada rapor edilmiş. Yapılan çalışma da Yeşil Floresan Protein (GFP) geni; çok takdir edilen bir raportör olan GUS (ß-glukoronidaz) ve Phosphinothricin (Bar) bir herbisit direnç geni kullanılmış.Çalışmanın sonunda Fosfinotrisinin çeşitli konsantrasyonlarında gözlemlenen doku büyümesi yanıtı oluşturup izole ediler seçilebilir işaretleyici olarak Fosfinotrisin asetil transferaz (BAR) geninin mevcudiye PCR analiziyle kanıtlanarak ilk rapor olarak sunulmuştur. [15–17]

SONUÇ VE ÖNERİLER

Sunulan bu derleme çalışmasında, yer fıstığı yetiştiriciliğinde herbisitlere dayanıklılığın ve etkisi olan genlerin üzerine durulmuştur. Yerfıstığı bitkisiyle ilişkili olarak herbisitlerin patejonik ve patojenik olmayan mikroflorayı nasıl etkilediği konusunda çok az şey bilinmektedir. Elde edilen bilgiler doğrultusunda herbisitlere dayanıklı yerfıstığı bireylerin geliştirilmesi yönünde daha fazla çalışmaların olması önem arz etmektedir.

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ERGENLERİN SOSYAL MEDYA KULLANIMLARI VE BAĞIMLILIKLARI ÜZERİNE BİR ÇALIŞMA

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ÖZET

Bilişim teknolojilerinin insan yaşamında vazgeçilmez bir durum alması ile sosyal medya önemli bir yer edinmiştir. Hemen hemen her yaştan kullanıcı sosyal medya platformunu kendisine bir çevre edinme ve belirli paylaşımlarda bulunma ortamı olarak görmektedir. Sosyal medya ile bilgi edinmeden boş zamanları değerlendirmeye kadar farklı amaçlar için iletişim kurulmaktadır. İnternet kullanımının her geçen gün artış sağladığı günümüzde, özellikle bu kullanımın ergenler arasında yaygın olduğu bilinmektedir. İnternet kullanımı konusunda ergenlerin tercihleri sosyal medya kullanımı alanında yaygınlık göstermektedir. Yapılan çalışmalar sosyal medya kullanan ergenlerin, arkadaşlarını takip, bilgi paylaşımı ve iletişim amaçlı kullanımda bulundukları yönündedir. Bu anlamda sosyal medya ergenler başta olmak üzere farklı amaçlarla paylaşımların özgürce gerçekleşebileceği bir mecra halini almıştır. Bu çalışma ile ergenler üzerine bir ölçek uygulanarak, sosyal medya bağımlılıkları analiz edilmiştir. Araştırmada kullanılan ölçek Özgenel ve diğ. (2019) tarafından ergenlerin sosyal medya bağımlılığı düzeylerini belirlemek amacıyla geliştirilen likert tipi ESMBÖ ölçeğidir. Ölçek 9 maddelik ve tek faktörlü bir yapıda, Cronbach Alfa güvenirlik katsayısı ise 0.904 olarak hesaplanmıştır. Verilerin analizinde betimsel istatistik yöntemleri, bağımsız örneklemler için t testi ve tek yönlü varyans analizi kullanılmıştır. Elde edilen veriler ile ergenlerin ne düzeyde sosyal medya bağımlısı oldukları ortaya konulmaktadır. Sosyal medya bağımlılıkları konusunda ergenlerden elde edilen verilerin cinsiyet gibi değişkenler açısından da incelenmesi bu çalışmada gerçekleştirilmiştir. Bundan sonraki çalışmalarda, ergenlerin sosyal medya kullanımı konusunda karşılaştıkları sorunların çözümü, farklı değişkenler açısından incelenmesi önerilebilir.

Anahtar Kelimeler: Sosyal medya, Sosyal medya bağımlılığı, Ergenler

A STUDY ON THE SOCIAL MEDIA USE AND ADDICTIONS OF ADOLESCENTS

ABSTRACT

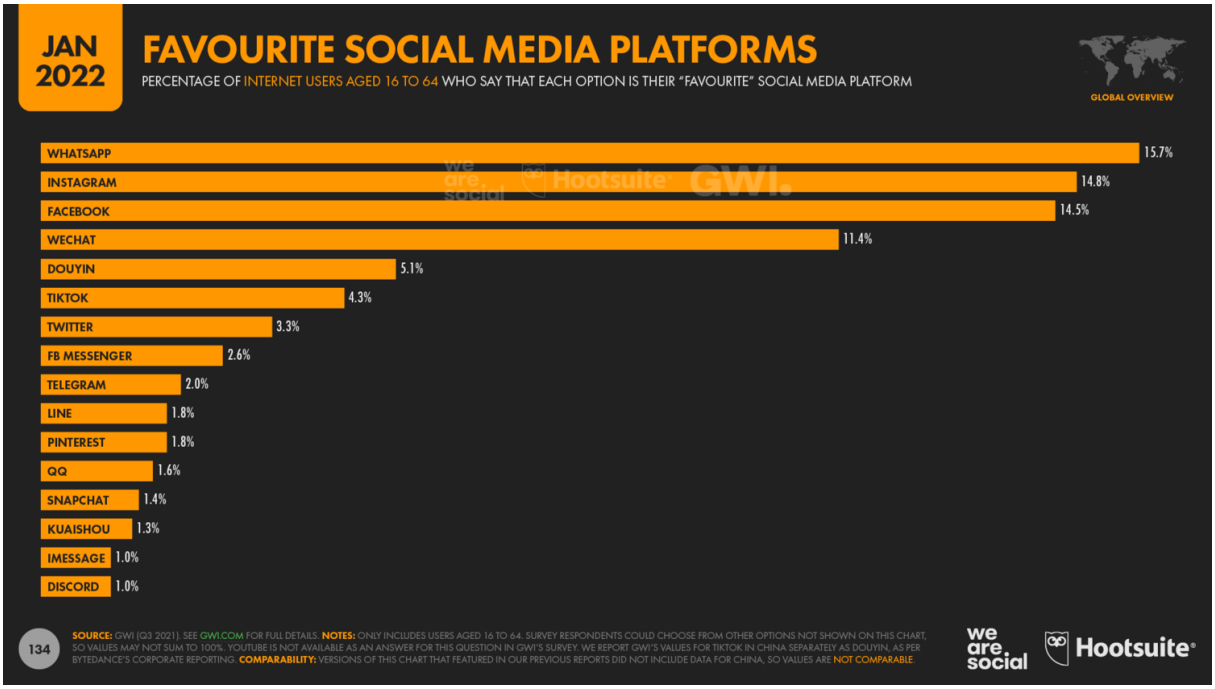
Social media has gained an important place as information technologies have become indispensable in human life. Users of almost all ages see the social media platform as an environment for acquiring a circle and sharing certain shares. With social media, communication is established for different purposes, from obtaining information to making use of leisure time. It is known that internet use is increasing day by day, and this use is especially common among adolescents. Adolescents' preferences for internet use are widespread in the field of social media use. Studies show that adolescents who use social media use social media to follow their friends, share information and communicate. In this sense, social media has become a medium where sharing can take place freely for different purposes, especially for adolescents. In this study, social media addictions were analyzed by applying a scale on adolescents. The scale used in the study was determined by Özgenel et al. (2019) to determine the social media addiction levels of adolescents, it is a likert type ESMD scale. The scale has 9 items and a single factor structure, and the Cronbach Alpha reliability coefficient was calculated as 0.904. In the analysis of the data, descriptive statistical methods, t-test for independent samples and one-way analysis of variance were used. With the data obtained, it is revealed to what extent adolescents are addicted to social media. In this study, the data obtained from adolescents on social media addictions were also examined in terms of variables such as gender. In future studies, it can be suggested that the solution of the problems faced by adolescents in the use of social media should be examined in terms of different variables.

Keywords: Social media, Social media addiction, Adolescents

1.GİRİŞ

Günümüzde internet kullanımının diğer alanlardan daha çok sosyal medya kullanımında olduğu söylenebilir. Sosyal medya kullanımı konusunda eğitimden sağlığa, eğlenceden pazarlamaya kadar farklı disiplinleri ilgilendiren çalışmalar gerçekleştirilmiştir. Farklı başlıklarda yapılan çalışmalar cinsiyet eğitim durumu ve bunlar benzeri farklı değişkenleri ele alarak yapılmıştır. Bu çalışmada, ergenlerin sosyal medya kullanımları ve bağımlılıkları üzerine bir araştırma yapılmıştır.

Ergenliğin en kısa tanımı, bir "çocuğun" bir "yetişkin"e görünür dönüşümünü yöneten ergenlikteki metamorfozdur. Ergenlerin fiziksel büyümesi, cinsiyet, ırk, vücut kütlesi, çevresel etkiler ve genel sağlık durumu gibi çeşitli faktörlerden etkilenen önemli değişkenliklerle başlar ve gelişir. Kabul edilen ortalama ergenlik yaşı, erkekler 9 ile 13,5 yaşları arasında ve kızlar 7 ile 13 yaşları arasında olmak üzere 11'e olarak ortalamalar alınabilir. Karakteristik iskelet büyüme atağı genellikle kadınlarda 10-12 ve erkeklerde 12-14 yaşları arasında görülür; kızlarda 17-19, erkeklerde 20 yaşında erişkin boyda sonlanır (Curtis, 2015, s.1). Ergenlik döneminde bireylerde bağımsız olma çabası olmaktadır. Yaşamlarında kararlarını kendileri almak isterler ve bu da özerkliği oluşturmaktadır (Özdemir ve Çok, 2011, s. 152). Bu anlamda ergenlerin özerkliklerini sosyal medya platformlarında ifade etme girişiminde oldukları yapılan çalışmalar sonucu belirtilebilir.



Şekil 1. Sosyal Medya Platformlarının Kullanım Oranları (Datareportal, 2022).

Birçok sosyal medya platformu kullanıcılar tarafından dünya genelinde kullanılmaktadır. Datareportal (2022)' ın güncel verilerine göre sosyal medya platformları arasında whatsapp, instagram ve facebook ilk üç sırada yer almaktadır. Bu üç sosyal medya platformunun da kullanım

oranlarının oldukça yakın olduğu da verilen grafikten anlaşılmaktadır. Ayrıca diğer pek çok platform sosyal medya ortamında kullanıcılara hizmet sunmaktadır.

Alanyazın incelendiğinde sosyal medya bağımlılığı konusunda çok sayıda çalışmaya rastlamak mümkündür. Özellikle son yıllarda büyük çoğunluğunun internet okur – yazarı olmaları dolayısıyla, sosyal medya bağımlılığı konusunda ergenleri ön plana çıkarmaktadır. Bu sebeplerden sosyal medya bağımlılığı konusunda ergenlerin birtakım istekleri ve sosyal ilişkilerinde karşılaştıkları olumsuzluklara ışık tutabilme adına bu çalışmanın önem arz ettiği düşünülmektedir.

Bu araştırmanın amacı, ergenlerin sosyal medya bağımlılıklarına yönelik görüşlerini belirlemektir. Ayrıca ergenlerin bazı değişkenlerinin ergenlerin sosyal bağımlılık düzeylerine ilişkin görüşlerinde farklılık yaratıp yaratmadıklarının ortaya konulması amaçlanmıştır.

Çalışmanın amacı doğrultusunda "Ergenlerin sosyal medya bağımlılığı düzeyleri nedir?" problemine ilişkin cevap bulunmaya çalışılmıştır.

2.YÖNTEM

Araştırma genel tarama modeline göre tasarlanmıştır. Karasar (2009)'ın genel tarama modellerini çok sayıda elemandan oluşan evrende evrenin tümü ya da evrenden alınacak bir grup, evren hakkında genel bir yargıya varmak düşüncesiyle örnek ya da örneklem üzerinde yapılan tarama düzenlemeleri olarak tanımlamaktadır.

Bu çalışmanın evrenini Osmaniye ilinde öğrenim gören ergenler oluşturmaktadır. Çalışmanın örneklemini ise lisede öğrenim gören toplamda 112 ergen oluşturmaktadır. Örneklem belirlenirken seçkisiz olmayan örnekleme yöntemlerinden, amaçsal örnekleme yöntemi tercih edilmiştir. Büyüköztürk (2012) amaçsal örnekleme yöntemini, derinlemesine araştırma yapabilmek amacıyla çalışmanın amacı bağlamında bilgi açısından zengin durumların seçilmesidir şeklinde ifade etmektedir.

2.1. Veri Toplama Aracı

Yapılan çalışmalar sosyal medya kullanan ergenlerin, arkadaşlarını takip, bilgi paylaşımı ve iletişim amaçlı kullanımda bulundukları yönündedir. Bu anlamda sosyal medya ergenler başta olmak üzere farklı amaçlarla paylaşımların özgürce gerçekleşebileceği bir mecra halini almıştır. Bu çalışma ile ergenler üzerine bir ölçek uygulanarak, sosyal medya bağımlılıkları analiz edilmiştir. Araştırmada kullanılan ölçek Özgenel ve diğ. (2019) tarafından ergenlerin sosyal medya bağımlılığı düzeylerini belirlemek amacıyla geliştirilen likert tipi ESMBÖ ölçeğidir. Ölçek 9 maddelik ve tek faktörlü bir yapıda, Cronbach Alfa güvenirlik katsayısı ise 0.904 olarak hesaplanmıştır. Verilerin analizinde betimsel istatistik yöntemleri, bağımsız örneklemler için t testi ve tek yönlü varyans analizi kullanılmıştır. Elde edilen veriler ile ergenlerin ne düzeyde sosyal medya bağımlısı oldukları ortaya konulmaktadır.

2.2. Verilerin Analizi

Bu araştırmada kullanılan ölçek sayesinde elde edilmiş olan veriler SPSS 25.0 programına girilmiştir. Veriler SPSS 25.0 programı ile analiz edilmiştir. Verilerin analiz edilmesinde betimsel istatistikten faydalanılmıştır. Aynı zamanda bağımsız örneklemler için t testi ve tek yönlü varyans analizi kullanılmıştır. Çalışmada tanımlayıcı istatistikler ile araştırmaya katılan ergenlerin sosyal medya bağımlılığına ilişkin görüşlerinin frekans yüzde dağılımları ile aritmetik ortalamaları hesaplanmıştır.

3.BULGULAR

Araştırma sonunda elde edilen verilerin istatistiksel olarak yapılan çözümlerinden edinilen bulgulara bu kısımda yer verilmiştir. Araştırmada kullanılan ergenler için sosyal medya bağımlılığı ölçeği ergenlere uygulanmıştır.

Araştırmaya katılan ergenlerin sosyal medya bağımlılıkları ile ilgili görüşlerinin dağılımları Tablo 1' de verilmiştir.

Tablo 1. Ergenlerin sosyal medya bağımlılıklarına yönelik görüşlerinin frekans yüzde dağılımları ve aritmetik ortalamaları

Önermeler	**Hiçbir Zaman**		**Nadiren**		**Bazen/Ara Sıra**		**Çoğunlukla**		**Her Zaman**		**x̄**
	f	%	f	%	f	%	f	%	f	%	
1.Sosyal medyayı kullanmadığımda sinirli, endişeli veya üzgün olurum.	33	29,5	38	33,9	29	25,9	8	7,1	4	3,6	2,21
2.Aklımda sürekli sosyal medyada yaptığım veya yapacağım etkinlikler vardır.	39	34,8	31	27,7	31	27,7	7	6,3	4	3,6	2,16
3.Sosyal medyayı çok kullandığım için sinema, tiyatro, müzik, spor gibi diğer etkinliklere veya hobilerime zamanım kalmıyor.	59	52,7	20	17,9	23	20,5	7	6,3	3	2,7	1,88
4.Sosyal medyada gezinirken "biraz daha" diyerek süreyi uzatırım.	13	11,6	24	21,4	36	32,1	26	23,2	13	11,6	3,01
5.Sosyal medya iş, okul veya aile hayatımı olumsuz etkilemesine rağmen sosyal medyayı kullanmaya devam ediyorum.	48	42,9	15	13,4	26	23,2	13	11,6	10	8,9	2,30
6.Sosyal medya kullanımımı kontrol etmeye, azaltmaya veya durdurmaya çalışırken zorlanıyorum.	47	42	17	15,2	20	17,9	18	16,1	10	8,9	2,34
7.Kendimi mutlu hissetmek için sosyal medyayı daha fazla kullanırım.	36	32,1	16	14,3	27	24,1	19	17	14	12,5	2,63
8.Sosyal medyada harcadığım zaman miktarını ailemden veya çevremdeki insanlardan gizlerim.	65	58	16	14,3	19	17	8	7,1	4	3,6	1,83
9.Sosyal medyada harcadığım süre yüzünden insanlarla (aile, arkadaş ve sosyal çevre) ilişkilerimde ciddi çatışmalar yaşarım.	69	61,6	15	13,4	20	17,9	3	2,7	5	4,5	1,75

Tablo 1 incelendiğinde katılımcıların en çok "Sosyal medyada gezinirken "biraz daha" diyerek süreyi uzatırım" önermesine ($\bar{x}$ = 3,01) katıldıkları görülmektedir. "Kendimi mutlu hissetmek için sosyal medyayı daha fazla kullanırım" önermesi ergenlerin katıldıkları bir diğer madde olmuştur ($\bar{x}$ = 2,63). Ayrıca araştırmaya katılan ergenlerin bir bölümü ($\bar{x}$ = 2,41) "Sosyal medya kullanımımı kontrol etmeye, azaltmaya veya durdurmaya çalışırken zorlanıyorum." önermesine katıldıklarını belirtmektedirler. Sosyal medya bağımlılığı anlamında ergenlerin verileri değerlendirildiğinde, "Sosyal medyada harcadığım süre yüzünden insanlarla (aile, arkadaş ve sosyal çevre) ilişkilerimde ciddi çatışmalar yaşarım." önerisine en düşük oranda ($\bar{x}$ = 1,75) katıldıkları görülmektedir.

Ergenlerin, sosyal medya bağımlılığı üzerine görüşlerinin cinsiyet değişkenine göre farklılığına ilişkin bulgular:

Araştırmaya katılan ergenlerin sosyal medya bağımlılığına yönelik görüşleri ile cinsiyetleri arasında anlamlı bir farklılığın olup olmadığı bağımsız t – testi ile belirlenmiştir. Araştırmaya katılan ergenlerin sosyal medya bağımlılığına ilişkin görüşlerinin, cinsiyet değişkenine göre farklılaşıp farklılaşmadığı sonucu Tablo 2' de verilmiştir.

Tablo 2. Cinsiyete göre ergenlerin sosyal medya bağımlılığına yönelik görüşlerinin t testi sonuçları

Cinsiyet	**N**	**$\bar{x}$**	**sd**	**t**	**p**
Kız	72	2,30	110	0.98	.496
Erkek	40	2,12			

Tablo 2' ye göre araştırmaya katılan ergenlerden kızların ve erkeklerin sosyal medya bağımlılığına yönelik görüşlerinin toplam puanlarının aritmetik ortalamalarının birbirlerine yakın olduğu, kızlarda ($\bar{x}$=2,30) ve erkeklerde ($\bar{x}$=2,12) olduğu, görülmektedir. Ergenlerin sosyal medya bağımlılığına yönelik görüşleri ile cinsiyet arasındaki ilişki incelenmiş ve istatistiksel açıdan anlamlı bir fark bulunamamıştır [sig. p > ,05]. Bu verilerden yola çıkarak ergenlerin sosyal medya bağımlılığına yönelik görüşlerinde cinsiyet faktörünün önemli olmadığı söylenebilir.

4.SONUÇ VE ÖNERİLER

Bu araştırmada, sosyal medya bağımlılığına yönelik olarak ergenlerin görüşleri belirlenmiştir. Ergenlerin kullanılan ölçeğe verdikleri yanıtlar ve ergenlerin cinsiyet durumlarına göre etkisi incelenmiş ve bazı sonuçlara ulaşılmıştır.

Ergenlik döneminde bireylerde bağımsız olma çabası olmaktadır. Yaşamlarında kararlarını kendileri almak isterler ve bu da özerkliği oluşturmaktadır. Bu anlamda ergenlerin özerkliklerini sosyal medya platformlarında ifade etme girişiminde oldukları yapılan çalışmalar sonucu belirtilebilir.

Günümüzde farklı alanlarda sosyal medya alanında çalışmalar yapıldığı görülmektedir (Baz, 2018). Pazarlama alanında yapılan çalışmalar (Barutçu ve Tomaş, 2013), iletişim alanında yapılan

çalışmalar (Budak, 2018), halkla ilişkiler (Yağmurlu, 2011) ve benzeri birçok alanda çalışmaların yapıldığı görülmektedir. Ayrıca alanda yapılan bazı çalışmalarda sosyal medya kullanıcıların kaygı durumlarının ölçüldüğü de görülmektedir (Aktan, 2018).

Ergenlerin sosyal medyada gezinirken biraz daha diyerek süreyi uzattıkları ve kendilerini mutlu hissetmek için sosyal medyayı daha fazla kullandıkları ergenler tarafından araştırmada ifade edilmiştir. Ayrıca araştırmaya katılan ergenlerin bir bölümü sosyal medya kullanımımı kontrol etmeye, azaltmaya veya durdurmaya çalışırken zorlandıklarını belirtmişlerdir. Sosyal medya bağımlılığı anlamında ergenlerin verileri değerlendirildiğinde sosyal medyada harcadıkları süre yüzünden insanlarla (aile, arkadaş ve sosyal çevre) ilişkilerinde ciddi çatışmalar yaşadıklarını diğer önermelerin hepsine göre en az oranda ifade etmişlerdir.

Bu araştırma sonuçlarına göre kızlarla erkeklerin sosyal medya bağımlılığı konusunda görüşlerinin yakın olduğu, kızların erkeklere oranla az da olsa bağımlılık düzeylerinin fazla olduğu ifade edilebilir. Araştırmada elde edilen verilere göre ergenlerin sosyal medya bağımlılığı konusuna yönelik görüşlerinde cinsiyet faktörünün önemli olmadığı söylenebilir.

Elde edilen veriler ile ergenlerin ne düzeyde sosyal medya bağımlısı oldukları ortaya konulmaktadır. Sosyal medya bağımlılıkları konusunda ergenlerden elde edilen verilerin cinsiyet, yaş gibi farklı değişkenler açısından da incelenmesi bu çalışmada gerçekleştirilmiştir. Bundan sonraki çalışmalarda, ergenlerin sosyal medya kullanımı konusunda karşılaştıkları sorunların çözümü, farklı değişkenler açısından incelenmesi önerilebilir.

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OKUL ÖNCESİ EĞİTİME YENİ BAŞLAYAN ÇOCUKLARIN AYRILMA KAYGILARI İLE ANNELERİNİN KAYGILARI ARASINDAKİ İLİŞKİ

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Ayşegül ÇIKRIKÇI

ÖZET

Bu araştırma, okul öncesi eğitime yeni başlayan çocukların ayrılma kaygıları ile annelerinin kaygıları arasındaki ilişkinin incelenmesini amaçlamaktadır. Araştırmada cinsiyet, yaş, kardeş sayısı, anne yaşı, anne öğrenim düzeyi, anne çalışma durumu ve ailenin sosyo-ekonomik düzeyine göre çocukların ayrılma kaygılarının ve çocukların cinsiyeti ile annenin öğrenim durumuna göre annelerin kaygılarının değişip değişmediği araştırılmıştır. Bu araştırma ilişkisel tarama modelinde nicel bir çalışma olarak gerçekleştirilmiştir. Araştırmanın örneklemi, 2019-2020 öğretim yılında Bursa'da, Milli Eğitim Müdürlüğüne bağlı, okul öncesi eğitim kurumlarına devam eden 120 çocuk ve onların anneleri ile 12 okul öncesi öğretmeni olmak üzere toplam 252 kişiden oluşmaktadır. Araştırmaya katılan annelere 'Yuva Çocukları için Ayrılma Kaygısı Ölçeği Anne-Baba Formu' ve 'Durumluk Sürekli Kaygı Ölçeği (STAI-I ve STAI-II Kaygı Ölçeği)' uygulanmıştır. Araştırmaya katılan okul öncesi eğitim öğretmenleri, araştırmaya katılan her çocuk için 'Yuva Çocukları için Ayrılma Kaygısı Ölçeği Öğretmen Formu'nu doldurmuşlardır. Okul yönetiminin desteği alınarak, anne ve çocuğun demografik özelliklerini belirleyebilmek amacıyla ailelere 'Kişisel Bilgi Formu' doldurtulmuştur. Çalışmadan elde edilen verilerin analizi SPSS 22 paket programı aracılığı ile gerçekleştirilmiştir. Araştırma sonuçlarına göre, okul öncesi eğitime yeni başlayan çocukların ayrılma kaygıları ile annelerinin kaygıları arasında ilişki bulunmamıştır. Ayrıca çocuk ayrılma kaygısı puanının kardeş sayısı, annelerin çalışma durumları ve ailelerin sosyo-ekonomik düzeyleri değişkenlerine göre farklılık gösterdiği belirlenmiştir. Annelerin sürekli kaygılarının ise öğrenim durumlarına göre farklılık gösterdiği bulunmuştur.

Anahtar Kelimeler: Ayrılma kaygısı, durumluk sürekli kaygı, okul öncesi eğitim.

THE RELATIONSHIP BETWEEN THE SEPARATION ANXIETY OF CHILDREN WHO HAVE A NEW BEGINNING OF PRESCHOOL EDUCATION AND THE CONCERNS OF THEIR MOTHERS

ABSTRACT

This study aims to examine the relationship between separation anxiety of children who have just started preschool education and their mothers' anxiety. In the study, it was investigated whether the separation anxiety of children changed according to gender, age, number of siblings, mother's age, mother's education level, mother's employment status and socio-economic level, and whether the anxiety of mothers changed according to the gender of the children and the education status of the mother. This research was carried out as a quantitative study in relational scanning model. The sample of the study consists of a total of 252 people, including 120 children attending pre-school education institutions affiliated to the National Education Directorate in Bursa in the 2019-2020 academic year, and their mothers and 12 preschool teachers. Separation Anxiety Scale for Kindergarten Children Parents form and State Trait Anxiety Scale (STAI-I and STAI-II Anxiety Scale) were applied to the participating mothers. Preschool teachers participating in the study filled in the Teacher Form of Separation Anxiety Scale for Kindergarten Children for each child participating in the study. With the support of the school administration, families were filled with a Personal Information Form in order to determine the demographic characteristics of the mother and child. The analysis of the data obtained from the study was carried out with the SPSS 22 package program. According to the results of the study, no relationship was found between separation anxiety of children who have just started preschool education and their mothers' anxiety. In addition, it was determined that the child separation anxiety score varied according to the variables of the number of siblings, the employment status of the mothers and socio-economic level. It was found that the trait anxiety of mothers differed according to their educational status.

Keywords: Preschool education, separation anxiety, state trait anxiety.

GİRİŞ

Çocuğun tüm gelişim alanlarında en süratli geliştiği evre bebeklik çağı şeklinde adlandırılan 0-2 yaş evresidir. Bu evrede biyolojik olarak tam gelişememiş olan bebek, bakımını yapan ve ihtiyaçlarını gideren kişiye karşı bir bağlanma geliştirir. Bu kişi genelde anne olmaktadır. Anneyle oluşturulan bu ilişki, hayatının ileriki senelerinde diğer insanlarla kuracağı ilişkilerinde belirleyici bir rol oynayacaktır (Tüzün & Sayar, 2006).Bakım vereni gözleme ve kaygılı anlarda varlığı giderek ortaya çıkan duygusal bağlılık, bağlanmanın birer parçasıdır (Thompson, 2002). Birey, hayatının ikinci ve üçüncü yıllarında annesinden ayrılmayı bir gelişimsel ödev olarak başarabilmelidir. Annesine güvensiz bağlanan çocuklar ayrılma sırasında zorluk çeker. Beklemediği bir anda gelen ayrılıklar çocuğun kaygısını arttırır ve kırılmasına sebep olur (Miral & Baykara, 1998).

Okul öncesi dönem, çocuğun dünyaya gelmesiyle beraber ilkokul eğitimine başlangıcına kadar olan yani çocuğun 0-6 yaşları arasındaki yıllarını içeren süreçtir (Başal, 2013). İnsan yaşamında büyük önem arz eden okul öncesi dönemde çocuk tüm gelişim alanlarında hızlı bir gelişim gösterir (Aslanargun, 2011; Başal, 2013; Kılıç, Yıldız & Dağ, 2017). Fiziksel, zihinsel, sosyal ve duygusal gelişimin olduğu bu dönemde, çocuğun yaşadığı ortama göre kaygı duygusu da biçim almaya başlar. Çocuğun ebeveynleri ve akranları kaygı seviyesinin artmasında veya azalmasında etkilidir (Alisinanoğlu & Ulutaş, 2003). Çocuğun kaygı duygusunun gelişimi ve ilerideki yaşamında diğer kişilerle olan ilişkilerinin kaynağı ebeveynlerinin çocukluk döneminde bireye gösterdiği tutuma dayanmaktadır (Yavuzer, 1990). Bireyin içsel ve dışsal durumlarının neden olduğu tehlike ihtimali veya bireyin bir olayı kişiselleştirip kendine yönelik risk olarak yorumlaması halinde gösterdiği psikolojik duruma kaygı denir (Craske & Glover, 2000; Işık, 1996; Spielberger & Vagg, 1995). Ayrılık kaygısı ise çocuğun bakımını yapan kişinin yokluğu halinde yaşanan durumdur (Rapee, Spence, Cobham & Wignal, 2014).

Okul öncesi eğitime başlayan çocuk yaş itibari ile yakın çevresine ve annesine bağımlıdır. Annesinden ilk kez ayrılacak olan çocuk uyma ile ilgili sorunlar yaşayıp okula gitmek istemeyebilir. Bu durum, problemin başlangıç noktası olarak çocuğun yoğun ayrılma kaygısına sahip olabileceğini göstermektedir (Akman, 1994; Ankay, 1992; Poyraz & Dere, 2006). Kaygı, kişinin uyum ve koruma işlevlerinin yerine getirilmesinde destek olmasıyla ilişkili olarak sağlıklı bireylerde yaşanan kaygının normal olduğu kabul görmektedir (Labellarte, Ginsburg, Walkup & Riddle, 1999). Çocukların da bağlanma nesnelerinden yani bakım verenden ayrılık sürecinde kaygı duymaları olağan bir durumdur (Ainsworth, Blehar, Waters & Wall, 1978). Ancak uzun süreli ve şiddeti yoğun ayrılma kaygısı yaşanmakta ise bu durum gelişimde anormal olup, normal gelişim seyrini değiştirmesi halinde ayrılma kaygısı bozukluğu (AKB) tanısı konmaktadır (Amerikan Psikiyatri Birliği, 1994).

Kaygı kavramının farklı tipleri olduğunu deneysel olarak Cattel ve Scheir'in (1958) araştırmaları kanıtlamıştır. Araştırmacılar yaptıkları faktör analiziyle beraber kaygıda durumluk ve sürekli şeklinde iki farklı boyutun varlığını sunmuşlardır (akt. Speilberger, 2013). Durumluk kaygı kişinin çevreden kaynaklı stres halinden dolayı meydana gelen, büyük oranda diğer insanların da anlayabileceği mantıklı nedenlere dayalı, her insanın yaşadığı veya yaşama ihtimali olduğu kaygı biçimidir (Öner & Le Comte, 1998). Sürekli kaygı ise kişide stresin ortaya çıkmasına neden olan sebepleri, kişinin tehlike yaratacağını düşünmesi durumunda yüksek oranda duygusal tepkiler vermesi ve bu tepkilerin sürekli biçime gelmesidir (Özgüven, 1994). İki kaygı tipi birbirinden ayrı düşünülmemektedir. Aralarında orta düzeyde ilişkinin varlığı bulunmaktadır (Başarır, 1990).

Çocuğun yaşamının en önemli seneleri olan 0-6 yaş döneminde ortaya çıkan kaygılar ve davranış bozuklukları sadece o dönemi değil, yaşamının ileriki yıllarını da olumsuz etkileyebilmektedir. Bu sorunların o dönemde çözüme kavuşturulamaması yetişkin olduğunda sosyal çevreye uyumunu zorlaştırmaktadır (Durmuşoğlu & Arslan, 2012). Ayrıca okula uyumda yaşanan sorunların önlemi alınmazsa ileride okul fobisinin oluşmasına yol açabilmektedir (Akman, 1988). Okula başlama güçlüğünün ana nedeni; çocuğun yaşadığı ortamından ya da bağ kurduğu kişiden ayrılması neticesinde, gelişim seviyesi göz önünde bulundurularak olması gerekenden çok daha fazla anksiyete duymasıdır (Bellibaş ve diğerleri, 2005). Fazla korumacı ailelerin çocuklarında okul korkusu daha çok görülür. Anneden ilk defa ayrılık yaşamak korkuya sebep olur. Çocukta bu duruma tepki olarak ağlama, tepinme, baş ağrısı ve kusma görülebilir. Okula başlarken görülen bu tepkiler ile beraber, anneler okuldan hatta sınıftan ayrılmazlar. Bu sürecin uzaması neticesinde gece korkuları başlayabilir (Ankay, 1992). Kaygıdan kaynaklı yaşanabilecek bu problemlerden dolayı ayrılık kaygısı semptomlarının erken yaşta anlaşılması çocuğun gelişimi için çok önemlidir (Wichstrom, Belsky & Berg-Nielsen, 2013).

Kaygının öğrenilebilen ve bulaşıcı bir duygu olduğu göz önünde bulundurulduğunda, annelerin sahip olduğu kaygı seviyelerinin çocuklarının kaygıları üzerinde etkisi olduğu ortaya çıkmaktadır (Alisinanoğlu & Ulutaş, 2003). Bu bilgiler doğrultusunda, çalışmada okul öncesi eğitim sürecine yeni başlayan çocuklardaki ayrılma kaygıları ile annelerin kaygıları arasındaki ilişki araştırılarak alana katkı sağlanacağı düşünülmüş ve çocukların cinsiyetinin, yaşının, kardeş sayılarının, annenin yaşının ve öğrenim düzeyinin, annenin çalışma durumunun ve sosyo-ekonomik düzeylerinin çocuklardaki ayrılma kaygısında farklılık oluşturup oluşturmadığı incelenmiştir. Ayrıca annelerin durumluk sürekli kaygı düzeylerinde öğrenim durumları ile çocukların cinsiyetinin farklılık oluşturup oluşturmadığı araştırılmıştır.

YÖNTEM

Araştırma Modeli

Araştırmada okul öncesi eğitime yeni başlayan çocukların ayrılma kaygıları ile annelerinin kaygıları arasındaki ilişkiyi çeşitli değişkenler açısından incelemek ve var olan durumu olduğu gibi betimlemek amacıyla ilişkisel tarama modeli kullanılmıştır. İlişkisel tarama modeli, "iki ya da daha çok değişken arasında birlikte değişimin varlığını ve/veya derecesini belirlemeyi amaçlayan araştırma modelleridir" (Karasar, 1998).

Evren ve Örneklem

Araştırmanın evrenini Bursa ilinde bulunan Milli Eğitim Bakanlığı'na bağlı okullarda okul öncesi eğitime yeni başlayan 36-72 ay arası çocuklar ile bu çocukların anneleri ve öğretmenleri oluşturmaktadır. Araştırmanın örneklemini ise, Bursa ilinde alt-orta-üst sosyoekonomik düzeyi temsil eden Milli Eğitim Bakanlığı'na bağlı Yıldırım, Osmangazi ve Nilüfer ilçelerindeki anaokullarından 120 çocuk, 120 anne ve 12 öğretmen olmak üzere toplam 252 kişi oluşturmaktadır. Araştırmadaki örneklem 'basit tesadüfi örnekleme' yöntemi ile oluşturulmuştur. Basit tesadüfi örnekleme yöntemi ana kütle birimleri ile ilgili hiçbir düzenleme yapılmadan her bir birime eşit seçilme şansı verilen örnekleme yöntemidir (Güriş & Astar, 2015).

Araştırmaya katılan annelerin ve çocukların demografik özellikleri incelendiğinde; 120 katılımcı annenin 40'ının (%33.3) üst, 40'ının (%33.3) orta ve 40'ının (%33.3) düşük sosyoekonomik düzeyde olduğu görülmektedir. Annelerin %15.8'inin ilkokul, %10'unun ortaokul, %29.2'sinin lise, %40'ının lisans, %5'inin yüksek lisans mezunu olduğu görülmektedir. Annelerin %6.7'sinin 22-27 yaş aralığında, %31.7'sinin 28-33 yaş aralığında, %45'inin 34-39 yaş aralığında, %16.7'sinin 40 yaş ve üzeri olduğu belirtilmiştir. Çalışmadaki annelerin %25'i tek çocuğa, %45.8'i iki çocuğa, %29.2'sinin üç çocuk ve üstüne sahip olduklarını belirtmişlerdir. Araştırmaya katılan çocukların %46.7'sinin kız, %53.3'ünün ise erkeklerden oluştuğu görülmektedir. Çocukların yaşlarına bakıldığında %1.7'sinin 36-47 ay arasında, %25'inin 48-59 ay arasında, %73.3'ünün 60 ay ve üstü olduğu belirtilmiştir.

Veri Toplama Araçları

Çalışmada, annelere "Yuva Çocukları için Ayrılma Kaygısı Ölçeği (Anne-Baba Formu)" ve "Durumluk- Sürekli Kaygı Ölçeği (STAI-I ve STAI-II)" uygulanmış ardından annelerin okula yeni başlayan 36 ay ve üstü okul öncesi dönem çocukları için, öğretmenleri tarafından "Yuva Çocukları için Ayrılma Kaygısı Ölçeği (Öğretmen Formu)" doldurulmuştur. Ayrıca araştırmada ailelerin demografik özelliklerini belirlemek için araştırmacılar tarafından geliştirilen Kişisel Bilgi Formu kullanılmıştır (Ek 1).

Yuva çocukları için ayrılma kaygısı ölçeği. Akman (1987) tarafından geliştirilen ölçeğin anne baba ve öğretmen formu şeklinde iki ayrı formu bulunmaktadır. Anne baba formunda 25, öğretmen formunda 25 olmak üzere toplam 50 maddeden oluşmaktadır. Ölçekteki maddeler çocuktaki ayrılma kaygısının göstergesi olarak ve anne babaları tarafından çocuktaki ayrılma kaygısının göstergesi olarak gözlemleyebilecekleri ifadelerden meydana gelmektedir. Maddelerin

her biri öğretmen ve anne baba tarafından birden beşe kadar olan derecelendirilmeler üstünden yapılmaktadır. Derecelerde 1=hiçbir zaman, 5=her zaman anlamına gelmektedir. Bir formun ayrılma kaygısı puanı hesaplanması hem anne baba hem öğretmen formundaki bireysel puanların toplanmasından sonra, formlardaki madde sayısına bölünerek gerçekleştirilir. Ardından meydana gelen bu iki ayrı puan toplanılarak çocuk ayrılma kaygısı puanı elde edilir. Ölçekten elde edilebilecek ayrılma kaygısı puanı 2 ile 10 arasında değişmektedir (Küçüködük, 2015).

Çalışmada kullanılan ölçeğin geçerlik ve güvenirlik analizleri Akman (1987) tarafından gerçekleştirilmiştir. Bu analizlerin sonucunda Cronbach alfa katsayısı 0.35 ile 0.94 arasında ve iki yarım test güvenirliği 0.96 olarak saptanmıştır (Akman, 1987). Bu çalışmada ölçeğe ait geçerlik ve güvenirlik analizleri araştırmacı tarafından yeniden yapılmış ve Cronbach alfa güvenirlik katsayısı 0,956 bulunmuştur. Ayrıca bu araştırma kapsamında yapılan KMO Barlett değeri 0.844 bulunulmuştur. Elde edilen bu sonuçlar, ölçeklerin araştırmanın yürütülebilmesi için geçerli ve güvenilir değerlere sahip olduğunu göstermektedir.

STAI-I VE STAI-II Durumluk-Sürekli Kaygı Envanteri. Durumluk-sürekli kaygı envanteri Spielberg ve arkadaşları (1971) tarafından geliştirilmiş ve Türkçe uyarlaması Öner ve Le Compte (1998) tarafından yapılmıştır. Durumluk-sürekli kaygı envanteri her bir formu 20 maddeden oluşan farklı iki ölçekten meydana gelmektedir. Kişilerin belli bir zamanda ve belli bir şartta hislerinin nasıl olduğunu durumluk kaygı envanteri belirler. Kişilerin içerisinde olduğu durumlar ve koşullar düşünülmeksizin genel olarak kendisini nasıl hissettiğini ise sürekli kaygı envanteri belirler. Durumluk kaygı envanteri yanıtlanırken ölçek maddesinde bahsedilen duyguların, düşüncelerin ve davranışların yaşanma şiddetine göre 1=hiç, 2=biraz, 3=çok ve 4=tamamiyle şıklarında bir tanesi seçilir. Sürekli kaygı envanteri yanıtlanırken ise ölçek maddesinde bahsedilen duyguların, düşüncelerin ve davranışların yaşanma sıklığına göre 1=hemen hemen hiçbir zaman, 2=bazen, 3=çok zaman ve 4=hemen hemen her zaman şıklarından bir tanesi seçilir (Aydemir ve Köroğlu, 2000).

Ölçeklerde maddeler doğrudan ve ters olarak 2 farklı tiptedir. Doğrudan olanlar olumsuz, ters olanlar ise olumlu duyguları ifade eder. Durumluk kaygı envanterinde ters ifadeler 1, 2, 5, 8, 10, 11, 15, 16, 19 ve 20. maddelerdir. Sürekli kaygı envanterinde ise 21, 26, 27, 30, 33, 36 ve 39. maddelerdir. Ölçek puanı hesaplanırken doğrudan maddelerden elde edilen toplam puandan, ters olan maddelerden elde edilen toplam puan çıkarılır. Ardından daha önce belirlenmiş olan sabit değer, elde edilen puana eklenir ve durumluk sürekli kaygı puanları elde edilmiş olur. Önceden belirlenmiş sabit değer, durumluk kaygı envanteri hesabında 50, sürekli kaygı envanteri hesabında 35 olarak alınır. Ölçeklerin her birinin toplam puanı en az 20, en çok 80 olmaktadır. Ölçek puanının yüksekliği kaygı seviyesinin derecesini işaret eder (Öner & Le Compte, 1998).

Durumluk sürekli kaygı envanteri için yurt içinde gerçekleştirilen geçerlik analizinde, farklı zamanlarda yapılmış yenileme faaliyetlerinde, farklı durumlarda durumluk kaygı düzeylerinde

artış ya da azalış olsa dahi, aynı bireylerin sürekli kaygı düzeylerinde anlamlı farklılıkların olmadığı görülmüştür. Farklı zamanlarda ve şartlarda gerçekleştirilen çalışmalarda durumluk ve sürekli kaygı düzeyleri arasındaki korelasyon değeri yaklaşık olarak .62 olarak bulunmuştur (Öner, 1997). Bu araştırma kapsamında ölçeğe ait geçerlik ve güvenirlik analizleri araştırmacılar tarafından yeniden yapılmış ve araştırmanın örnekleminde Durumluk Sürekli Kaygı Envanterinin Cronbach alfa güvenirlik katsayısı durumluk boyutu için 0.891, süreklik boyutu için 0.847, ölçeğin tamamı için 0.916 bulunmuştur. Ayrıca bu araştırma kapsamında yapılan KMO Barlett değeri 0.806 bulunulmuştur.

Verilerin Toplanması

Araştırmanın verileri; Yuva Çocukları için Ayrılma Kaygısı Ölçeği ve STAI-I Ve STAI-II Kaygı Ölçeği aracılığıyla toplanmıştır. Anne ve çocuğun demografik özelliklerini belirleyebilmek için de Kişisel Bilgi Formu uygulanmıştır.

Verilerin Analizi

Bu çalışmada elde edilen veriler SPSS 22 paket programı aracılığı ile analiz edilmiştir. Verilere ilişkin frekans dağılımları verilmiştir. İlk olarak verilerin normal dağılımdan gelme durumları araştırılmıştır. Normallik durumlarına bakılırken normallik testi ile basıklık ve çarpıklık katsayılarından yararlanılmış ve sonucunda normal dağılım sergilemedikleri saptanmıştır. Bundan dolayı non-parametrik istatistiklerden faydalanılmıştır. Bu durumdan kaynaklı iki gruplu karşılaştırmalarda Mann-Whitney U testi, üç ve daha fazla gruplu karşılaştırmalarda ise Kruskall-Wallis H testi kullanılmıştır. Normal dağılımdan gelmeyen değişkenler arasındaki ilişkiler incelenirken Spearman's Korelasyon Katsayısından yararlanılmıştır. Gruplar arası farklılık incelenirken; anlamlılık seviyesi olarak 0,05 kullanılmış olup $p<0,05$ olması durumunda gruplar arası anlamlı farklılığın olduğu, $p>0,05$ olması durumunda ise gruplar arası anlamlı farklılığın olmadığı belirtilmiştir.

BULGULAR

Okul Öncesi Dönemdeki Çocukların Ayrılma Kaygısına İlişkin Bulgular

Bu kısımda okul öncesi dönemdeki çocukların kaygıları cinsiyet, yaş, kardeş sayısı, anne yaşı, anne öğrenim düzeyi, annenin çalışma durumu ve sosyo-ekonomik düzey gibi değişkenlere göre farklılaşıp farklılaşmadığına ilişkin bulgulara yer verilmiştir.

Yuva Çocukları için Ayrılma Kaygısı Ölçeği ile STAI-I VE STAI-II Kaygı Ölçeğinden elde edilen bulgular ışığında, okul öncesi eğitim sürecine yeni başlayan çocukların ayrılma kaygıları ile annelerinin durumluk sürekli kaygılarına ilişkin betimsel istatistik sonuçları Tablo 1'de gösterilmektedir.

Tablo 1. Okul öncesi eğitime yeni başlayan çocukların ayrılma kaygıları ile annelerinin durumluk, sürekli ve toplam kaygılarına ilişkin betimsel istatistik sonuçları

Ölçekler	$\bar{X}$	ss	Min	Max
Çocukların ayrılma kaygıları	3,38	,98	2,24	7,32
Annelerin durumluk kaygıları	41,61	7,40	22,00	71,00
Annelerin sürekli kaygıları	46,55	5,97	28,00	61,00
Annelerin toplam kaygıları	88,17	10,78	50,00	115,00

Tablo 1 incelendiğinde okul öncesi eğitime yeni başlayan çocukların yuva çocukları için ayrılma kaygısı ölçeğinden aldıkları ortalama puanın $\bar{X}$=3,38, okul öncesi eğitime yeni başlayan çocukların annelerinin durumluk kaygı ölçeğinden aldıkları ortalama puanın $\bar{X}$=41,61, sürekli kaygı ölçeğinden aldıkları ortalama puanın $\bar{X}$=46,55 ve toplam kaygı ortalama puanlarının $\bar{X}$=88,17 olduğu görülmektedir. Yuva çocukları için ayrılma kaygısı ölçeğinden alınabilecek puanın en az 2, en fazla 10 olduğu bilgisinden hareketle çocukların ayrılma kaygılarının ortalama puanın altında olduğu söylenebilir. Bununla birlikte durumluk sürekli kaygı ölçeğinden alınabilecek en düşük toplam puanın 40, en yüksek toplam puanın 160 olduğu düşünüldüğünde annelerin toplam kaygılarının ortalamanın hemen altında olduğu söylenebilir.

Yuva Çocukları için Ayrılma Kaygısı Ölçeğinden elde edilen bulgulara göre, cinsiyete göre çocukların ayrılma kaygıları Tablo 2'de gösterilmektedir.

Tablo 2. Cinsiyete göre çocukların ayrılma kaygısının Mann Whitney U testi Sonuçları

Cinsiyet	N	Sıra Ortalaması	Sıra Toplamı	u	z	p
Kız	56	58,01	3248,50	1652,5	-,734	,463
Erkek	64	62,68	4011,50			
Toplam	120					

Tablo 2'deki Mann-Whitney U testine ilişkin bulgular cinsiyete göre çocukların ayrılma kaygılarında istatiksel olarak anlamlı bir farklılığın olmadığını göstermektedir (Z= -0.734; p>.05). Kız çocukların ayrılma kaygıları ortalamasının ($\bar{X}$=58,01) ve erkek çocukların ayrılma kaygıları ortalamasının ($\bar{X}$ =62,68) olduğu görülmektedir.

Yuva Çocukları için Ayrılma Kaygısı Ölçeğinden elde edilen bulgulara göre, yaşa göre çocukların ayrılma kaygıları Tablo 3'de gösterilmektedir.

Tablo 3.*Yaşa göre çocukların ayrılma kaygılarına ilişkin Kruskal Wallis–H (KWH) testi sonuçları*

Gruplar	N	Sıra Ortalaması	sd	KWH	p
36-47 ay	2	58,75	0,48	0,619	,734
48-59 ay	30	56,23			
60 ay ve üstü	88	61,99			
Toplam	120				

Tablo 3'deki Kruskal Wallis–H (KWH) testine ilişkin bulgular yaşa göre çocukların ayrılma kaygılarında istatiksel olarak anlamlı bir farklılığın olmadığını göstermektedir (KWH=0,619; p>.05). Gruplar, sıra ortalamaları açısından incelendiğinde; 36-47 ay arası çocukların ayrılma kaygılarının ($\overline{X}$ =58,75), 48-59 ay arası çocukların ayrılma kaygıları ortalamasının ($\overline{X}$ =56,23), 60 ay ve üstü çocukların ayrılma kaygıları ortalamasının ($\overline{X}$ =61,99) olduğu görülmektedir.

Elde edilen bulgulara göre, kardeş sayısına göre çocukların ayrılma kaygıları

Tablo 4'de gösterilmektedir.

Tablo 4.*Kardeş sayısına göre çocukların ayrılma kaygılarına ilişkin Kruskal Wallis–H (KWH) testi sonuçları*

Gruplar	N	Sıra Ortalaması	sd	KWH	p
Tek Çocuk	30	77,23	0,737	11,199	,004
İki Çocuk	55	58,99			
Üç çocuk ve üstü	35	48,53			
Toplam	120				

Tablo 4'deki Kruskal Wallis–H (KWH) testine ilişkin bulgular kardeş sayısına göre çocukların ayrılma kaygılarında istatiksel olarak anlamlı bir farklılığın olduğunu göstermektedir (KWH=11,199; p<.05). Farkın kaynağını tespit etmek ve hangi kategoriler arasında anlamlı farklılık olduğunu bulmak için Mann Whitney-U testi yapılmıştır. Elde edilen bulgularda sıra puanları incelendiğinde tek çocuklar ile iki kardeş olan çocuklar arasında tek çocuklar lehine (51,78>38,21) ve tek çocuklar ile üç kardeş ve daha fazlasına sahip çocuklar arasında tek çocuklar lehine (40,95>26,19) anlamlı bir farklılık vardır. Bir başka ifade tek çocukların hem iki kardeş olan çocuklara hem de üç kardeş ve üstüne sahip olan çocuklara göre ayrılma kaygıları anlamlı şekilde yüksektir. Gruplar, sıra ortalamaları açısından incelendiğinde; tek çocukların ayrılma kaygılarının ortalamasının ($\overline{X}$ = 77,23), iki kardeş olan çocukların ayrılma kaygıları ortalamasının ($\overline{X}$ =58,99) ve üç kardeş ve daha fazlasına sahip çocukların ayrılma kaygıları ortalamasının ($\overline{X}$ =48,53) olduğu görülmektedir.

Elde edilen bulgulara bakarak, annenin yaşına göre çocukların ayrılma kaygıları Tablo 5'de gösterilmektedir.

Tablo 5.*Annenin yaşına göre çocukların ayrılma kaygılarına ilişkin Kruskal Wallis–H (KWH) testi sonuçları*

Gruplar	N	Sıra Ortalaması	sd	KWH	p
22-27 yaş	8	51,00	0,82	3,323	,344
28-33 yaş	38	67,75			
34-39 yaş	54	55,85			
40 yaş ve üzeri	20	63,08			
Toplam	120				

Tablo 5'deki Kruskal Wallis–H (KWH) testine ilişkin bulgular annenin yaşına göre çocukların ayrılma kaygılarında istatiksel olarak anlamlı bir farklılığın olmadığını göstermektedir

(KWH=3,337; p>.05). Gruplar, sıra ortalamaları açısından incelendiğinde; 22-27 yaş aralığındaki annelerin çocuklarının ayrılma kaygıları ortalamasının ($\overline{X} = 51,0$), 28-33 yaş aralığındaki annelerin çocuklarının ayrılma kaygıları ortalamasının ($\overline{X} = 67,75$), 34-39 yaş aralığındaki annelerin çocuklarının ayrılma kaygıları ortalamasının ($\overline{X} = 55,85$), 40 yaş ve üzeri annelerin çocuklarının ayrılma kaygıları ortalamasının ($\overline{X} = 63,08$) olduğu görülmektedir. 22-27 yaş aralığındaki anne sayısının diğer gruplara nazaran az sayıda olduğu (n=8) göz önünde bulundurulursa; nispeten daha erken yaşta anne olanların çocuklarının ayrılma kaygıları ortalamasının (28-33 yaş) ile daha geç yaşta anne olanların çocuklarının ayrılma kaygıları ortalamasının (40 yaş ve üzeri) daha yüksek olduğu belirtilebilir.

Elde edilen bulgulara bakarak, annenin öğrenim durumuna göre çocukların ayrılma kaygıları Tablo 6'da gösterilmektedir.

Tablo 6. *Annenin öğrenim durumuna göre çocukların ayrılma kaygılarına ilişkin Kruskal Wallis–H (KWH) testi sonuçları*

Gruplar	N	Sıra Ortalaması	sd	KWH	p
İlkokul	19	53,87	1,15	2,347	,672
Ortaokul	12	51,00			
Lise	35	61,09			
Ön Lisans veya Lisans	48	64,75			
Yüksek Lisans	6	63,08			
Toplam	120				

Tablo 6'daki Kruskal Wallis–H (KWH) testine ilişkin bulgular annenin öğrenim durumuna göre çocukların ayrılma kaygılarında istatiksel olarak anlamlı bir farklılığın olmadığını göstermektedir (KWH=2,347; p>.05). Gruplar, sıra ortalamaları açısından incelendiğinde; ilkokul mezunu annelerin çocuklarının ayrılma kaygıları ortalamasının ($\overline{X}$ =53,87), ortaokul mezunu annelerin çocuklarının ayrılma kaygıları ortalamasının ($\overline{X}$ =51,00), lise mezunu annelerin çocuklarının ayrılma kaygıları ortalamasının ($\overline{X}$ =61,09), önlisans veya lisans mezunu annelerin çocuklarının ayrılma kaygıları ortalamasının ($\overline{X}$ =64,75), yüksek lisans mezunu annelerin çocuklarının ayrılma kaygıları ortalamasının ($\overline{X}$ =63,08) olduğu görülmektedir.

Elde edilen bulgulara bakarak, annenin çalışma durumuna göre çocukların ayrılma kaygıları Tablo 7'de gösterilmektedir.

Tablo 7. *Annenin çalışma durumuna göre çocukların ayrılma kaygısının Mann Whitney U testi Sonuçları*

Çalışma Durumu	N	Sıra Ortalaması	Sıra Toplamı	u	z	p
Çalışıyor	50	53,06	2653,00	1378,0	-1,981	,048
Çalışmıyor	70	65,81	4607,00			
Toplam	120					

Tablo 7'deki Mann-Whitney U testine ilişkin bulgular annenin çalışma durumuna göre çocukların ayrılma kaygılarında istatiksel olarak anlamlı bir farklılığın olduğunu göstermektedir (Z= -1.981;

p<.05). Çalışan annelerin çocuklarının ayrılma kaygıları ortalamasının ($\overline{X}$=53,06) ve çalışmayan annelerin çocuklarının ayrılma kaygıları ortalamasının ($\overline{X}$ =65,81) olduğu görülmektedir. Dolayısıyla çalışmayan annelerin çocuklarının ayrılma kaygılarının daha yüksek olduğu söylenebilir.

Elde edilen bulgulara bakarak, gelir düzeyine göre çocukların ayrılma kaygıları Tablo 8'de gösterilmektedir.

Tablo 8. *Gelir düzeyine göre çocukların ayrılma kaygılarına ilişkin Kruskal Wallis–H (KWH) testi sonuçları*

Gruplar	N	Sıra Ortalaması	sd	KWH	p
Düşük	40	47,59	0,81	23,951	,000
Orta	40	51,56			
Yüksek	40	52,20			
Toplam	120				

Tablo 8'deki Kruskal Wallis–H (KWH) testine ilişkin bulgular ailenin gelir düzeyine göre çocukların ayrılma kaygılarında istatiksel olarak anlamlı bir farklılığın olduğunu göstermektedir [KWH=23,951, p<.05]. Farkın kaynağını tespit etmek ve hangi kategoriler arasında anlamlı farklılık olduğunu bulmak için Mann Whitney-U testi yapılmıştır. Elde edilen bulgularda sıra ortalamalarına bakıldığında orta sosyoekonomik düzeydeki okul öncesi çocukları ile düşük sosyoekonomik düzeydeki okul öncesi çocukları arasında orta sosyoekonomik düzey okul öncesi çocukları lehine (41,71>39,29), yüksek sosyo ekonomik düzeydeki okul öncesi çocukları ile düşük sosyoekonomik düzeydeki okul öncesi çocukları arasında yüksek sosyoekonomik düzey okul öncesi çocukları lehine (52,20>28,80), yüksek sosyoekonomik düzeydeki okul öncesi çocukları ile orta sosyoekonomik düzeydeki okul öncesi çocukları arasında yüksek sosyoekonomik düzeydeki okul öncesi çocukları lehine (50,65>30,35) anlamlı bir farklılık vardır.

Annelerin Durumluk Sürekli Kaygılarına İlişkin Bulgular

Bu bölümde annelerin durumluk sürekli kaygıları yaş, öğrenim durumu, aylık gelir düzeyi ve çocuğunun cinsiyetine göre farklılaşıp farklılaşmadığına ilişkin bulgulara yer verilmiştir.

Durumluk Sürekli Kaygı Envanteri'nden elde edilen bulgulara göre, okul öncesi çocuklarının cinsiyetine göre annelerinin durumluk sürekli kaygıları Tablo 9'da gösterilmektedir.

Tablo 9. *Çocukların cinsiyetine göre annelerinin durumluk sürekli kaygılarına ilişkin Mann Whitney U testi Sonuçları*

	Cinsiyet	N	Sıra Ortalaması	Sıra Toplamı	u	z	p
	Kız	54	59,12	3310,50	1714,50	-,408	,683
Durumluk Kaygı	Erkek	64	61,71	3949,50			
	Toplam	120					
	Kız	56	62,79	3516,50	1663,500	-,677	,498
Sürekli Kaygı	Erkek	64	58,49	3743,50			
	Toplam	120					
	Kız	56	61,27	3431,00	1749,000	-,226	,821
Toplam Kaygı	Erkek	64	59,83	3829,00			
	Toplam	120					

Tablo 9'daki Kruskal Wallis–H (KWH) testine ilişkin bulgular çocukların cinsiyetine göre annelerin durumluk kaygılarında istatiksel olarak anlamlı bir farklılığın olmadığını göstermektedir (KWH= -0.408; p>.05). Gruplar, sıra ortalamaları açısından incelendiğinde; kız çocukların annelerinin durumluk kaygı ortalamalarının ($\overline{X}$ =59,12), erkek çocukların annelerinin durumluk kaygı ortalamalarının ($\overline{X}$ =61,71) olduğu görülmektedir.

Tablo 9'daki Kruskal Wallis–H (KWH) testine ilişkin bulgular çocukların cinsiyetine göre annelerin sürekli kaygılarında istatiksel olarak anlamlı bir farklılığın olmadığını göstermektedir (KWH= -0.677; p>.05). Gruplar, sıra ortalamaları açısından incelendiğinde; kız çocukların annelerinin sürekli kaygı ortalamalarının ($\overline{X}$ =62,79), erkek çocukların annelerinin sürekli kaygı ortalamalarının ($\overline{X}$ =58,49) olduğu görülmektedir.

Tablo 9'daki Kruskal Wallis–H (KWH) testine ilişkin bulgular çocukların cinsiyetine göre annelerin toplam kaygılarında istatiksel olarak anlamlı bir farklılığın olmadığını göstermektedir (KWH= -0.226; p>.05). Gruplar, sıra ortalamaları açısından incelendiğinde; kız çocukların annelerinin toplam kaygı ortalamalarının ($\overline{X}$ =61,27), erkek çocukların annelerinin toplam kaygı ortalamalarının ($\overline{X}$ =59,83) olduğu görülmektedir.

Durumluk Sürekli Kaygı Envanterinden elde edilen bulgulara göre, annelerin öğrenim durumlarına göre durumluk sürekli kaygıları Tablo 10'da görülmektedir.

Tablo 10. *Durumluk Sürekli Kaygı Envanteri'nden elde edilen bulgulara göre, annelerin öğrenim durumlarına göre durumluk sürekli kaygıları*

	Öğrenim Durumu	N	Sıra Ortalaması	sd	KWH	p
	İlkokul	19	72,26	1,15	3,578	,466
	Ortaokul	12	65,83			
Durumluk Kaygı	Lise	35	59,57			
	Önlisans veya Lisans	48	56,28			
	Yüksek Lisans	6	51,75			
	Toplam	120				
	İlkokul	19	73,66	1,15	11,432	,022
	Ortaokul	12	49,75			
Sürekli Kaygı	Lise	35	67,37			
	Önlisans veya Lisans	48	57,22			
	Yüksek Lisans	6	26,50			
	Toplam	120				
	İlkokul	19		1,15	7,992	,092
	Ortaokul	12				
Toplam Kaygı	Lise	35				
	Önlisans veya Lisans	48				
	Yüksek Lisans	6				
	Toplam	120				

Tablo 10'daki Kruskal Wallis–H (KWH) testine ilişkin bulgular öğrenim durumlarına göre annelerin durumluk kaygılarında istatiksel olarak anlamlı bir farklılığın olmadığını göstermektedir (KWH= 3.578; p>.05). Gruplar, sıra ortalamaları açısından incelendiğinde; ilkokul mezunu annelerin durumluk kaygı ortalamalarının ($\overline{X}$ =72,26), ortaokul mezunu annelerin durumluk kaygı ortalamalarının ($\overline{X}$ =65,83), lise mezunu annelerin durumluk kaygı ortalamalarının ($\overline{X}$ =59,57), önlisans veya lisans mezunu annelerin durumluk kaygı ortalamalarının ($\overline{X}$ =56,28), yüksek lisans mezunu annelerin durumluk kaygı ortalamalarının ($\overline{X}$ =51,75) olduğu görülmektedir.

Tablo 10'daki Kruskal Wallis–H (KWH) testine ilişkin bulgular öğrenim durumlarına göre annelerin sürekli kaygılarında istatiksel olarak anlamlı bir farklılığın olduğunu göstermektedir (KWH= 11.432; p<..05). Gruplar, sıra ortalamaları açısından incelendiğinde; ilkokul mezunu annelerin sürekli kaygı ortalamalarının ($\overline{X}$ =73,66), ortaokul mezunu annelerin sürekli kaygı ortalamalarının ($\overline{X}$ =49,75), lise mezunu annelerin sürekli kaygı ortalamalarının ($\overline{X}$ =67,37), önlisans veya lisans mezunu annelerin sürekli kaygı ortalamalarının ($\overline{X}$ =57,22), yüksek lisans mezunu annelerin sürekli kaygı ortalamalarının ($\overline{X}$ =26,50) olduğu bulunmuştur.

Farkın kaynağını tespit etmek ve hangi kategoriler arasında anlamlı farklılık olduğunu bulmak için Mann Whitney-U testi yapılmıştır. Elde edilen bulgularda yüksek lisans mezunu anneler ile hem ilkokul hem lise mezunu annelerin kaygıları arasında anlamlı bir farklılık bulunmuştur. Sıra ortalamalarına bakıldığında ilkokul mezunu annelerin kaygıları yüksek lisans mezunu annelerin kaygılarına kıyasla daha yüksek olduğu (15,18>6,08) ve lise mezunu annelerin kaygıları yine yüksek lisans mezunu annelerin kaygılarına göre daha yüksek olduğu (22,87>10,08) görülmüştür.

Tablo 10'daki Kruskal Wallis–H (KWH) testine ilişkin bulgular öğrenim durumlarına göre annelerin toplam kaygılarında istatiksel olarak anlamlı bir farklılığın olmadığını göstermektedir (KWH= 7.992; p>.05). Gruplar, sıra ortalamaları açısından incelendiğinde; ilkokul mezunu annelerin toplam kaygı ortalamalarının ($\overline{X}$ =73,50), ortaokul mezunu annelerin toplam kaygı ortalamalarının ($\overline{X}$ =60,92), lise mezunu annelerin toplam kaygı ortalamalarının ($\overline{X}$ =66,31), önlisans veya lisans mezunu annelerin toplam kaygı ortalamalarının ($\overline{X}$ =53,88), yüksek lisans mezunu annelerin toplam kaygı ortalamalarının ($\overline{X}$ =37,58) olduğu görülmektedir.

Okul Öncesi Dönemdeki Çocukların Ayrılık Kaygısı ile Annelerin Durumluk Sürekli Kaygı Düzeylerine İlişkin Bulgular

Yuva Çocukları için Ayrılma Kaygısı Ölçeği ile Durumluk-Sürekli Kaygı Ölçeğinden elde edilen bulgularla, çocukların ayrılma kaygıları ile annelerinin toplam kaygı puanlarına ilişkin betimsel istatistik sonuçları Tablo 11'de verilmiştir.

Tablo 11. *Çocukların ayrılma kaygıları ile annelerinin durumluk-sürekli kaygı puanlarına ilişkin betimsel istatistik sonuçları*

Ölçekler	N	$\bar{x}$	ss	Min	Max
Yuva Çocukları için Ayrılma Kaygısı Ölçeği	120	3,38	0,98	2,24	7,32
Durumluk Sürekli Kaygı Ölçeği	120	88,17	10,78	50	115

Tablo 11 incelendiğinde; okul öncesi eğitime yeni başlayan çocukların yuva çocukları için ayrılma kaygısı ölçeğinden aldıkları ortalama puanın, ($\overline{X}$ = 3,38) olduğu, bu çocukların annelerinin durumluk sürekli kaygı ölçeğinden aldıkları ortalama puanın, ($\overline{X}$=88,17) olduğu görülmektedir. Yuva çocukları için ayrılma kaygısı ölçeğinden alınabilecek en düşük puanın 2, en yüksek puanın 10 olduğu düşünüldüğünde çocukların ayrılma kaygılarının düşük olduğu söylenebilir. Bununla birlikte durumluk sürekli kaygı ölçeğinden alınabilecek toplam minimum puan 40, maksimum puanın ise 160 olduğu düşünüldüğünde annelerin kaygı puanının ortalamaya yakın olduğu söylenebilir.

Okul öncesi dönemdeki çocukların ayrılık kaygıları ile annelerin kaygıları arasındaki ilişkiyi incelemek adına korelasyon analizi gerçekleştirilmiştir. Bu analize ilişkin bulgular Tablo 12'de verilmektedir.

Tablo 12. *Çocukların Ayrılık Kaygısı ile Annelerin Durumluk Sürekli Kaygı Düzeyleri Arasındaki İlişki*

Değişkenler	$\bar{x}$	sd	r
Annelerin Durumluk-Sürekli Kaygısı	88,17	10,78	,155*
Çocukların Ayrılık Kaygısı	3,38	,98	

*p<.05

Tablo 13 'de görüldüğü gibi, annelere uygulanan Durumluk-Sürekli Kaygı Ölçeği toplam puanı ile ve çocukların öğretmenlerine ve annelerine uygulanan Yuva Çocukları için Ayrılma Kaygısı Ölçeği toplam puanı arasında anlamlı bir ilişki görülmemektedir (r=0,155, p<.05).

TARTIŞMA VE ÖNERİLER

Okul öncesi eğitime başlayan çocukların ayrılma kaygılarına ilişkin tartışma

Araştırma sonucunda okul öncesi eğitime başlayan çocukların ayrılma kaygılarının cinsiyete göre anlamlı olarak farklılaşmadığı belirlenmiştir. Puan ortalamalarına bakıldığında ise erkek çocukların ayrılma kaygılarının biraz daha yüksek olduğu görülmüştür. Ülkemizde yapılan bir araştırmada cinsiyet ile ayrılma anksiyetesi belirtileri varlığı arasında anlamlı bir ilişki bulunmamış ve erkek öğrencilerin %13,7'sinin ayrılma kaygısı belirtilerinin eşik değerden yüksek olduğu saptanmıştır. Bu oran kızlarda %10,5 olarak bulunmuştur (Saltık, 2019). Bu sonuç, yapılan bu araştırmayı destekler niteliktedir. Ülkemizde bu araştırmalarla aynı sonuçları destekleyen ve kaygı düzeyleri ile cinsiyetler arasında fark saptanmayan birçok çalışma mevcuttur (Ayaz, Ayaz, Fiş ve Güler, 2012; Batur, Demir, Ulu, Güneş, Irmak ve Aşkın, 2005; Sümer & Şendağ, 2009; Teze,2016).

Benzer sonuçlara yurtdışında yapılan araştırmalarda da görmek mümkündür. Battaglia ve diğerleri (2016), Spence ve arkadaşları (2001), Last, Perrin, Hersen ve Kazdin (1992) ve Bird, Gould, Yager, Staghezza ve Canino (1989) ayrılık kaygısı bozukluğu üzerinde yaptıkları çalışmalarda her iki cinsiyet üzerinde fark saptanmadığını bulmuşlardır. Sonuç olarak içinde bulunulan yıllarda geçmişe nazaran kız ve erkek çocukların aralarındaki yetiştirme farklılıklarının azaldığı, ayrılma kaygısının kız çocuklarında daha çok olacağı önyargısının giderek aşıldığı düşünülebilir.

Araştırma sonucunda okul öncesi eğitime başlayan çocukların ayrılma kaygılarının yaşa göre anlamlı olarak farklılaşmadığı belirlenmiştir. Gruplar, sıra ortalamaları açısından incelendiğinde; 36-47 ay arası çocuklar (58,75) ile 48-59 ay arası çocukların (56,23) ayrılma kaygıları ortalamasının birbirine yakın,60 ay ve üstü çocukların (61,99) ayrılma kaygılarının daha yüksek olduğu görülmüştür. Battaglia ve diğerlerinin (2016) gerçekleştirdiği boylamsal araştırmada 1,5-6 yaş arasındaki çocuklarda ayrılma kaygısının 4-5 yaşına kadar artıp daha sonra azaldığı görülmüştür. 4-5 yaşını geçtiği halde yüksek ayrılma kaygısı süren çocukların ise doğumdan önce ve sonra karşılaştığı faktörler ile ailevi etmenlerin kaygılarına etki ettiği saptanmıştır. Ancak literatürde farklı sonuçlar da görülmektedir. Küçüködük (2015) tarafından yapılan çalışmada annelerdeki ayrılma kaygıları ile çocuklardaki ayrılma kaygılarının aralarındaki ilişki araştırılmış ve 4-5 yaşındaki çocuklardaki kaygı seviyesinin 3 yaş çocuklarına kıyasla anlamlı düzeyde düşük olduğu saptanmıştır. Çocukların yaşlarının artmasıyla ayrılmaya uyum sürecinin kolaylaşacağı ve ayrılma kaygısının azalacağı düşünülmüş ancak çocuk yaşı ile ayrılma kaygısı arasında ilişki saptanamamıştır. Güngör (2009) 5 ve 6 yaşındaki çocukların kaygı düzeyini karşılaştırdığı araştırmada, 5 ve 6 yaş çocukları birbirleriyle kıyaslandığında 6 yaş çocukların kaygılarının 5 yaşa göre daha yüksek kaygıya sahip oldukları görülmüştür. Bu durumun sebebi olarak çocukların yaşlarının artmasıyla daha çok bilinçlenmeleri ve 6 yaş grubundaki çocukların bir sonraki sene okul değiştirmelerinin neticesinde kaygılarının artmış olabileceği belirtilmiştir. Bu araştırmanın

sonucunda da 60 ay çocuklarının anlamlı derecede olmasa da kaygı puan ortalamalarının daha yüksek olmasının benzer bir sebebi olabileceği düşünülmektedir. Ayrıca bu araştırmanın örneklemindeki çocukların çoğunun (%73.3) yaşının 60 ay ve üstü olması ve yaşların homojen bir dağılımda olmaması da anlamlı sonucun çıkmamasının başka bir nedeni olabilir. Bu sebeple çocukların yaşları açısından daha homojen bir dağılımda ve katılımcı sayısının daha yüksek olduğu yeni araştırmalara ihtiyaç duyulmaktadır.

Araştırma sonucunda okul öncesi eğitime başlayan çocukların ayrılma kaygılarının kardeş sayısına göre anlamlı şekilde farklılaştığı ve tek çocukların hem iki hem de üç ve üzeri kardeşe sahip çocuklara göre ayrılma kaygısının daha yüksek olduğu belirlenmiştir. Balkaya (1998) ve Nazlıoğlu (2019) araştırmalarında ailenin tek çocuğu olanların ayrılma kaygısı puanlarının iki çocuk olanlara göre daha yüksek olduğu sonucunu saptamışlardır. Bu sonuca benzer başka çalışmalarında olduğu görülmektedir (Küçüködük, 2015; Çetin, 2017) Aile içindeki etkileşimler çocuk sayısından yüksek oranda etkilenmektedir. Çocukların sayıca fazla olması ebeveyn çocuk iletişiminin daha az olmasına, çocukların birbirleriyle olan iletişiminin daha fazla olmasına neden olmaktadır. Ebeveynler kötü yönde bir tavır sergilemediği müddetçe, çoğunlukla kardeşler birbirini sever. Dolayısı ile kardeş sayısı kaygı düzeyine etki etmez. Ancak ebeveynlerin çocuklara gösterdikleri davranışlar genellikle farklı olmaktadır. Genelde tek çocuğa sahip ebeveynler çocuğa olması gerekenden daha yoğun ilgi gösterirler. Çocuğun kendi karşılayabileceği ihtiyaçları dahi ebeveynleri tarafından karşılanarak çocuk, hayatın gerçeklerinden bihaber büyütülmektedir. Bu yetiştirme tarzı çocuğun ailesinde gördüğü bu ilgiyi ve konforu bulamadığı zamanlarda yüksek kaygı yaşamasına neden olabilir (Alisinanoğlu & Ulutaş, 2003). Bu sebeple kardeş sayısının kaygı düzeyini etkileyebileceği düşünülmüştür. Bu durumun bir başka sebebi olarak tek çocukların genellikle ebeveynle vakit geçirmek zorunda olması, kardeşi olan çocukların ise kardeşleriyle etkileşime girme şansı bulabilmesidir. Bu süreçlerde ebeveynlerinden ayrılma becerileri olumlu yönde etkilenebilmektedir. Aynı zamanda grup oyunları oynayabilmeleri okul yaşamına adaptasyonda avantaj olarak etkisini hissettireceği söylenebilir.

Araştırma sonucunda okul öncesi eğitime başlayan çocukların ayrılma kaygılarının annenin yaşına göre anlamlı şekilde farklılaşmadığı görülmüştür. Ülkemizde farklı zamanlarda yapılan bazı çalışmalarda annenin yaşı ile çocuğun ayrılık kaygısı değişkeni arasında anlamlı bir fark bulunmamıştır (Ayaz, 2015; Balkaya, 1998; Solmaz, 2017). Bu durumun nedeninin, çocuk kaygısında çevrenin ve genetik etmenin etkili olduğu söylenebilir. Günümüzde giderek farklılaşan hayat şartları, aile kurumunun yapısını ve çalışma koşullarının değişimini de beraberinde getirmektedir. Bu değişimle beraber annelerin evin dışında çalışma hayatının başlamasıyla çocuk bakımının sorumluluğu tek kişi üzerinden kalkıp paylaşılma gerekliliğine doğru yön değiştirmiştir (Myers, 1996). Bu durum sebebiyle, çocuğun ayrılma kaygı durumunda annenin dışında diğer kişilerin de çocuk yetiştirme tutumlarının etkisinin olabileceğini düşünülmektedir.

Araştırma sonucunda okul öncesi eğitime başlayan çocukların ayrılma kaygılarının annelerinin öğrenim durumuna göre anlamlı şekilde farklılaşmadığı görülmüştür. Ayaz (2015) tarafından yapılan çalışmada annelerin öğrenim durumunun çocukların ayrılık kaygısı bozukluğu gelişiminde anlamlı bir fark oluşturmadığı bulunmuştur. Literatürde bu araştırmanın sonucunu destekleyen başka çalışmaların da olduğu görülmektedir (Alisinanoğlu, Ulutaş, 2003; Balkaya, 1998; Nazlıoğlu, 2019; Özdemir, 2019; Saltık, 2019). Çocuğun ayrılma kaygısı üzerinde annelerin öğrenim durumunun anlamlı bir etkisinin olmamasının farklı nedenleri olabilir. Eğitim düzeyi düşük anneler çocuk eğitimi hakkında kitaplar okuyarak, bu alanda seminerlere katılarak kendilerini geliştirmiş olabilirler. Eğitim düzeyi yüksek annelerin çocuklarını en iyi şekilde yetiştirme isteği ile bilgilerini olumlu yönde kullanmayıp çocukları üzerinde farkında olmadan aşırı koruyucu ve baskıcı tutum gösterebilirler. Bu gibi durumların araştırma sonuçlarını etkilediği düşünülmektedir.

Araştırma sonucunda okul öncesi eğitime başlayan çocukların ayrılma kaygılarının annelerinin çalışma durumlarına göre anlamlı şekilde farklılaştığı görülmüştür. Araştırma sonucunda çalışmayan annelerin çocuklarının ayrılma kaygılarının çalışan annelere göre istatiksel olarak anlamlı düzeyde daha yüksek kaygıya sahip oldukları bulunmuştur. Bu sonucun sebebi, çalışmayan annenin sürekli olarak evde bulunmasıyla anne çocuk arasındaki bağımlı ilişkinin pekişmesi olabilir. Çocuk evde bulduğu rahat güvenli ortamdan uzaklaşmak istemeyip bağımsızlık kazanmakta güçlük çekebilir. Çalışmayan annelerin çocuğun bakımıyla çalışan bir anneye göre daha fazla zaman ayırması ve efor sarfetmesi neticesiyle aralarındaki ilişki yıpranabilmektedir. Evde tüm ihtiyaçlarının annesi tarafından karşılandığı, bütün gün annesinin denetimi ve gözetimi veya baskısı altında olan çocuğun daha fazla kaygı yaşadığı düşünülmektedir. Ayrıca tüm gün çocukla beraber olduğunu düşünen anne kaliteli zaman geçirme konusunda hassasiyet göstermiyor olabilir. Annenin çocuğuyla geçirdiği zamanda yaptığı hataları ve problemleri sağlıklı bir şekilde görebilmesi için ortamdan uzaklaşması gerekir. Çalışan anne bu fırsatı bulabilirken, çalışmayan anne ev ortamından uzaklaşıp kendini eleştirme fırsatını bulamıyor olabilir. Yeşildaş (2018) tarafından yapılan çalışmada çalışmayan annelerin çocuklarındaki ayrılık kaygısı puan ortalamalarının çalışan annelerin çocuklarının ayrılık kaygısı puan ortalamalarına göre anlamlı olarak yüksek bulunmuştur. Araştırmamızda çalışmayan annelerin bir kısmının meslek sahibi oldukları halde çalışmadıkları görülmüştür. Doğumla beraber izne ayrılmış olan annenin çocuğuyla olan bağımlı ilişkisi ve çocuğun yaşadığı ayrılma kaygısından dolayı işe geri dönmemiş olabileceği de düşünülmektedir. Ancak çalışmamızda buna yönelik bir araştırma yoktur.

Araştırma sonucunda okul öncesi eğitime başlayan çocukların ayrılma kaygılarının ailelerinin gelir düzeylerine göre anlamlı şekilde farklılaştığı görülmüştür. Araştırma sonucunda yüksek düzey sosyoekonomik okul öncesi çocukların orta ve düşük düzey sosyoekonomik okul öncesi

çocuklarına göre, orta düzey sosyoekonomik okul öncesi çocukların düşük düzey sosyoekonomik okul öncesi çocuklarına göre ayrılma kaygıları anlamlı şekilde daha yüksek olduğu görülmüştür. Bu sonuca benzer bir sonuç Alisinanoğlu ve Ulutaş (2003) tarafından yapılan araştırmada gözlenmiştir. Yaptıkları çalışmada çocuklardaki kaygı seviyeleri ile ailelerin sosyoekonomik seviyeleri arasında anlamlı bir fark bulunmamış, ancak sıra ortalamalarına bakıldığında üst sosyoekonomik düzey ailelerin çocuklarının en yüksek kaygı puanına sahip olduğu, bunu orta ve alt düzeyin izlediği görülmüştür. Solmaz (2017) yaptığı çalışmada yüksek sosyoekonomik düzeyin çocuklardaki korkuyu anlamlı şekilde farklılaştırdığını saptamıştır. Alan yazın incelendiğinde ailelerin ekonomik durumları ile çocukların yaşadığı ayrılma kaygıları hakkında fazla çalışmanın yapılmadığı belirlenmiştir. Bu araştırmanın sonucu değerlendirildiğinde üst sosyoekonomik düzeydeki ailelerin imkanlarının geniş olması sebebiyle çocuklarının daha mükemmel olmasını isteyebilecekleri düşünülmektedir. Erken yaş dönemlerinde çocuğunun hep en iyisi olmasını isteyen ve çocuğa bu yönde telkinlerde bulunan ebeveyn çocuk üzerinde stres oluşturur ve bu da kaygının meydana gelmesine neden olur (Güngör, 2009). Yüksek sosyoekonomik seviyedeki ailelerin çocukların her türlü ihtiyaçlarını karşılayabilmek ve ailelerin yüksek ekonomik şartları oluşturabilmek için yoğun çalışmaları neticesinde çocukların duygusal gereksinimlerini görememe ya da bu ihtiyaçları hemen gideremeyeceleri nedeniyle çocuklardaki kaygı yüksek olabilir (Solmaz, 2017). Yüksek sosyoekonomik düzeydeki ebeveynlerin yoğun çalışıyor olması çocukların vakitlerinin büyük çok büyük bir kısmını televizyon ya da tabletle harcayarak sosyalleşememe ihtimalini düşündürmektedir. Literatürde annelerin çalışma koşullarının çocukların ruhsal durumları üzerine farklı etkilerinden söz edilmektedir. Koşulları zor, çalışma saatleri düzenli olmayan işlerde çalışan annelerin çocuklarında çalışan ya da çalışmayan annelerle karşılaştırıldığında daha fazla kaygı, depresyon ve saldırganlık gözlenmiştir (Dunifon ve diğerleri, 2013). Türkiye'de çocuk modernleşme anlamında da farklılaşmaktadır. Bu farklılık en çocuk oyunları üzerinde kendini göstermekte olup, eskiye nazaran daha bireysel olma ve açık hava oyunlarının azalması şeklinde değişmektedir. Bu durum, üst sosyoekonomik düzeydeki ailelerin çocuklarının sosyal gelişimlerinde olumsuz yönde etki edebilir (Zeteroğlu, 2014). Sosyal gelişimi düşük olan çocuğun evden ayrılmakta zorluk çekeceği düşünülmektedir.

Annelerin kaygılarına ilişkin tartışma.

Araştırma sonucunda okul öncesi eğitime başlayan çocukların annelerinin durumluk sürekli kaygılarının çocuğunun cinsiyetine göre farklılaşmadığı görülmüştür. Güngör ve Buluş (2016) araştırmasında ebeveynlerin kaygı seviyeleri ile çocukların cinsiyeti arasında istatiksel olarak anlamlı fark oluşturmadığı bulgusunu belirlemiştir. Ülkemizde yapılan bir çalışmada çocuğun cinsiyetinin annelerinin tutumlarını etkilemediği görülmüştür (Zeteroğlu, 2014). Bu bulgu annelerin çocuklarının cinsiyetine göre tutumlarını şekillendirmediklerini düşündürmektedir.

Tutum değişikliğinin olmaması, annelerin kaygılarında farklılık oluşturmamasına neden olmuş olabilir.

Araştırma sonucunda okul öncesi eğitime yeni başlayan çocukların annelerinin öğrenim durumuna göre durumluk kaygılarının istatiksel olarak farklılaşmadığı görülmüştür. Sürekli kaygılarında ise anlamlı bir fark olduğu belirlenmiştir. Bu farklılığın sonucunda ilkokul ve lise mezunu annelerin yüksek lisans mezunu annelere göre daha yüksek kaygıya sahip olduğu belirlenmiştir. Yüksek lisans mezunu annelerin sürekli kaygılarının daha düşük olmasının sebebi aldıkları eğitimler sebebiyle sahip oldukları bilgi ve tecrübelerin kişiye kattığı bilinç seviyesi olabilir. Ayrıca ilkokul mezunu anneler ile ortaokul mezunu anneler arasında ve ortaokul mezunu anneler ile lise mezunu anneler arasında anlamlı bir fark bulunamamıştır. Bunun nedeni olarak artık günümüzde bu kademeler arasında net bir farkın kalmaması söylenebilir. Bu araştırmada annelerin durumluk kaygıları ile öğrenim durumları arasında istatiksel olarak anlamlı bir fark görülmemiştir. Durumluk kaygı geçici ve çevre şartlarından etkilenen bir kaygı türüdür (Köknel, 1989). Annelerin durumluk yani durum süresince ortaya çıkan ve zamanla biten kaygıları ile öğrenim durumları arasında fark saptanmamasının sebebi ölçeğin uygulandığı zaman kişilerin bireysel çevre şartlarının farklılığı olabilir. Nazlıoğlu (2019) yaptığı çalışmada annenin öğrenim düzeyi ile annenin durumluk sürekli kaygısı arasında anlamlı bir fark saptamamıştır. Yaşar (2000) yaptığı çalışmada ise ebeveynlerin öğrenim durumları ile durumluk sürekli kaygıları arasında anlamlı bir fark saptamış ve öğrenim seviyesinin artmasıyla durumluk sürekli kaygı seviyesinin azaldığını belirlemiştir. Demirci (2018) yaptığı çalışmada annelerin sürekli kaygı seviyeleri ile öğrenim durumları arasında anlamlı bir fark saptamış ve yükseköğrenim mezunu annelerdeki sürekli kaygı seviyelerinin ilköğretim ve ortaöğrenim mezunu annelerden daha az olduğu saptanmıştır. Barlow ve arkadaşları (2002) tarafından yapılan çalışmada düşük eğitim seviyesinin depresyonda artışa neden olduğu saptanmıştır. Literatürdeki bu araştırmalar araştırmamızda bulunan sonucu destekler niteliktedir.

Okul öncesi eğitime başlayan çocukların ayrılma kaygıları ile annelerin kaygıları arasındaki ilişkiye ilişkin tartışma.

Araştırma sonucunda okul öncesi eğitim sürecine başlayan çocukların ayrılma kaygıları ile annelerinin durumluk sürekli kaygıları arasında bir ilişki saptanmamıştır. Turhan (2017) çocuklardaki kaygı seviyeleri ile annelerdeki kaygı seviyeleri arasında anlamlı bir fark olmadığı sonucuna ulaşmıştır. Solmaz (2017) yaptığı çalışmada ebeveynlerin kaygıları ile çocukların korkusu arasında anlamlı bir ilişki olmadığını saptamıştır. Literatüre bakıldığında çocukların kaygıları ile annelerin kaygıları arasında ilişki saptanan çalışmalar bulunmaktadır (Alisinanoğlu & Ulutaş, 2003; Çetin, 2017; Nazlıoğlu, 2019). Ancak bu çalışmada okul öncesi eğitime yeni başlayan çocuklar örneklem grubunu oluşturmaktadır. Alanyazında okula yeni başlayan çocukların ayrılma kaygılarını inceleyen bir araştırmaya rastlanılmamıştır. Okula başlamak

çocuğun hayatında önemli dönüm noktalarındandır. Literatüre ters düşen bu sonucun ortaya çıkmasında çocukların ayrılma kaygı durumlarında okula başlama faktörünün etkisinin olduğu düşünülebilir.

Öneriler

Bu araştırma Bursa merkez ilçelerinde okul öncesi eğitimine yeni başlayan 120 çocuk ile gerçekleştirilmiştir. Aynı çalışma örneklem genişletilerek farklı okul ve farklı çocuklarla yapılarak çeşitlilik sağlanabilir. Çocukların ayrılma kaygıları ile annelerinin kaygılarına ilişkin boylamsal araştırmalar gerçekleştirilebilir. Gerçekleştirilecek çalışmalarda nicel verilerin yanı sıra nitel veriler de elde edilerek bulguların güvenirliliği desteklenebilir. Araştırma yapılırken okul öncesi eğitimine yeni başlayan çocukların yaşları kategorilere ayrılarak yaş grupları arasındaki ilişkiye bakılabilir. Yapılan araştırmada okul öncesi eğitime ilk defa başlayan çocuklar ele alınmıştır. Daha önceki yıllarda okul öncesi eğitim almış çocuklarda araştırmaya katılarak her iki grup arasındaki ayrılma kaygı düzeyleri karşılaştırılabilir. Çalışma anneler ile yapılmıştır. Babaların da katıldığı başka araştırmalar gerçekleştirilebilir. Ebeveynlere ayrılma kaygısı hakkında bilgilendirici seminerler düzenlenebilir. Okul hayatına başlangıçta ayrılma kaygısı yaşayan çocuklara yönelik kaygıyı azaltacak etkinlikler okula uyum programlarına eklenebilir. Eğitimciler tarafından içerisinde bulundukları sosyal çevrede okula başlayacak olan çocukların ailelerine yönelik uygun aile eğitimleri düzenleyebilir, annelere çocukları ile nitelikli vakit geçirme hakkında seminerler verilebilir.

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VALSARTAN VE HİDROKLOROTİAZİD İÇEREN YÜKSEK TANSİYON İLACINDA ETKEN MADDELERİN UV-SPEKTROFOTOMETRİK YÖNTEM VE KEMOMETRİK YÜNTEMLERLE TAYİNLERİ

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ÖZET

Dünyanın neredeyse bütün bölgelerinde olduğu gibi Türkiye'de de yüksek tansiyon büyük bir sorun olarak görülmektedir. Bu konuda yapılan çalışmalara bakıldığında yüksek tansiyonun bireylerde görülme yaşının oldukça düştüğü gözlenmektedir. Bu sebeple özellikle yüksek tansiyonda kullanılan etken maddelerin analizi ayrı bir önem kazanmaktadır. Analitik kimyacılar bu konularda çalışmalarını hassas bir şekilde sürdürmektedirler. Yapılan bu çalışmada piyasada satılan Diostar-plus isimli ilaç üzerinde spektrofotometrik analizler yapılmış ve elde edilen veriler PLS (kısmi en küçük kareler) ve PCR (temel bileşen regresyon) kemometrik yöntemleri ile değerlendirilmiştir. UV Görünür bölge spektrofotometresindeki ölçme çalışmalarında valsartan ve hidroklorotiyazid aktif bileşenleri için çeşitli çözücüler denenmiş ve en iyi sonuçlar metanol' de gözlendiği için metanol kullanılarak çözme işlemleri yapılmış ve hazırlanan etken madde çözeltilerinin spektrumları alınarak kaydedilmiştir. Bu işlemde ilk basamakta piyasadan elde edilen saf valsartan ve hidroklorotiyazid etken maddelerinin önce tek tek, sonraki basamakta ise ilaç içeriğine uygun sentetik karışımlar hazırlanarak spektrumları kaydedilmiştir. Çalışmanın son bölümünde ise piyasadan temin edilen ticari örnek analiz edilmiş, bütün veri grupları MİNİTAB 16 istatistik programı ile değerlendirilmiştir. Çalışma ortamı için çeşitli pH değerlerinde denemeler yapılmış en optimum sonuçların elde edildiği pH 7,5 değerinde çalışmalara devam edilmiştir. Çalışmalarda elde edilen veri grupları PLS ve PCR yöntemleri ile kemometrik olarak değerlendirilerek, geri kazanımları hesaplanmıştır. Valsartan ve hidroklorotiyazidin PCR çalışmaları sonucunda elde edilen geri kazanım değerleri sırasıyla %100,31 ve %99,93; standard sapmalar ise 0,82 ve 0,72 olarak bulunmuştur. PLS çalışmaları sonucunda elde edilen geri kazanım değerleri sırasıyla %100,29 ve %99,82; standard sapmalar ise 0,88 ve 0,71 olarak bulunmuştur. Çalışmanın son aşamasında piyasadan temin edilen tablet numunesinde hesaplamalar gerçekleştirilmiştir. Yapılan çalışmanın neticesinde uygulanan kemometrik yöntemlerin (PCR, PLS), geçerli, duyarlı, hassas, seçici, hızlı ve ekonomik olduğu görülmüştür. Uygulanan yöntemler ilaç endüstrisinde ARGE laboratuvarlarında kolaylıkla uygulama alanı bulabilir.

Anahtar Kelimeler: Valsartan, hidroklorotiazid, UV-Spektrofotometre, kemometri.

DETERMINATION OF ACTIVE SUBSTANCES IN HIGH TENSION DRUG CONTAINING VALSARTAN AND HYDROCHLOROTHIAZIDE BY UV-SPECTROPHOTOMETRIC METHOD AND CHEMOMETRIC METHODS

ABSTRACT

As in almost all regions of the world, high blood pressure is seen as a major problem in Turkey. When the studies on this subject are examined, it is observed that the age of high blood pressure in individuals has decreased considerably. For this reason, the analysis of active substances used in high blood pressure gains a special importance. Analytical chemists continue to work on these issues sensitively. In this study, spectrophotometric analyzes were performed on the commercially available drug called Diostar-plus, and the data obtained were evaluated by PLS (partial least squares) and PCR (main component regression) chemometric methods. Various solvents were tested for the active components of valsartan and hydrochlorothiazide in the measurement studies in UV Visible spectrophotometer, and since the best results were observed in methanol, dissolving processes were performed using methanol and the spectra of the prepared active ingredient solutions were recorded. In this process, in the first step, the spectra of the pure valsartan and hydrochlorothiazide active substances obtained from the market were prepared one by one, and in the next step, synthetic mixtures suitable for the drug content were prepared and their spectra were recorded. In the last part of the study, the commercial sample obtained from the market was analyzed and all data groups were evaluated with the MINITAB 16 statistical program. Trials were made at various pH values for the working environment, and studies were continued at pH 7.5, where the optimum results were obtained. The data groups obtained in the studies were evaluated chemometrically by PLS and PCR methods, and their recovery was calculated. The recovery values obtained as a result of PCR studies of valsartan and hydrochlorothiazide were 100.31% and 99.93%, respectively; standard deviations were found to be 0.82 and 0.72. The recovery values obtained as a result of PLS studies were 100.29% and 99.82%, respectively; standard deviations were found to be 0.88 and 0.71. At the last stage of the study, calculations were made on the tablet sample obtained from the market. As a result of the study, it was seen that the applied chemometric methods (PCR, PLS) were valid, sensitive, sensitive, selective, fast and economical. The applied methods can easily find application in ARGE laboratories in the pharmaceutical industry.

Keywords: Valsartan, hydrochlorothiazide, UV -spectrophotometer, chemometry

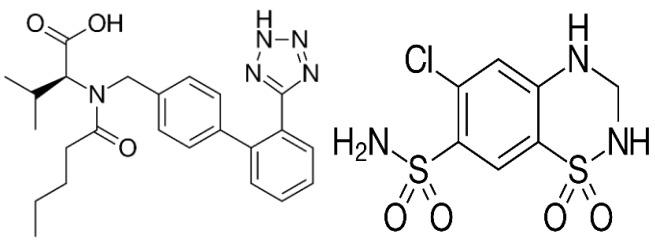
1. GİRİŞ

Günümüzde çeşitli amaçlar için çok çeşitli ilaçlar kullanılmakta ve bunlara her gün yenileri eklenmektedir. İlaçların aktif kısımları, ilaçların aktif bileşenleridir. Hem üretim hem de pazar kontrolleri sırasında aktif farmasötik bileşenlerin miktarlarının doğru belirlenmesi kullanım açısından çok önemlidir. Etken maddesi eksik olan ilaçlar gerekli faydayı göstermez ve ilaçların yan etkileri dikkate alındığında çok fazla etken maddesi olanlar birçok zararlı yan etkiye neden olurlar. İlaç etken maddeleri farklı ilaçlarda farklı matrislerde bulunduğundan, bunları doğru bir şekilde belirlemek bilimsel olarak da önemlidir.

Karışımların analizinde başarılı sonuçlar verdiği için farmasötik preparatların analizinde klasik analitik yöntemlerin ve kemometrik kalibrasyonların artan yoğunlukta kullanıldığı çalışmalardan görülmektedir. Farmasötik preparatlar, sabit bir yardımcı madde matrisi ve bileşiği içeren bir, iki veya daha fazla aktif numuneden oluşur. Analitik kimyada kombine farmasötik preparatların ayrıştırılmadan veya ön ayrıştırma işlemi kullanılmadan eş zamanlı kantitatif analizi son derece önemlidir.

Herhangi bir ayırma işlemi olmaksızın kemometrik kalibrasyon yöntemleri ile kombinasyon halinde ilaç preparatlarının eşzamanlı kantitatif tayini yapmak mümkündür. Ayrıca kullanılan kemometrik yöntemi ile seçiciliğin artmasıyla grafik detay da artacağı için ilacın tek bir aktif bileşenini içeren preparatlar üzerinde yapılan analizler daha kolay gerçekleştirilmektedir. Diüretik karışımların kullanımı ile sinerjik etkiler elde edilerek etkinliğin arttırılması amaçlanmaktadır. Tiyazidlerin ve diüretiklerin kombinasyonları genellikle karmaşık karışımlarda kullanılır. Kompleks ilaçların avantajları düşük dozları içerir ve hipertansiyonun aktivitesini arttırır.

Valsartan (VAL), anjiyotensin II reseptör antagonistleri ailesine ait yeni bir antihipertansif ilaçtır. Miyokard enfarktüsünü takiben sol ventrikül disfonksiyonu olan hastalarda kardiyovasküler mortaliteyi azaltmak için hipertansiyon ve kalp yetmezliğinin tedavisinde kullanılır. Hidroklorotiyazid (HCT) [6-kloro-3,4-dihidro-2H-1,2,4-benzotiadiazin-7-sülfonamid -1, 1-dioksit,] distal kıvrımlı tübül üzerinde etkili bir diüretiktir. Molekül ağırlığı 297,7 g / mol'dür ve kapalı moleküler formülü $C_7H_8ClN_3O_4S_2$'dir. Sinerjik anti hipertansif etkileri nedeniyle, valsartan ve hidroklorotiyazid, kombine bir dozaj formu olarak ticari olarak temin edilebilir. Çalışılan etken maddelerin açık formülleri Şekil 1' de gösterilmiştir.



a) Valsartan b) Hidroklorotiyazid

Şekil 1. Çalışılan etken maddelerin açık kimyasal formülleri

Literatür taramasında valsartan veya hidroklorotiyazid miktarının tek tek veya çeşitli matrislerde diğer antihipertansif ilaçlarla kombinasyon halinde belirlenmesi için çeşitli yöntemler bulunmuştur. Yapılacak çalışmaların yüksek maliyeti ve verimliliğinin düşük olması nedeniyle her iki ilacın bireysel çalışmaları tercih edilmese de yine yapılan literatür araştırmalarında az da olsa karşılaşılmıştır. Her iki maddeyi ve bunların yardımcı maddelerini bir arada tayinlerine literatürde HPLC yöntemleri (Elshanawane vd 2014; Vignaduzzo vd 2011; Shaikh vd 2020), UV spektrofotometrik yöntem (Vetuschi vd 2005; Kul vd 2010), spektroflorimetrik yöntem (Ragab vd 2017), kapiler elektroforez (Zeng vd 2015) ve UPLC (Vojta vd 2015) gibi yöntemlerde rastlanılmıştır.

Bu çalışmada, çok yakın yerlerde absorbans verdiklerinden dolayı klasik UV yöntemleri ile belirlenmesi zor olan VAL ve HCT' nin, bir ilaç formülasyonunda güçlü kemometrik yöntemlerle aktif etken maddeleri belirlenmeye çalışılmıştır.

2. ARAŞTIRMA VE BULGULAR

2.1. Uygulanan kemometrik yöntemler

PLS yöntemi: UV-Vis spektrumlarında, absorbans verileri (A) ve derişim verileri (C), A_o veri matrisi ve C_o vektörü verecek şekilde ortalanır. Ortogonalize PLS algoritması aşağıdaki adımlara sahiptir. Yükleme ağırlığı vektörü W aşağıdaki ifadeye sahiptir:

$$W = \frac{A_o^T C_o}{C_o^T C_o}$$

Skorlar ve yüklemeler aşağıdaki gibi verilir:

$$t_ı = A_o W \; ; \; P_1 = \frac{A_o^T t_1}{t_1^T t_1} \; ; \; q_1 = \frac{C_o^T t_1}{t_1^T t_1}$$

A_o ve C_o'daki artıkların matrisi ve vektörü aşağıdaki gibidir:

$$A_1 = A_o - t_1 P_1^T$$

$$C_1 = C_o - t1\, q_1^T$$

Genel doğrusal denklemden regresyon katsayıları şu şekilde hesaplanmıştır:

$$b = W(P^T W)^{-1} q$$

$$a = C_{ortalama} - A_{ortalama}^T\, b$$

Oluşturulan kalibrasyon denklemi, numunelerdeki bileşiklerin tahmini için kullanılır.

PCR yöntemi: PCR, faktör analizini içeren çok değişkenli bir yöntemdir. En büyük avantajı, tüm spektruma uygulanmasıdır. PCR gerçekleştirilirken, spektrumdaki ve bilinmeyen bileşen içeriğinin numune spektrumundan tahmin edildiği tüm modeller için bir kalibrasyon adımı ve spektral ayırma içerir. PCR ayrımı, bileşenin içeriğinden bağımsız olarak bir bütün olarak spektral değişikliklere dayanır. Elbette, en uygun kalibrasyon yöntemi, diğer yöntemlerde olduğu gibi belirli deney koşullarına bağlı olarak değişir.

2.2. Kullanılan cihaz

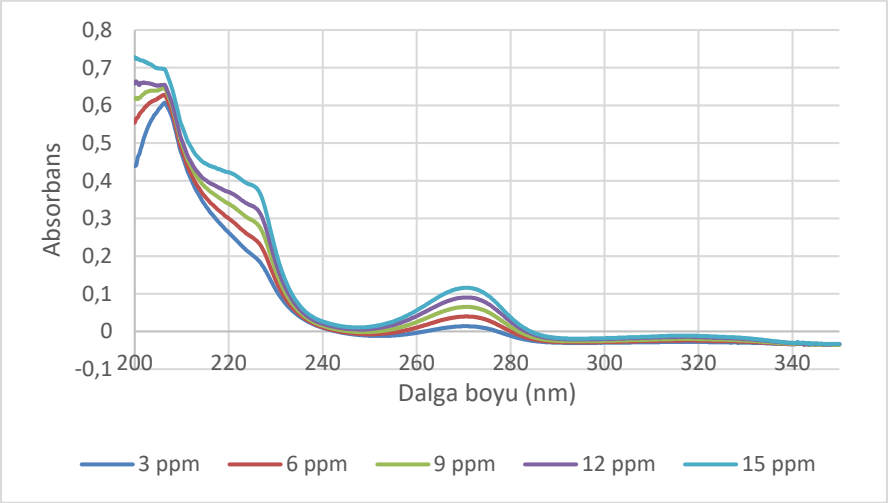
Spektrometrik ölçümler için 1 cm uyumlu kuvars hücreleri ile donatılmış bir Shimadzu (Model UV-1700) UV-Görünür spektrometresi (Shimadzu, Kyoto, Japonya) kullanılmıştır.

2.3. Kullanılan kimyasallar

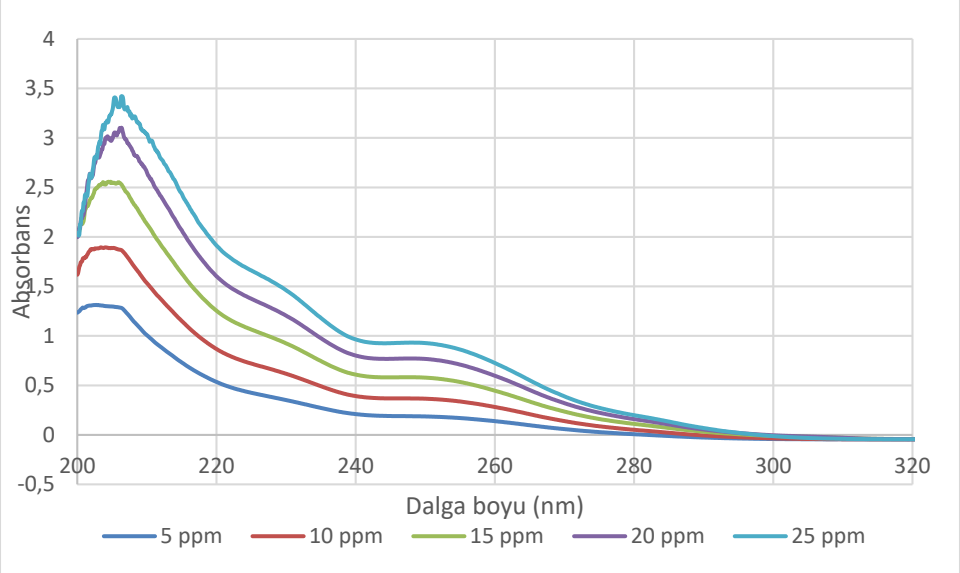
Deneylerde kullanılan kimyasallar analitik saflıkta olup valsartan ve hidroklorotiyazid etken maddeleri Sigma Aldrich firmasından, çözücü olarak kullanılan metanol ise Merck firmasından temin edilmiştir. İlaç analizi ise piyasadan alınan ve içeriği 160 mg valsartan ve 25 mg hidroklorotiyazid olan Dio star plus (Pharma International) adlı ilaç üzerinde gerçekleştirilmiştir.

3. SONUÇLAR VE TARTIŞMA

Çalışmada ilk olarak her iki etken maddenin çeşitli derişimlerde hazırlanan çözeltilerinin spektrumları alınmış ve hangi dalga boylarında absorbans verdikleri tespit edilmeye çalışılmıştır. Her iki etken madde için elde edilen spektrum grafikleri şekil 2 ve 3'de gösterilmiştir.



Şekil 2. HCT etken maddesinin absorpsiyon spektrumu



Şekil 3. VAL etken maddesinin absorpsiyon spektrumu

Alınan bu spektrumların değerlendirilmesi sonucunda aktif maddelerin her birinin spektroskopik özellikleri Tablo 1 de verilmiştir. Tablo 1'den de görüldüğü gibi her iki etken madde için derişimle ölçülen absorbanslarında kabul edilebilir bir korelasyon gözlenmiştir.

Tablo1. İlaç aktif maddelerinin spektroskopik özellikleri

İlaç Etken Madde	Max. Dalga Boyu (nm)	Kalibrasyon denklemi	Korelasyon Katsayısı
Valsartan	255	y = 0,0338x - 0,004	R^2 = 0,9984
Hidroklorotiyazid	271	y = 0,0093x - 0,025	R^2 = 0,9951

Yapılan işlemleri doğrulamak ve kemometrik yöntemleri uygulamak amacı ile HCT için 1-5 µg/mL ve VAL için 5-25 µg/mL derişim aralıklarında her iki etken maddeyi de içeren 15 değişik bileşimde simetrik bir kalibrasyon seti metanol içerisinde hazırlanmış ve spektrumları alınmıştır. Simetrik kalibrasyon setine göre hazırlanıp spektrumları alınan etken maddelerin her iki modele göre elde edilen geri kazanım değerleri Tablo 2 de verilmiştir.

Yapılan işlemlerin doğruluğunu test etmek için bazı istatistiksel parametrelerin uygulanması gerekir. Bir kalibrasyon modelinin kemometrik metotlarda uygulama kabiliyeti birkaç şekilde açıklanabilir. Bunun için ilk olarak tahmini kalan kareler toplamını veya PRESS'i incelemek en iyi yollardan biridir. PRESS'i hesaplamak için, tüm numuneler için beklenen ve tahmin edilen değerler arasındaki hatalar hesaplanarak bunların kareleri alınır ve toplanır.

PRESS = $\sum_{i=1}^{n}(C_i^{eklenen} - C_i^{bulunan})^2$

Ancak, çalışılan tüm veri setleri aynı sayıda örnek içermediğinde, bu PRESS değerlerini normalleştirmenin doğru bir yolu değildir. Farklı sayıda örnek içeren veri kümeleri için PRESS değerlerini doğru bir şekilde karşılaştırmak istenirse, aşağıdaki formülle verilen standart tahmin hatasına (SEP) değerleri de hesaplanabilir.

SEP = $\sqrt{\frac{\sum_{i=1}^{n}(C_i^{eklenen} - C_i^{bulunan})^2}{n-1}}$

Burada $c_i^{eklenen}$, ilave edilen ilaç derişimi, $c_i^{bulunan}$ ise hesaplanan ilaç derişimi ve n ise sentetik karışımların toplam sayısıdır. SEP, kalibrasyon modelinin ortalama olarak ne kadar iyi performans gösterdiğinin iyi bir ölçüsünü sağlayabilir. Ancak çoğu zaman kalibrasyon modelinin performansı analit seviyesine bağlı olarak değişir.

Her iki modelin istatiksel verileri de toplu olarak Tablo 3 de gösterilmiştir.

Tablo 2. Etken ilaç maddelerinin her iki yöntemle elde edilen geri kazanım değerleri

Karışım (µg/mL)		Geri Kazanım (%)			
		PLS		**PCR**	
VAL	HCT	VAL	HCT	VAL	HCT
5,00	1,00	100,68	99,28	110,17	105,18
10,00	2,00	99,82	99,44	97,56	105,11
15,00	3,00	99,88	100,08	100,46	104,98
20,00	4,00	100,26	99,32	100,38	99,61
25,00	5,00	100,02	98,88	100,18	97,94
5,00	3,50	100,22	99,58	106,54	102,36
10,00	3,50	99,58	100,08	103,59	100,37
15,00	3,50	100,56	100,58	99,07	96,94
20,00	3,50	100,38	100,02	101,35	102,32
25,00	3,50	99,88	99,56	99,08	100,83
8,00	1,00	100,84	99,72	102,43	90,97
8,00	2,00	99,98	99,88	91,43	96,39
8,00	3,00	100,64	100,64	98,52	97,74
8,00	4,00	99,84	100,18	95,72	98,29
8,00	5,00	101,86	100,06	98,32	99,85
	Ortalama	100,29	99,82	100,31	99,93

Tablo 3. Kalibrasyon basamağındaki istatiksel parametreler

Parametre	**PLS**		**PCR**	
	VAL	HCT	VAL	HCT
PRESS	1,4212	0,0671	0,3512	0,0171
SEP	0,0308	0,0602	0,1524	0,0336
r*	0,9981	0,9960	0,9981	0,9957
Eğim	0,9981	0,9960	0,9981	0,9958
Kayma	0,0254	0,0111	0,0127	0,0058

Son aşamada piyasadan temin edilen ve içeriği çalışılan etken maddeler olan ilacın analizi yapılarak elde edilen spektrum verilerine PLS ve PCR kemometrik yöntemleri uygulanmış ve sonuçlar tablo 4' de gösterilmiştir. Verilen değerler altı deney ortalamasıdır.

Tablo 4. İlaç tabletleri için deney sonuçları

İlaç	**PLS**	**PCR**
VAL Ortalama ± SD*	160,04 ± 0,08	159,84 ± 0,04
HCT Ortalama ± SD*	25,98 ± 0,02	25,88 ± 0,05

SD: Standart sapma

Deney sonuçları ve tablet analiz sonuçları irdelendiğinde önerilen kemometrik yöntemlerin doğru, hassas ve tekrarlanabilir sonuçlar verdiği gözlemlenmiştir. Önerilen yöntemlerin ilaç ARGE laboratuvarlarında uygulanabilir olduğu düşünülebilir.

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İLAÇ NUMUNELERİNDE METAMİZOL VE KAFEİN ETKEN MADDELERİNİN UV-SPEKTROFOTOMETRİK YÖNTEM YARDIMIYLA KLASİK VE TERS EN KÜÇÜK KARELER YÖNTEMLERİ İLE TAYİNLERİ

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ÖZET

İlaçlar, insan hücreleri üzerinde yaptığı etki ile neden olunan bir hastalığın teşhis edilmesi, bunun iyileştirilmesi veya oluşabilecek belirtilerin en aza indirilmesi amacı ile tedavisini veya neden olduğu hastalık türlerinden korunmasını sağlayan ya doğal ya da yarı sentetik veya sentetik kimyasal maddelerdir. Şüphesiz ki ilaçlar günlük yaşantımızda önemi olan maddelerdir. Bundan dolayı ilaçların hammadde olarak üretilmesinden vücutta kullanımına hatta vücuttan çeşitli yollarla atılmasına kadar olan tüm işlemlerde bunların analiz edilmeleri önem arz etmektedir. İlaçların çeşitli tiplerde üretim aşamasında miktarları insan sağlığı açısından önemli olduğu aşikardır. Vücuda alınan miktarların çok olduğu durumda önemli sağlık problemleri baş gösterirken, az olduğunda herhangi bir faydasının olmayacağı aşikardır. Kullanılan her ilacın vücuda girdiği andan itibaren kana geçme miktarları daha sonra da ne kadarının vücuttan atıldığı ya da ne kadarının çeşitli organlarda kullanıldığının bilinmesi önem arz etmektedir. İlaç analizlerinin sağlıklı bir şekilde yapılabilmesi için, öncelikle uygulanacak analiz için kullanılacak cihazlar ve bunlardan elde edilen sayısal verilerin anlaşılabilir hale getirilebileceği matematiksel metotlardır. Modern çağda ilaçların analizleri için kullanılan ve nispeten pahalı yatırımlar gerektiren enstrümantal cihazlar varken ucuz ve hassas olup daha anlaşılır sonuçlar veren görünür bölge spektrofotometresi gibi her laboratuvarda bulunabilen cihazların da olduğu bilinmektedir. Görünür bölge cihazlarının kullanılması içinde tek etken madde içeren ilaçların analizinde herhangi bir sorun yaşatmazken birbiri ile çok yakın bölgelerde absorbans veren ilaç karışımları analizlerinde sıkıntılar çıkarabilir ve bu durumda farklı matematiksel işlemlere ihtiyaç duyulabilir. Yapılan deneysel çalışmada klasik en küçük kareler yöntemi (CLS) ve ters en küçük kareler yöntemi (ILS) gibi kemometri metotları ilaç örneklerindeki metamizol (MET) ve kafeinin (CAF) bir arada ve aynı anda analizlerinde herhangi bir ön ayırma işlemi yapmaksızın başarılmıştır. Bu yöntemlerde görünür bölge spektroskopisi yönteminden elde edilen sayısal veriler kemometri kullanılarak değerlendirilmiştir. Bu kemometrik yöntemleri doğrulamak için CAF için 4-12 µg/ml ve MET için 5–17 µg/ml derişim aralıklarında her iki etken maddeyi içeren simetrik bir kalibrasyon seti uygun çözücü içinde hazırlanmış, kalibrasyon setinin 200-350 nm dalga boyu aralıklarında absorpsiyonları alınmıştır. Uygulanan kalibrasyon setinin alınan dalga boyları aralığındaki değerleri daraltılarak elde edilen verilerin arasındaki korelasyondan faydalanılarak iki kemometrik kalibrasyon oluşturulmuştur. CLS ve ILS yöntemlerinin doğrulaması, etken maddeleri kapsayan uygun karışımların analiz edilmesi ile gerçekleştirilmiştir. CLS ve ILS yöntemlerinin CAF ve MET karışımlarının analizine uygulamasında, CLS ve ILS için % geri kazanım sonuçları ile karşılık gelen bağıl standart sapma değerleri sırasıyla CAF için %99,48; %1,02, %100,2; %0,45; MET için %99,88; %0,48; %99,88; %0,88 olarak bulunmuştur. Son basamakta ise CLS ve ILS metotları, iki farklı ticari ilaç örneğindeki CAF ve MET' ün bir arada simültane miktar tayinlerine başarı ile uygulanmıştır.

Anahtar Kelimeler: Metamizol, kafein, klasik en küçük kareler, ters en küçük kareler

DETERMINATION OF METAMIZOL AND CAFFEINE ACTIVE INGREDIENTS IN MEDICINE SAMPLES BY CLASSIC AND INVERSE LEAST SQUARE METHODS WITH THE AID OF UV-SPECTROPHOTOMETRIC METHOD

ABSTRACT

Medicines are natural, semi-synthetic or synthetic chemical active substances that provide treatment or protection from diseases in order to diagnose, treat or reduce the symptoms of a disease with its effect on living cells. Undoubtedly, drugs have a very important place in our daily life. Their analysis is important at all points from their production to their use and even their excretion from the body. It is obvious that the amounts of drugs put into tablets in tablet production are important for human health. While significant health problems arise in case of excessive doses, it is obvious that there will be no benefit in case of low doses. It is very important to know the amount of each drug used from the moment it enters the body, and then how much of it is excreted from the body or how much is used in the liver. For the drug analysis in question, the important thing is primarily the tools to be used for analysis and the mathematical methods by which the data to be obtained can be made understandable. Today, while there are highly sensitive, advanced but expensive instruments such as liquid chromatography and mass spectroscopy used for analysis, it is known that there are devices in every laboratory such as UV Visible spectrophotometers, which are cheap and sensitive and give more understandable results. While the use of UV Visible instruments does not pose any problem in the analysis of drugs containing a single active substance, it may cause problems in the analysis of drug mixtures with overlapping spectrum, and in this case, different mathematical processes may be required. In this study, chemometric calibration techniques such as the classical least squares method (CLS) and the inverse least squares method (ILS) was successfully applied in the simultaneous determinations of metamizole (MET) and caffeine (CAF) in drug samples without any pre-separation. In these methods, the data obtained from the UV visible field spectroscopy method were evaluated chemometric. In the validation of these chemometric methods, a symmetrical calibration set with 19 different compositions containing both components in the concentration range of 4-12 µg/ml for CAF and 5-17 µg/ml for MET was prepared in 0.1M HCl and the wavelength of the calibration set was 200-350 nm. Absorption spectra were recorded. Two chemometric calibrations were created by utilizing the relationship between the calibration set and the absorption data obtained in the 240-285 nm wavelength range against this set. Validation of the CLS and ILS methods was performed by analysis of synthetic mixtures containing CAF and MET. In the application of CLS and ILS methods to the analysis of CAF and MET mixtures, the % recovery results for CLS and ILS and the corresponding relative standard deviation values for CAF were 99.48%; 1.02%, 100.2%; 0.45%; for MET; 0.48%; 99.88%; 0.88%; 99.88%. In the next step, CLS and ILS methods were applied to the simultaneous determinations of CAF and MET in two different commercial drug preparations.

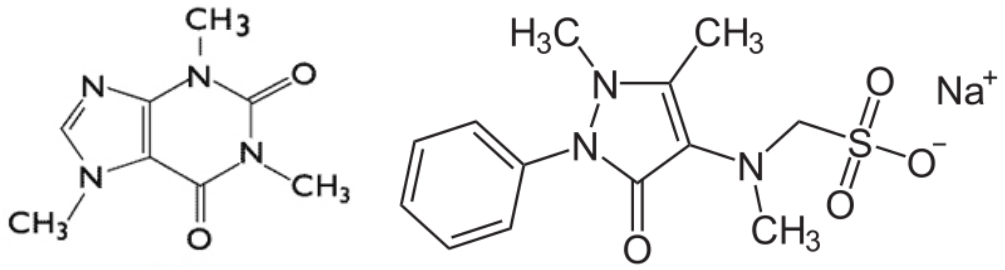
Keywords: Metamizol, caffeine, classic least square, inverse least square

1. GİRİŞ

Bir alkaloid olan **kafein** doğal olarak günlük hayatta sıklıkla kullandığımız sıvılar olan kahve ve çay veya çikolata gibi insanı mutlu eden yiyeceklerde bulunan ve buna bağlı olarak bağımlılık yaratma özelliğine sahip bir maddedir. Günlük yaşantıda sürekli olarak tüketilen çay ve kahveden alınan kafein haricinde de örneğin birçok ağrı kesici ilaçlar ağrı kesiciler, sinir sistemini uyaran ilaçlar, çeşitli alerjenler, soğuk algınlığı ilaçlarda da kafein bulunduğu bilinmektedir. Kafein ağrı kesici ilaçlara "zindelik hissi" veren uyarıcı özelliği nedeniyle eklenmektedir.

Günlük hayatta çeşitli nedenlerden dolayı kafein kullanan kişiler, zamanla bağışıklık göstermeye başladığı için, süreç ilerledikçe kişinin kafein ihtiyacı artış gösterir. Aşırı kafein tüketen kişiler bu tüketimi kesmeleri halinde vücutta örneğin baş ağrısı, aşırı yorgunluk, huzursuz olma gibi rahatsız bir ruh hali oluşabilir. Oluşan bu olumsuzluklar ise yaklaşık 1 –2 hafta sürebilir.

Metamizol sodyum (MS) veyadipron olarak da bilinen bu etken madde aminopirinin 4 – metilaminoetanosülfat türevdir. MS'nin siklooksijenaz inhibitör ve antienflamatuvar etkileri az olmasına rağmen, ağrı kesici özelliği öne çıkmaktadır. Bir ön ilaç olması dolayısıyla, in vitro çalışmalarda siklo oksijenaz enzimini etkilemediği belirtilmiştir. Çalışılan iki ilaç aktif maddesinin açık kimyasal formülleri şekil 1'de gösterilmiştir.



a) Kafein b) Metamizol

Şekil 1. Çalışılan kimyasal maddelerin açık kimyasal formülleri

Literatüre bakıldığında bu iki etken madde bir arada veya tek başlarına veya diğer etken maddelerle bir arada çalışmalarına rastlanılmıştır. Bunlar kısaca spektrofotometrik (Dinç, 2003; Jose ve arkadaşları, 2003; Khoshayand ve arkadaşları, 2008; Özdemir ve arkadaşları, 2010; Mansour, 2018), sıvı kromatografi (Kartal, 2001), infrared spektroskopisi (Ferreira ve arkadaşları, 2009), reflektometri (Weinart ve arkadaşları, 2007) sayılabilir. Bunlara ek olarak ilaç hammaddelerini sudan temizleme çalışmaları da mevcuttur (Lessa ve arkadaşları, 2018).

Yapılan bu çalışmada yukarıda da belirtildiği gibi insan yaşamında önemli etkilere sahip olan ilaç etken maddelerinden Metamizol (MET) ve kafein (CAF) miktarlarının herhangi bir ön işlem yapılmaksızın eş zamanlı tayinlerinde klasik en küçük kareler yöntemi (CLS) ve ters en küçük kareler yöntemi (ILS) gibi kemometrik kalibrasyon teknikleri ilaç örneklerine başarıyla uygulanmıştır.

2. ARAŞTIRMA VE BULGULAR

2.1. Uygulanan kemometrik yöntemler

Klasik En Küçük Kareler Yöntemi. Bu yaklaşımda yöntem, n bileşik içeren çok bileşenli karışım sistemi spektrometrik kantitatif analiz için seçilen dalga boylarında soğurma değerlerinin kullanılmasına dayanmaktadır (Kramer, 1998). Absorpsiyon, A_1^1 (%1, 1 cm), iki bileşik X ve Y değerleri, ikili karışımdaki bileşiklerin her biri için sıfır dereceli spektrumlarda seçilen dalga boylarında ölçülen absorbans kullanılarak hesaplanır. Değerler kullanılarak, ikili karışımdaki bileşikler için n bilinmeyenli denklem sistemleri yazılmıştır. Matris gösterimi, konuları büyük ölçüde basitleştirir ve aşağıda gösterildiği gibi iki bilinmeyenli denklem sistemini kolayca çözer:

$$\begin{bmatrix} A_1 \\ A_2 \\ \dots \\ \dots \\ A_n \end{bmatrix} = \begin{bmatrix} \alpha_1\beta_1 \\ \alpha_2\beta_2 \\ \dots\dots \\ \dots\dots \\ \alpha_n\beta_n \end{bmatrix} * \begin{bmatrix} C_X \\ C_Y \\ \\ \end{bmatrix} \qquad (1)$$

Burada A_1, A_2,…A_n X ve Y ve $\alpha_{1,2,\dots ve\ n}$, $\beta_{1,2,\dots ve\ n}$ karışımlarının solüsyonunun absorbansını temsil eder, …n, X ve Y için sırasıyla λ_1,λ_2,….ve λ_n 'de hesaplanan A_1^1 değerlerini ifade eder. C_X ve C_Y sırasıyla X ve Y'nin g/100 mL cinsinden konsantrasyonudur. MLRC yönteminde açıklanan benzer prosedür kullanılarak bu matris çözüldü ve karışımlarındaki X ve Y konsantrasyonları belirlendi.

Ters En Küçük Kareler Yöntemi: Bazen P-matris kalibrasyonu olarak da bilinen ters en küçük kareler (ILS) (Kramer, 1998), orijinal olarak, Beer-Lambert spektroskopi Yasasının ters ifadesine çoklu doğrusal regresyon (MLR) uygulamasını içerdiğinden böyle adlandırılır:

$C = P * A$ (2)

Yukarıdaki denklem lineer denklem sistemi olarak aşağıdaki gibi yazılabilir:

$C_1 = P_{11}A_1 + P_{12}A_2 + \dots + P_{1W}A_W$

$C_2 = P_{21}A_1 + P_{22}A_2 + \dots + P_{2W}A_W$

……. ….. … …..

$C_C = P_{C1}A_1 + P_{W2}A_2 + \dots + P_{CW}A_W$

Burada A_W, w^{th} dalga boyuna göre absorbans, P_{CW}, c^{th} bileşeninin w^{th} dalga boyunda kalibrasyon katsayısı, C_C ise c^{th} bileşeninin konsantrasyonudur.

2.2. Kullanılan cihaz

Çalışmadaki etken maddelerin UV-Vis spektrumları UV 1700 PHARMASPEC SHİMADZU spektrofotometresi kullanılarak elde edilmiş ve bu spektrum değerleri ilaç tabletlerindeki CAF ve MET miktarını saptamak amacı ile çalışılan metotlara başarı ile uygulanmıştır.

2.3. Kullanılan kimyasallar

Deneylerde kullanılan kimyasallar analitik saflıktadır. Kafein ve metamizol etken saf maddeleri Sigma Aldrich firmasından, çözücü olarak kullanılan HCl ise Merck firmasından temin edilmiştir. İlaç analizi ise piyasadan alınan ve içeriği 400 mg metamizol ve 50 mg kafein olan Peraljin adlı ilaç üzerinde gerçekleştirilmiştir.

2.4. Kullanılan çözeltiler

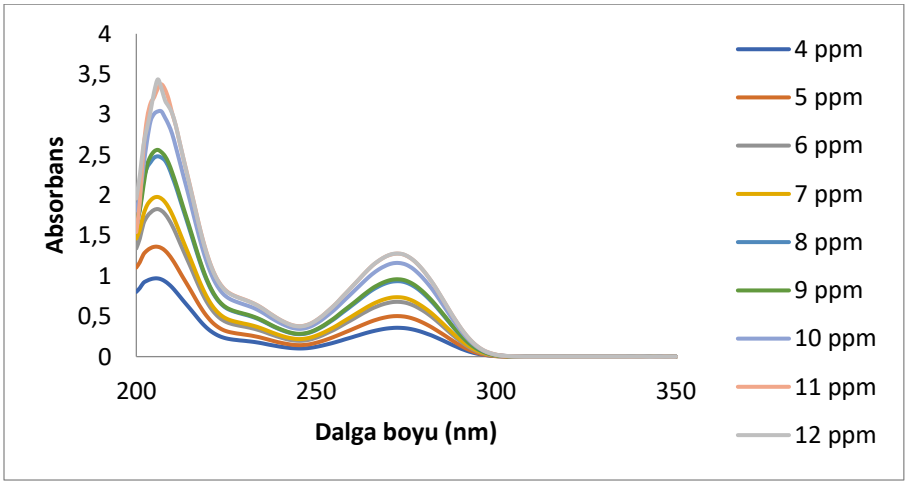
Her iki etken maddenin 100 mg miktarları dikkatli bir şekilde çözülerek 0,1 M HCl çözücüsünde stok çözeltileri hazırlanmış ve deneylerde bu stok çözeltiler kullanılarak hazırlanan kalibrasyon ve validasyon işlemleri gerçekleştirilmiştir.

2.5. Tablet analizi

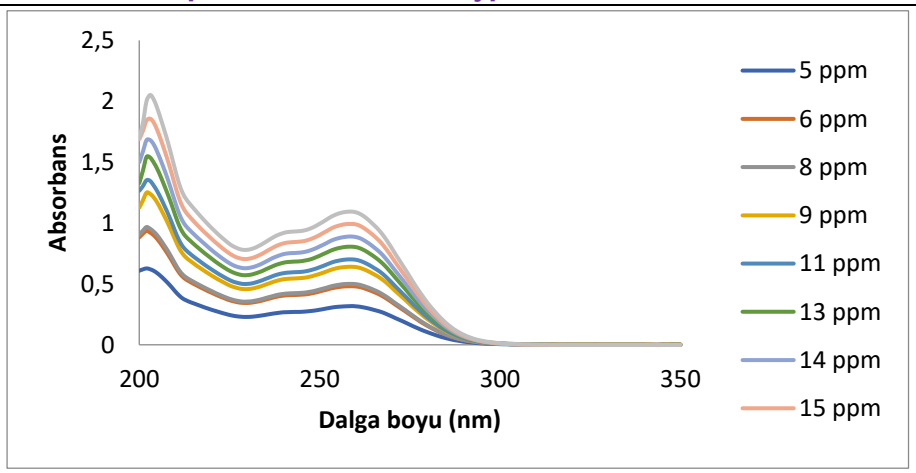
Ticari olarak piyasadan temin edilen Peraljin adlı ilaçtan en az on tablet havanda ezilerek bir tablet miktarına karşılık gelen 0,25 g tartılmış az miktarda 0,1 M HCl ilavesi ile kırk beş dakika manyetik bir karıştırıcıda karıştırılmış, oluşan çözelti takiben süzülmüş süzgeç kâğıdında kalan kısım 0,1 M HCl ile yıkanmış ve son hacim 100 ml' ye tamamlanarak çalışmanın takip eden bölümlerinde çalışılacak olan derişimlere seyreltilmiştir.

3. SONUÇLAR VE TARTIŞMA

İlk olarak her iki etken maddenin çeşitli derişimlerde hazırlanan çözeltilerinin spektrumları alınarak hangi dalga boylarında absorbans verdikleri tespit edilmiştir. Her iki etken madde için elde edilen spektrum grafikleri şekil 2 ve 3'de gösterilmiştir.



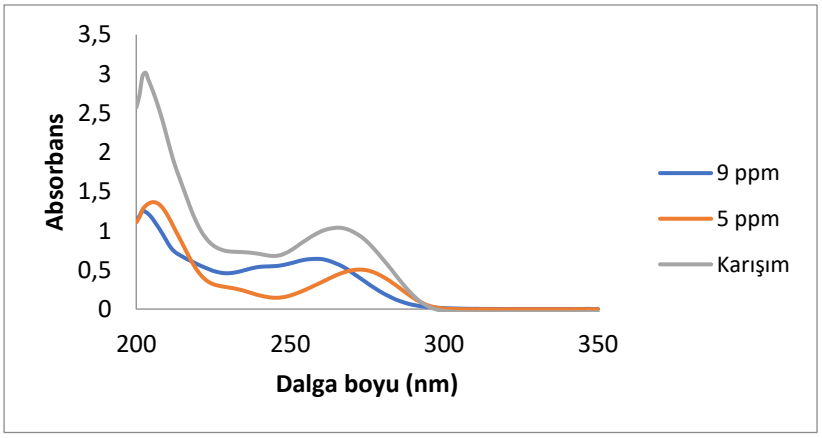
Şekil 2. CAF etken maddesinin absorpsiyon spektrumu



Şekil 3. MET etken maddesinin absorpsiyon spektrumu

Alınan bu spektrumların değerlendirilmesi sonucunda kafein etken maddesinin 272 nm'de maksimum absorpsiyon verdiği ve r^2 değerinin 0,9949 olduğu ve y = 0,065x-0,012 doğru denklemine uyduğu, metamizol etken maddesinin ise 259 nm' de maksimum absorpsiyon verdiği gözlenmiş r^2 değeri 0,9973 olarak bulunmuş ve y=0,03x+0,0015 doğru denklemine uyduğu tespit edilmiştir. Kolayca görülebildiği gibi derişimle ölçülen absorpsiyonlar arasında kabul edilebilir bir korelasyon vardır.

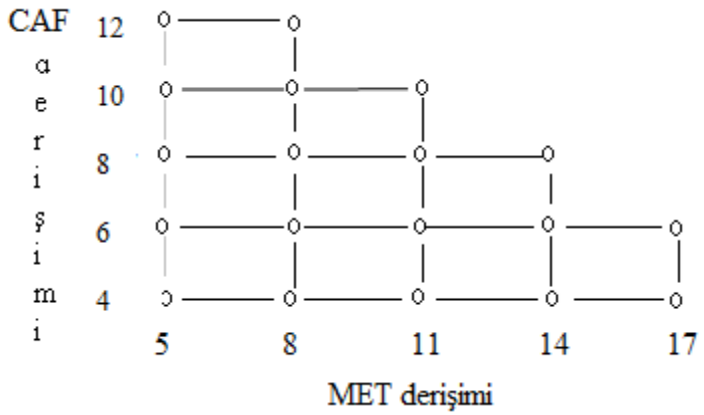
Spektral koşulları belirlemeden önce yapılan çalışmada etken maddeler için 0,1 M HCl çözücüsünün uygun çözücü olduğu saptanmış ve etken maddelerin ve bunlara karşı gelen karışımlarının 200-350 nm dalga boyu aralığında spektrumları çekilmiştir (Şekil 4). Şekil 4' de de görüldüğü üzere her iki etken madde yaklaşık dalga boylarında girişim yaptığından dolayı bu iki etken maddenin klasik yaklaşımlarla bir arada simültane tayinleri mümkün olmadığından kemometrik metotlar tercih edilmiştir.



Şekil 4. MET (9 µg/ml) ve CAF (5 µg/ml) ile iki bileşiğe karşılık gelen karışımın absorpsiyon spektrumları (0,1 M HCl içerisinde)

Validasyon işleminde CAF için 4-12 µg/mL ve MET için 5-17 µg/mL derişim aralığında her iki etken maddeyi içeren 19 değişik farklı bileşimde simetrik bir kalibrasyon seti 0,1 M HCl içerisinde hazırlanmış, kalibrasyon setinin yukarıda belirtilen dalga boyları aralığında absorpsiyon

spektrumları alınmıştır. Simetrik kalibrasyon seti hazırlanmasının en öönemli sebebi analiz sırasında oluşabilecek kalibrasyon hatalarını en aza indirmektir. Şekil 5' de üzerinde çalışılan simetrik kalibrasyon seti verilmiştir.



Şekil 5. Simetrik kalibrasyon seti

Simetrik kalibrasyon setine göre hazırlanıp spektrumları alınan etken maddelerin her iki modele göre elde edilen geri kazanım değerleri Tablo 1 de verilmiştir.

Her iki ilacın eğitim seti ve sentetik ikili karışımları için yapılan kalibrasyonların doğrulanması için bazı istatistiksel parametrelere başvurulur. Bir kalibrasyon modelinin uygulama yeterliliği birkaç şekilde açıklanabilir. Bu sonuçları sayısal olarak da inceleme şansına sahibiz Bunun için ilk olarak tahmini kalan kareler toplamını veya PRESS'i incelemek en iyi yollardan biridir. PRESS'i hesaplamak için, tüm numuneler için beklenen ve tahmin edilen değerler arasındaki hataları hesaplar, karelerini alır ve birlikte toplarız.

$$\text{PRESS} = \sum_{i=1}^{n}(C_i^{eklenen} - C_i^{bulunan})^2$$

Çarpıcı bir şekilde, tüm veri setleri aynı sayıda örnek içermediğinde, bu PRESS değerlerini normalleştirmenin doğru bir yolu değildir. Farklı sayıda örnek içeren veri kümeleri için PRESS değerlerini doğru bir şekilde karşılaştırmak istiyorsak, aşağıdaki formülle verilen standart tahmin hatasına (SEP) dönmeliyiz.

$$\text{SEP} = \sqrt{\frac{\sum_{i=1}^{n}(C_i^{eklenen} - C_i^{bulunan})^2}{n-1}}$$

Burada $c_i^{eklenen}$, ilave edilen ilaç derişimi, $c_i^{bulunan}$ ise hesaplanan ilaç derişimi ve n ise sentetik karışımların toplam sayısıdır. SEP, kalibrasyon modelinin ortalama olarak ne kadar iyi performans gösterdiğinin iyi bir ölçüsünü sağlayabilir. Ancak çoğu zaman kalibrasyon modelinin performansı analit seviyesine bağlı olarak değişir.

Her iki modelin istatiksel verileri de toplu olarak Tablo 2 de gösterilmiştir.

Tablo 1. Etken ilaç maddelerinin her iki yöntemle elde edilen geri kazanım değerleri

Karışım (µg/mL)		**Geri Kazanım (%)**			
		CLS		**ILS**	
CAF	MET	CAF	MET	CAF	MET
4,00	5,00	99,74	99,82	99,74	99,58
4,00	8,00	99,02	99,24	99,80	99,22
4,00	11,00	99,82	99,82	99,82	99,88
4,00	14,00	100,24	100,02	100,24	100,32
4,00	17,00	98,92	99,84	99,94	98,94
6,00	5,00	99,88	99,62	99,88	97,58
6,00	8,00	101,22	99,88	100,88	99,88
6,00	11,00	101,14	99,28	99,74	101,38
6,00	14,00	98,87	100,28	100,28	100,14
6,00	17,00	98,52	98,94	99,84	99,87
8,00	5,00	99,98	99,68	99,80	99,52
8,00	8,00	100,22	99,98	99,58	99,84
8,00	11,00	98,88	100,58	100,98	100,48
8,00	14,00	100,28	99,48	100,98	100,88
10,00	5,00	98,88	100,58	100,28	101,12
10,00	8,00	99,58	99,78	100,48	99,84
10,00	11,00	99,84	99,96	100,58	100,24
12,00	5,00	96,84	100,28	100,96	100,12
12,00	8,00	98,34	100,84	100,32	100,02
	Ortalama RSD*	99,48 1,02	99,88 0,48	100,20 0,45	99,88 0,88

RSD* Bağıl standart sapma

Tablo 2. Kalibrasyon basamağındaki istatiksel parametreler

Parametre	**CLS**		**ILS**	
	MET	CAF	MET	CAF
PRESS	0,0611	0,1317	0,1049	0,0362
SEP	0,0567	0,0832	0,0743	0,0436
r*	0,9998	0,9963	0,9996	0,9999
Eğim	0,9944	0,9912	1,0017	1,0097
Kayma	0,0387	0,0236	0,0191	0,0485

Son aşamada piyasadan temin edilen ve içeriği çalışılan etken maddeler olan ilacın analizi yapılarak elde edilen spektrum verilerine CLS ve ILS kemometrik yöntemleri uygulanmış ve sonuçlar tablo 3' de gösterilmiştir. Verilen değerler altı deney ortalaması olup gayet tekrarlanabilir sonuçlar elde edilmiştir.

Tablo 3. İlaç tabletleri için deney sonuçları

İlaç	**CLS**	**ILS**
MET **Ortalama ± SD***	449,68 ± 0,08	449,84 ± 0,04
CAF **Ortalama ± SD***	49,98 ± 0,02	49,88 ± 0,04

SD : Standart sapma

Deney sonuçları ve tablet analiz sonuçları irdelendiğinde önerilen kemometrik yöntemlerin doğru, hassas ve tekrarlanabilir sonuçlar verdiği gözlemlenmiştir. Önerilen yöntemlerin ilaç ARGE laboratuvarlarında uygulanabilir olduğu düşünülebilir.

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ARAŞTIRMA SORGULAMAYA DAYALI FEN ÖĞRETİMİNİN ÖĞRETMEN ADAYLARININ BİLİMSEL SÜREÇ BECERİLERİ VE MOTİVASYONLARINA ETKİSİNİN ARAŞTIRILMASI

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ÖZET
Bu çalışma araştırma sorgulamaya dayalı öğretimin fen bilgisi öğretmen adaylarının Fene yönelik motivasyonu ve bilimsel süreç becerileri üzerindeki etkisini incelemeyi amaçlamaktadır. Araştırmada deney kontrol gruplu yarı deneysel model kullanılmıştır. Araştırmanın çalışma grubunu 78, (3. Sınıf) Fen Bilgisi öğretmen adaylarından oluşmaktadır. Çalışmada araştırma sorgulama yönteminin öğretmen adaylarının bilimsel süreç becerilerine etkisini belirlemek amacıyla "Bilimsel Süreç Becerileri (BSB) Ölçeği kullanılmıştır. Araştırmada kullanılan ikinci veri toplama aracı Biyoloji Dersi Motivasyon Anketi'dir. Uygulama sürecinde elde edilen veriler kodlanarak SPSS programına aktarılmış ve analiz edilmiştir. Deney ve kontrol grubu için her bir değişkene ait veriler üzerinde betimsel istatistik analizi yapılmıştır. Deney ve kontrol grubuna ait ön test BSB ve motivasyon puanlarından elde edilen verilere bağımsız örnekleme t-testi yapılmış ve gruplar arasında anlamlı bir farklılık olmadığı incelenmiştir. Ortalamalardaki farklılıkların etkisinin kaldırılması amacıyla son testler üzerinde tek yönlü kovaryans analizi (ANCOVA) yapılmış ve ön testler ortak değişken olarak kullanılmıştır. Grupların son test puanlarının ortalamasının ANCOVA analizi sonucunda oluşan ortak etki sonuçlarına göre, deney grubu öğrencilerin lehine anlamlı bir farklılık belirlenmiştir. Başka bir ifadeyle, araştırma sorgulama yönteminin öğretmen adaylarının bilimsel süreç becerileri üzerinde geleneksel öğretim yöntemine göre daha olumlu etkisi olduğu belirlenmiştir. Deney ve kontrol grubu öğrencilerinin motivasyon son test puanları arasındaki farkla ilgili yapılan bağımsız t-testi sonuçlarına göre deney ve kontrol gruplarının son test ortalamaları arasında deney grubu lehine anlamlı fark olduğu tespit edilmiştir. Elde edilen bu sonuç ile araştırma sorgulamaya dayalı öğrenmenin öğrencilerin motivasyonlarını geliştirdiği çıkarımı yapılabilir. Çalışmanın sonucunda öğretmen eğitiminde araştırma sorgulama yaklaşımının kullanılmasının artırılması sağlanabilir. Farklı veri toplama araçları kullanılarak veri çeşitliliği sağlanabilir. Nitel ve nicel yöntemlerin birlikte kullanıldığı çalışmalar yapılabilir.

Anahtar kelimeler: Araştırma Sorgulamaya Dayalı Fen, Bilimsel Süreç Becerileri, Motivasyon, Öğretmen Adayları

INVESTIGATION OF THE EFFECTS OF INQUIRY-BASED SCIENCE TEACHING ON PRE-SERVICE TEACHERS' SCIENCE PROCESS SKILLS AND MOTIVATION

ABSTRACT

In this study aims to examine the effect of inquiry-based instruction on pre-service science teachers' motivation towards science and their science process skills. In the research, a quasi-experimental model with experimental control group was used. The study group of the research consists of 78 (3rd grade) science teacher candidates. In the study, the "Scientific Process Skills (SPS) Scale" was used in order to determine the effect of the inquiry method on the science process skills of teacher candidates. The second data collection tool used in the research is the Biology Lesson Motivation Questionnaire. The data obtained during the application process were coded, transferred to the SPSS program and analyzed. Descriptive statistical analysis was performed on the data of each variable for the experimental and control groups. An independent sampling t-test was performed on the data obtained from the pre-test science process skills and motivation scores of the experimental and control groups and it was observed that there was no significant difference between the groups. In order to remove the effect of differences in the means, one-way analysis of covariance (ANCOVA) was performed on the posttests and pretests were used as a covariate. According to the common effect results of the ANCOVA analysis of the average of the post-test scores of the groups, a significant difference was determined in favor of the experimental group students. In other words, it was determined that the inquiry method had a more positive effect on the science process skills of teacher candidates than the traditional teaching method. According to the results of the independent t-test on the difference between the motivation post-test scores of the experimental and control group students, it was determined that there was a significant difference between the post-test averages of the experimental and control groups in favor of the experimental group. With this result, it can be deduced that inquiry-based learning improves students' motivation. As a result of the study, it can be ensured that the use of inquiry approach in teacher education can be increased. Data diversity can be achieved by using different data collection tools. Studies in which qualitative and quantitative methods are used together can be done.

Keywords: inquiry-based science, science process skills, motivation, prospective teachers

GİRİŞ

Günümüz eğitim anlayışı, bilginin ezberci bir şekilde verilmesinin yerine, öğrenciye bilginin elde ediliş yaklaşımını kazandırmayı amaçlamaktadır. Öğretmenler öğrencilerine araştırma, sorgulama, gözlem ve deney yapma, veriler toplayarak analiz etme ve sonuca ulaşma, elde edilen sonucu paylaşma becerilerini kazandırmalıdır. Bu da modern eğitim yöntemlerinden araştırma-sorgulama yaklaşımı ile sağlanır. Fen Bilimleri Programlarının vizyonu, bireysel farklılıkları ne olursa olsun fen okuryazarı, düşünen, sorgulayan, öğrendiklerini günlük yaşam durumlarına uyarlayabilen, Bilim Çağı'nın gereklerine uygun bireyler yetiştirmektir (Milli Eğitim Bakanlığı [MEB], 2004; 2013). Fen okuryazar birey yetiştirmenin en etkili yollarından birinin araştırma-sorgulama yaklaşımının olduğu vurgulanmaktadır (National Research Council [NRC], 1996). Araştırma-sorgulama yaklaşımının bugünün öğretmen adaylarına kazandırılması araştırma-sorgulama pedagojisinin yarının sınıflarında başarıyla uygulanabilmesinin önünü açacaktır. Yapılan birçok araştırmada araştırma-sorgulama yaklaşımına dayalı fen dersleriyle ilgili öğretmen adaylarının bilimsel araştırma yapma deneyimlerinin ve yeterliliğinin olmadığı belirlenmiştir. Yapılan çalışmalarda ayrıca öğretmen adaylarının araştırma-sorgulama yaklaşımını derslerinde uygulayabilmeleri için gerekli deneyim ve yeterlilik kazanamadıklarını ortaya koymuştur (Bayır, 2008). Nitekim çoğu öğretmenin araştırma-sorgulama yaklaşımını kendi sınıflarında uygula(ya)madıkları yapılan araştırmalarda belirlenmiştir (Windschitl, 2002). Birçok ortaokul öğretmeni pedagojik alan bilgisi zayıf ve fen konularını öğretmede sınırlı anlayışa sahiptir. Yapılan çalışmalarda da birçok öğretmenin araştırma-sorgulama yaklaşımına aşina olmadıkları ve sınıflarında uygulamadıkları belirtilmiştir. Amerikan Ulusal Fen Eğitimi Standartları (National Science Education Standards), öğretmenlerin mesleki gelişimleri için araştırma-sorgulama yaklaşımını öğrenmeleri gerektiği belirtilmektedir (NRC, 1996).

ABD'de 1987 yılında kurulan Öğretmenlik Mesleği Standartları Ulusal Kurulu (NBPTS), bir sivil toplum örgütü olarak, ulusal öğretmenlik mesleği standartlarına ilişkin politikaları belirlemiş ve 25 alanda ulusal standartlar oluşturmuştur. NBPTS tarafından hazırlanan, öğretmen yeterliklerinin kapsamını tanımlayan "Öğretmenler Neleri Bilmeli ve Neleri Yapabilmeli" başlıklı politika belgesi öğretmen yeterliklerinin belirlenmesine yönelik çalışmaların temel dayanağı olarak kabul edilmiştir. Bu belge ile öğretmen yeterliklerinin kapsamı tanımlanmıştır (NBPTS, 2002). Öğretmen öğrencilerin ilgisini çekmek ve sürdürebilmek için öğretim ortamları oluşturabilir, bu ortamları değiştirebilir ve geliştirebilir. Öğrencilerin katılımını, motivasyonunu ve odaklanmasını sağlayacak çeşitli öğretim tekniklerini akıcı bir şekilde kullanabilir. Öğrenme teorileri ve öğretim stratejilerini bilir ve eğitimde güncel konularda sürekli kendini yeniler ((NBPTS, 2002). Sorgulama pedagojisi bilginin düşünme, fikirlerin entegrasyonu ve sosyal etkileşim yoluyla aşamalı olarak oluşturulduğunu varsayan yapılandırmacı felsefenin temelidir (American Association for the Advancement of Science, 1990)

Fen öğretme ve öğrenme etkinliklerinin bir özeti olan sorgulamanın farklı tanımları bulunmaktadır Sorgulamaya dayalı fen öğretimi öğrencilerin merak ve soru sorma (sorgulama); planlama ve tasarlama; veriyi kullanma ve araştırma; analiz etme ve iletişim kurma yoluyla bilimin doğasını ve bilim yapma kabiliyetinin artmasıdır. Perry ve Richardson (2001), sorgulamaya dayalı öğrenmeyi öğrencilerin sorular sorarak, araştırarak ve verileri analiz ederek öğrenme süreci olarak görmektedir. Inquiry and the Natioanl Science Education Standarts (NRC, 2000) sorgulamayı bir süreç olarak tanımlar. Colburn (2000) ise sorgulamanın hem öğretim yöntemi olarak hem de fen yapmak anlamlarında kullanıldığını bunun da sorgulamanın tanımında karışıklığa sebep olduğunu belirtmiştir. Sorgulamaya dayalı fen öğretimi Bilimsel sorgulama problemleri tanımlamayı, hipotezleri test etmeyi, problemleri çözüme ulaştırmayı, bilimsel araştırmaları yürütmeyi, bilimsel kanıtları paylaşmayı içermektedir (NRC, 1996). Araştırma sorgulama yaklaşımı feni yaparak öğrenme, feni öğrenme ve fenin nasıl yapıldığını öğrenme potansiyeline sahiptir (Anderson, 2007; NRC, 2000). Ulusal Araştırma Konseyi (National Research Council, [NRC]) tarafından belirlenen Amerikan Ulusal Fen Eğitimi Standartları'nda (National Science Education Standards) araştırma temelli öğrenme yaklaşımı, öğrenciler tarafından gözlemlerin yapıldığı, soruların sorulduğu, konuyla ilgili var olan bilgilerin kitaplar ve diğer kaynaklardan araştırıldığı, araştırmaların planlandığı, bilgilerin deneysel bulgularla karşılaştırıldığı, bilgi toplamak, analiz etmek ve yorumlamak için araç-gereçlerin işe koşulduğu, varsayımların, açıklamaların ve sonuçların ortaya konulduğu ve tartışıldığı çok boyutlu bir süreç olarak tanımlanmıştır (NRC, 2000).

Çağın ihtiyaç duyduğu insan profilinin değişmesi beraberinde eğitim anlayışı da değişmesini gerektirmiş ve öğrencilere bilgi ile birlikte birtakım becerilerin kazandırıldığı bir eğitim ön plana çıkmıştır. Bu becerilerin en önemlilerinden biri bilimsel süreç becerileridir. Fen Bilgisi dersi kapsamında kazandırılması gereken bilimsel süreç becerileri, insanların doğayı incelemede kullandıkları beceriler ve düşünme süreçleri olarak tanımlanmaktadır (Önal Çalışkan ve Kaptan, 2009). Çepni, Ayas, Johnson ve Turgut'a (1997) göre ise bilimsel süreç becerileri fen bilimlerinde öğrenmeyi kolaylaştıran, öğrencilerin aktif olmasını sağlayan, kendi öğrenmelerinde sorumluluk alma duygusunu geliştiren, öğrenmenin kalıcılığını artıran, ayrıca araştırma yol ve yöntemlerini kazandıran temel becerilerdir. Bu ifadeler ışığında bireylerin bilimsel süreç becerilerine sahip olmalarının çağın önemli bir gerekliliği olduğu ifade edilebilir. Bu becerilere ilişkin farklı sınıflandırmalar söz konusu olmakla birlikte Martin (2003) bilimsel süreç becerilerini; temel bilimsel süreç becerileri (gözlem yapma, sınıflama yapma, iletişim, ölçme, tahmin etme, çıkarımda bulunma) ve bütünleştirilmiş bilimsel süreçleri (değişkenleri belirleme ve kontrol etme, hipotezler formüle etme, verileri yorumlama, operasyonel olarak tanımlama, deney yapma ve modeller oluşturma) olarak iki başlık altında gruplandırmıştır.

Yapılandırmacı yaklaşımın eğitim sisteminde kullanımının yaygınlaşmasıyla birlikte duyuşsal öğrenmeler de önem kazanmıştır. Duyuşsal davranışlar arasında yer alan motivasyon bir öğrenme

sürecinin önemli unsurlarından birisidir. Öğrencinin, öğrenmeye karşı istekli olması veya motivasyonu öğrenmeyi etkileyin önemli etkenlerden biridir. Martin (2001) motivasyon kavramını, öğrencilerin başarıya ulaşmaları, okulda sıkı çalışmaları ve öğrenmeleri için itici bir güç olarak tanımlamıştır. Pintrich (2003) ise motivasyonu, bir hedefe yönelik olarak davranışı harekete geçirme, sürdürme ve yönlendirme süreci olarak belirtmiştir. Bir öğrenme sürecinin etkin bir şekilde sürdürülmesinde ve sonlandırılmasında da motivasyon önemli bir öğe olarak karşımıza çıkmaktadır. Spitzer'e (1996) göre öğrenci motivasyonu öğretim programını etkilemektedir; bu yüzden öğrenme ortamlarında motivasyon faktörünün önemsenmemesi başarısızlığa veya istenilen öğrenme hedeflerine ulaşamama nedenlerinden sayılabilir (Spitzer, 1996). Fen eğitiminde sıklıkla kullanılan duyuşsal faktörlerden olan motivasyon, belirli bir amaç doğrultusunda bir davranışın başlamasını, hangi yönde ilerleyeceğini, şiddetinin derecesini ve kararlılığını açıklamada kullanılan kuramsal bir kavramdır (Brophy, 1998). Araştırma sorgulamanın öğrencilerin fen öğrenme motivasyonlarını geliştirdiğini (Crawford, 2000) ve fen başarılarını artırdığını (Edelson, 1998) belirten çalışmalara literatürde rastlamak mümkündür. Araştırmanın amacı araştırma sorgulamaya dayalı fen eğitiminin öğretmen adaylarının fen öğrenmeye yönelik motivasyonları ve bilimsel süreç becerilerine üzerinde etkisini araştırmaktır.

YÖNTEM

Araştırmada deney kontrol gruplu yarı deneysel model kullanılmıştır (Fraenkel & Wallen, 2006). Eğitim alanında yapılan çalışmalarda tam olarak rastgele (random) atama yapılamaması (Kılıç, 2007) nedeniyle bu modelin kullanılması uygun görülmüştür. Okul idaresi tarafından belirlenmiş sınıfların araştırmacı tarafından rastgele deney ve kontrol grubu olarak atandığı araştırmalarda bu desen sıklıkla kullanılmaktadır (Çepni, 2012). Araştırmanın deneysel deseni Tablo 1'de gösterilmektedir.

Tablo1. Araştırmada kullanılan deneysel desenin Şematik Gösterimi

Grup	Ön test	Uygulama	Son test
Deney	BSB Motivasyon	Araştırma sorgulama	BSB Motivasyon
Kontrol	BSB Motivasyon	Geleneksel öğretim	BSB Motivasyon

Tablo 1'de görüldüğü gibi, deneysel uygulama başlamadan önce deney ve kontrol gruplarına ön testler uygulanmıştır. Deney grubunda dersler araştırma sorgulama yaklaşımına göre işlenirken; kontrol grubunda geleneksel öğretim metodu ile işlenmiştir. Deneysel uygulamanın sonunda tüm gruplara son testler uygulanmıştır.

Çalışma grubu

Araştırmanın çalışma grubunu 78, 3. Sınıf Fen Bilgisi öğretmen adaylarından oluşmaktadır.

Veri toplama araçları

Araştırmada araştırma sorgulama yönteminin öğretmen adaylarının bilimsel süreç becerilerine etkisini belirlemek amacıyla Burns ve diğerleri (1985) tarafından geliştirilen, Croanbach-alfa güvenirlik değeri .86 olarak bulunan ve Geban, Aşkar, & Özkan (1992) tarafından Türkçe'ye uyarlanan "Bilimsel Süreç Becerileri (BSB) Ölçeği kullanılmıştır. Ölçek 36 sorudan oluşan çoktan seçmelidir. Bu testte ölçülmeye çalışılan beceriler; değişkenleri tanımlayabilme (12 soru), işevuruk tanımlama (6 soru), hipotez kurma ve tanımlama (9 soru), grafiği ve verileri yorumlama (6 soru) ile araştırmayı tasarlama (3 soru) becerileridir. Testin Croanbach-alfa güvenirlik değeri .83 olarak bulunmuştur. Araştırmada kullanılan ikinci veri toplama aracı Biyoloji Dersi Motivasyon Anketi'dir. Biyoloji Dersi Motivasyon Anketi, Glynn ve Koballa tarafından hazırlanmış ve Ekici (2009) tarafından Türkçeye uyarlanmıştır. Anket 30 maddeden oluşan 5'li likert tipindedir. Ankette yer alan "fen bilgisi" kavramı yerine fizik, kimya, biyoloji kavramları kullanılarak tüm fen alanlarında kullanılabilmektedir (Ekici, 2009). Ankette fen motivasyonuna bağlı olarak hazırlanan maddelerin boyutları İçsel motivasyon (1, 16, 22, 27, 30), Dışsal motivasyon (3, 7, 10, 15, 17), Biyoloji öğrenmeye ilgi boyutu (2,11, 19, 23, 25), Biyoloji öğrenmede sorumluluk boyutu (5, 8, 9, 20, 26), Biyoloji öğrenmede güven boyutu (12, 21, 24, 28, 29), biyoloji sınavlarında endişe boyutu (4, 6, 13, 14, 18) şeklindedir (Anoymous, 2009). Anketten alınabilecek en düşük puan 30, en yüksek puan ise 150'dir. Anketin her bir boyutundan ise alınabilceke en yüksek puan 25, en düşük puan ise 5'tir. Ekici (2009) anketin Cronbach Alpha güvenirlik katsayısını .87 olarak bulmuştur (Ekici, 2009). Anketin alt boyutlarının Cronbach Alpha değerleri 0.89 ile 0.80 arasında değişmektedir.

Uygulama

Araştırma 2013-2014 öğretim yılında Fen Bilimleri Laboratuvarı I ve II dersleri kapsamında haftada ikişer saat süren oturumlarla gerçekleştirilmiştir. Araştırmanın başında deney ve kontrol grubuna bilimsel süreç becerileri testi ve motivasyon anketi ön test olarak uygulanmıştır. Ön testler uygulandıktan sonraki haftadan itibaren deney grubunda araştırma sorgulama yaklaşımına dayalı öğretim etkinlikleri; kontrol grubunda ise geleneksel öğretim yöntemine göre dersler işlenmiştir. Araştırma sorgulama yaklaşımına dayalı etkinlikler, Yüksek Öğretim Kurulu tarafından belirlenen Fen Öğretimi Laboratuvarı II dersi programındaki konulara uygun olarak gerçekleştirilmiştir. Öğrencilere deney yapmadan önce deney konusu verilerek bu konu ile ilgili problem belirleme, hipotez oluşturma, değişkenleri belirleme, işlem basamaklarını belirleme, deneyi yapma ve sonuçları yorumlama aşamalarını gerçekleştirmeleri sağlanmıştır. Her dersin başında öğrenciler araştırma sorularını, planlarını, bulgularını ve araştırma sonuçlarını hazırladıkları poster şeklinde tüm sınıflar paylaşmışlardır. Yapılan poster sunumları 15-20 dk sürmüştür. Öğretmen adayları hem kendilerini hemde akranlarını sunumlar esnasında değerlendirmişlerdir.

Verilerin Analizi

Uygulama sürecinde elde edilen veriler kodlanarak SPSS programına aktarılmış ve analiz edilmiştir. Deney ve kontrol grubu için her bir değişkene ait veriler üzerinde betimsel istatistik analizi yapılmıştır. Deneysel işlem öncesinde ve sonrasında uygulanan BSB testi ve motivasyon anketi verilerinin kontrol ve deney gruplarına ait basıklık ve çarpıklık değerleri incelendiğinde normal dağılım gösterdiği belirlenmiştir. Deney ve kontrol grubuna ait ön test BSB ve motivasyon puanlarından elde edilen verilere bağımsız örnekleme t-testi yapılmış ve gruplar arasında anlamlı bir farklılık olmadığı incelenmiştir. Ortalamalardaki farklılıkların etkisinin kaldırılması amacıyla son testler üzerinde tek yönlü kovaryans analizi (ANCOVA) yapılmış ve ön testler ortak değişken olarak kullanılmıştır.

BULGULAR

Araştırma sorusu kapsamında yanıt aranan araştırma sorgulama yaklaşımıyla gerçekleştirilen öğretme-öğrenme süreçlerinin öğretmen adaylarının Fen Öğretimi Laboratuvarı II dersindeki bilimsel süreç becerileri ve motivasyonlarına etkisini belirlemektir Bu bağlamda, ön test-son test olarak uygulanan Bilimsel süreç becerileri testi ve motivasyon anketinin verilerinin kontrol ve deney gruplarına ait basıklık ve çarpıklık değerleri incelenerek normal dağılım gösterdiği belirlenmiş, verilerin istatistiksel çözümlenmesinde parametrik testlerden yararlanılabileceğine karar verilmiştir (Huck, 2008).

Kontrol ve deney grupları ön test-son test sonuçlarının normal dağılıma ilişkin değerleri Tablo 2'de verilmiştir.

Tablo 2 Ön-test ve son-test puanlarına ait betimsel istatistik değerleri

Test		Deney		Kontrol	
		BSB	Motivasyon	BSB	Motivasyon
Ön	M	17.6	112.95	15.6	115.8
	Median	19.0	113.0	15.0	115.0
	Variance	12.1	160.0	13.4	153.2
	Min.	8.0	82.0	8.00	86.0
	Max.	25.0	137.0	20.0	139.0
	Skewness	-.74	-.294	-.356	-.335
	Kurtosis	.771	-.301	-.739	-.524
Son	M	28.62	117.2	25.02	111.7
	Median	29.0	119.0	25.0	112.0
	Variance	7.76	120.4	5.61	79.1
	Min.	22.0	95.0	17.0	94.0
	Max.	34.0	137.0	29.0	127.0
	Skewness	-.482	-.457	-.922	-.297
	Kurtosis	-.125	-.658	.437	-.816

Tablo 2 incelendiğinde grupların ön-test ve son-test puanları incelendiğinde normal dağılım varsayımlarının karşılandığı söylenebilir. Tablo 2 incelendiğinde, basıklık ve çarpıklık değerlerin -1.0 ve +1.0 değerleri arasında olması, verilerin istatistiksel çözümlenmesinde parametrik testlerden yararlanılabileceğini göstermektedir.

Bilimsel süreç becerileri testine ilişkin bulgular

Araştırmanın amacı doğrultusunda deney ve kontrol gruplarının bilimsel süreç becerilerini ön test-son test puanlarına ilişkin ortalama ve standart sapma değerleri incelenmiştir (Tablo 3).

Tablo 3. Ön test-son test puanlarına ilişkin ortalama ve standart sapma değerleri

BSB	Deney Grubu			Kontrol grubu		
	n	M	ss	n	M	ss
Ön test	43	93.45	16.80	35	105.20	17.71
Son test	43	129.95	12.37	35	116.35	15.16

Grupların BSB ön test puanları arasında anlamlı bir farklılık olup olmadığını belirlemek için bağımsız gruplar t-testi analizi yapılmış ve elde edilen bulgular Tablo 4'de gösterilmiştir.

Tablo 4. Ön test BSB puanlarına ilişkin bağımsız t testi sonuçları

Gruplar	n	M	ss	sd	t	p
Deney	43	17.69	3.48	76	2.58	.012
Kontrol	35	15.6	3.67			

Deney grubunun BSB ön test ortalama puanının (M=17.69) kontrol grubunun BSB ön test ortalama puanından (M =15.6) daha yüksek olduğu hesaplanmıştır. Bağımsız gruplar t-testi analizi sonucunda grupların ön test puanları arasındaki fark istatistiksel olarak anlamlı bulunmuştur ($t_{(76)}$=2.58; p=.012). Grupların ön test puanları arasındaki farklılıktan dolayı, son test puanlarının ne düzeyde farklılık gösterdiğini, değişimden kaynaklanan farklılığın anlamlı olup olmadığını belirlemek için ANCOVA analizi yapılmıştır. Bonferroni testi ile düzeltilmiş ortalamalara yer verilmiştir. ANCOVA analizinde BSB son test puanları kovaryant olarak alınmıştır. Sonuçlar Tablo 5'de gösterilmiştir.

Tablo 5. Deney ve kontrol grupları için BSB ön testine göre düzeltilmiş son test ortalamalarının ANCOVA sonuçları

Varyansın kaynağı	Kareler toplamı	sd	Kareler ortalaması	F	p
BSB ön tetst	11.49	1	11.49	1.705	.196
Gruplar	201.59	1	201.59	29.9	.00
Hata	505.52	75	6.74		
Toplam	57683.0	78			
Düzeltilmiş toplam	766.98	771193			

Tablo 5'de ANCOVA çözümleme sonuçları ön test puanlarına göre düzeltilmiş ve son test puanlarının gruplama ana etkisinin anlamlı olduğu saptanmıştır ($F_{(1-75)}$=29.9, p=.00). Başka bir ifadeyle, grupların son test puanlarının ortalamasının ANCOVA analizi sonucunda oluşan ortak etki sonuçlarına göre, deney grubu öğrencilerin lehine anlamlı bir farklılık belirlenmiştir. Belirlenen anlamlı farklılığın daha net bir biçimde ifade edilmesi amacıyla, grupların BSB son test puanlarının ortalama ve düzeltilmiş ortalama değerlerinin son durumu Tablo 6'te verilmiştir.

Tablo 6. Grupların son test puanlarının tanımlayıcı istatistik değerleri

Grup	n	M	Düzeltilmiş ortalama
Deney	43	28.62	28.52
Kontrol	35	25.02	25.15

Deney ve kontrol gruplarının düzeltilmiş ön test puan ortalamalarına göre deney grubunun BSB becerilerinin kontrol grubuna göre daha olumlu şekilde değiştiği belirlenmiştir. Başka bir ifadeyle, araştırma sorgulama yönteminin öğretmen adaylarının bilimsel süreç becerileri becerileri üzerinde geleneksel öğretim yöntemine göre daha olumlu etkisi olduğu belirlenmiştir. Deneysel uygulama sonunda tüm gruplarda BSB testi puanlarının arttığı görülmüştür. Deney grubunda BSB ön-test puanlarının ortalaması 17.69 iken, son-test puanlarının ortalaması uygulama sonunda 10.93 puan artarak 28.62 olmuştur. Kontrol grubunda ise BSB testi ön-test puanlarının ortalaması 15.60 iken, son-test puanlarının ortalaması uygulama sonunda 9.42 puan artarak 25.02 olmuştur. Deney gruplarında gözlenen artışın kontrol grubuna göre daha fazla olduğu görülmektedir

Motivasyona ilişkin bulgular

Çalışmada öğretmen adaylarının fene yönelik motivasyonlarını belirlemek amacıyla kullanılan motivasyon ölçeğinden elde edilen verilere ait ön test sonuçları Tablo 7'de verilmiştir.

Tablo 7. Ön test motivasyon puanlarına ilişkin bağımsız t testi sonuçları

Gruplar	n	M	ss	t	p
Deney	43	112.9	12.6	-.998	.322
Kontrol	35	115.8	12.3		

Tablo 7'deki sonuçlar incelendiğinde deney grubunun motivasyon ön test ortalaması 112.9 (ss=12.6) ve kontrol grubunun ön test ortalaması 115.8 (ss=12.3) olduğu görülmektedir. Ön test sonuçlarına göre deney ve kontrol grupları arasındaki ön test akademik başarı puanları arasında 0,05 seviyesinde istatistiksel olarak anlamlı fark bulunmamaktadır (t=-.998, p>0,05).

Tablo 7'de görüldüğü gibi uygulama öncesi kontrol ve deney gruplarının motivasyon puanları arasında anlamlı bir farklılık yoktur. Bu bulgulara göre deney ve kontrol gruplarının ön motivasyon düzeylerinin benzer olduğu söylenebilir. Araştırma sorgulamaya dayalı öğrenmenin öğrencilerin motivasyonları üzerine etkisini incelemek amacıyla deney ve kontrol grubu motivasyon son test verileri bağımsız t testi ile incelenmiştir (Tablo 8).

Table 8. Son test motivasyon puanlarına ilişkin bağımsız t testi sonuçları

Group	n	M	ss	t	p
Deney	43	117.2	10.9	2.390	.019
Kontrol	35	111.7	8.89		

Deney ve kontrol grubu öğrencilerinin motivasyon son test puanları arasındaki farkla ilgili bağımsız t-testi sonuçlarına bakıldığında deney grubunun son test puan ortalaması 117.2, (ss=10.9); kontrol grubu son test puan ortalaması 111.7 (ss=8.89) olduğu görülmektedir ($t=2.390$, $p<0.05$). Tablo 8 incelendiğinde deney ve kontrol gruplarının son test ortalamaları arasında deney grubu lehine anlamlı fark olduğu tespit edilmiştir. Elde edilen bu sonuç ile araştırma sorgulamaya dayalı öğrenmenin öğrencilerin motivasyonlarını geliştirdiği çıkarımı yapılabilir.

TARTIŞMA VE SONUÇ

Bu çalışmanın amacı araştırma sorgulamaya dayalı öğretimin fen bilgisi öğretmen adaylarının Fene yönelik motivasyonu ve bilimsel süreç becerileri üzerindeki etkisini incelemektir. Araştırma sorgulama öğrenme yaklaşımına dayalı öğretim etkinliklerinin ele alındığı deney grubu ve geleneksel öğretim programına göre öğretimin yapıldığı ve kontrol grubu öğrencilerinin bilimsel süreç becerileri son test puanları, deney grubundaki öğrencilerin lehine daha yüksek değerde bulunmuştur. Buna göre deney grubunda uygulaması yapılan, araştırma sorgulama öğrenme yaklaşımına dayalı öğretim etkinliklerinin, öğrencilerin bilimsel süreç becerilerini geliştirmede önemli bir etkiye sahip olduğu görülmektedir. Bu sonuç, öğrenciler bilimsel süreçlerle ilgili deneyimler edinirlerse, bu becerilerin gelişeceği görüşünü desteklemektedir (NRC, 2000). Araştırmanın yürütüldüğü deney ve kontrol grubu öğrencilerinin motivasyon ön test ve son test puan ile ilgili olarak ulaşılan sonuçlar incelendiğinde araştırma sorgulama öğrenme yaklaşımına dayalı öğretim etkinliklerinin gerçekleştirildiği deney grubu ve uygulamadaki fen ve teknoloji öğretim programı öğretim etkinliklerine göre öğretimin yapıldığı kontrol grubundaki öğrencilerinin motivasyon son test puanları deney grubundaki öğrencilerin lehine, daha yüksek olarak belirlenmiş ve anlamlı düzeyde bulunmuştur. Burada deney grubunda uygulaması yapılan araştırma sorgulama yönteminin öğretmen adaylarının motivasyonu geliştirmede önemli bir etkiye sahip olduğu görülmektedir. Uygulamadaki fen ve teknoloji öğretim programındaki öğretim etkinliklerinin yer aldığı kontrol grubu öğrencilerin motivasyon ön test-son test uygulamaları arasında, anlamlı düzeyde farklılık bulunmamıştır. Buradan, kontrol grubunda uygulaması yapılan öğretim etkinliklerinin, öğrencilerin motivasyonu geliştirmede etkisinin olmadığı söyenebilir. McPhedran (2006) tarafından yapılan çalışmada, sorgulamaya dayalı öğrenmenin öğrencilerin motivasyonları üzerindeki olumlu etkisi olduğu belirlenmiştir. Bu durum çalışmadaki bulgularla paralellik göstermektedir. Alanyazında yer alan çalışmalar sorgulamaya dayalı öğrenme yaklaşımının öğrencilerin fene karşı tutumlarını artırdığını ortaya koymuştur

(Kılınç, 2007; Çeliksöz, 2012; Dilbaz, Yelken, & Özelen, 2016). Ancak Güneş (2021) tarafından yapılan çalışmada sorgulamaya dayalı öğrenme yaklaşımının öğrencilerin motivasyonları üzerinde etkisinin az olduğu belirlenmiştir. Bu sonuç çalışmanın bulgularıyla örtüşmemektedir. Güneş (2021) elde edilen bu sonucun sorgulama yönteminin kısa süreli uygulanmasından kaynaklandığını belirtmiştir. Duyuşsal bir davranışın kazandırılabilmesi için uygulamanın uzun süre sürecin devam etmesi önerilmektedr. Çalışmada araştırma sorgulama yaklaşımının fen bilgisi öğretmen adaylarının motivasyon düzeylerini ve bilimsel süreç becerilerini geliştirdiği tespit edilmiştir. Bu bağlamda öğretmen adaylarının araştırma yapmada, araştırma sorusu oluşturmada, veri toplamada, verileri analiz etmede, sonuçları paylaşma becerilerini geliştirdiği söylenebilir. Çalışma kapsamında şunlar önerilebilir: öğretmen eğitiminde araştırma sorgulama yaklaşımının kullanılmasının artırılması sağlanabilir. Farklı veri toplama araçları kullanılarak araştırma sorgulama yaklaşımının başka davranışlar üzerine etkisi araştırılabilir. Nitel ve nicel yöntemlerin birlikte kullanıldığı çalışmalar gerçekleştirilebilir. Araştırma sorgulama öğrenme Öğretmen adaylarının sorumluluk almalarını ve kendilerini yenileme düşüncelerini kazandıracağı düşünülmektedir. Bu bağlamda dersler araştırma sorgulamaya dayalı fen öğretimi şeklinde işlenerek öğretmen adaylarının araştırma sorgulama becerisi hakkında deneyim sahibi olmaları sağlanabilir.

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ÖZET

Schiff baz bileşiklerinin metal kompleksleri tarımda, tekstilde, elektronikte, polimer üretiminde ve endüstrinin birçok alanında kullanılmaktadır. Günümüzde tıp, optik, elektronik, endüstriyel ve tarım alanlarında kuantum mekaniksel yöntemler kullanılarak modelleme yapılarak birçok ilaç ve malzeme üretilebilmektedir. Bu çalışmada, Schiff bazı [Ni (C15H11BrN4O2)] C3H7NOH2O (I) nikel kompleks yapısı, optimize edilmiş geometrisi ve sekroskopik özellikleri kuantum mekaniksel yöntemler kullanılarak incelenmiştir. Gaussian 09 paket programı, DFT (B3LYP) yöntemi ve LANL2DZ baz seti [1] geometri optimizasyonları ve NMR hesaplamaları yapmak için kullanılmıştır. Yapının görselleştirilmesi ve çıktıların analizi Gauss-View yazılımı [2] ile gerçekleştirilmiştir. Literatürde, çalışılan kompleks asimetrik birim başına bir molekül ile P1 triklinik uzay grubunda kristalleşir [3]. Kompleks molekül neredeyse düzlemsel bir yapıyı sahiptir. 4000–400 cm^{-1} aralığında kompleksin kızılötesi spektrumu çok zengindir ve tüm karakteristik fonksiyonel grup değerlerini gösterir. Hesaplamaların sonuçları, molekülün titreşim spektrumlarını simüle etmek için uygulanır. ^{1}H ve ^{13}C NMR kimyasal kaymaları, GIAO yöntemi kullanılarak hesaplanır. Molekülün NMR spektrumları da farklı çözeltilerde kaydedilir ve çözücü etkileri için hidrojen ve karbon atomlarının kimyasal kaymaları değerlendirilir. Elektronik özellikler olarak da çalışılan metal kompleksin öncü moleküler orbitalleri ve moleküler elektronik potansiyel haritası çizilerek sonuçlar analiz edilmiştir. Hesaplanan geometrik parametreler literatür verileriyle iyi bir uyum içindedir. Bu teorik ve geçici sonuçlar bize moleküllerin yapısal ve fizikokimyasal özelliklerinin ayrıntılı bir tanımını verecektir [3].

Anahtar Kelimeler: Schiff baz, metal kompleksi, spektroskopi, YFT.

SPECTROSCOPIC PROPERTIES OF THE SCHIFF BASE Ni METAL COMPLEX COMPOUND WITH THEORETICAL METHOD

ABSTRACT

Metal complexes of Schiff base compounds are used in agriculture, textiles, electronics, polymer production and many areas of industry. Today, many drugs and materials can be produced in the fields of medicine, optics, electronics, industrial and agriculture by modeling using quantum mechanical methods. In this study, Schiff base [Ni(C15H11BrN4O2)]C3H7NOH2O (I) nickel complex structure, optimized geometry and sectroscopic properties were studied using quantum mechanical methods. Gaussian 09 program package has been used to perform geometry optimizations and NMR calculations by DFT (B3LYP) method with the LANL2DZ basis set. Visualization of the structure and the analysis of the outputs have been carried out with Gauss-View software. In literature, the crystallizes in the triclinic space group P1 with one molecule per asymmetric unit. The complex molecule adopts an almost planar conformation. The infrared spectrum of complex in the 4000–400 cm^{-1} range is very rich and shows all characteristic functional group peaks. The results of the calculations are applied to simulate the vibrational spectra of the molecule. ^{1}H and ^{13}C NMR chemical shifts are calculated by using GIAO method. NMR spectra of the molecule are also recorded in different solutions and the chemical shifts of hydrogen and carbon atoms are evaluated for solvent effects. The frontier molecular orbitals of the metal complex, which is also studied as electronic properties, and the molecular electronic potential map were drawn and the results were analyzed. The calculated geometric parameters are good agreement with the literature data. This theoretical and tentative results will give us a detailed description of the structural and physicochemical properties of the molecules[3].

Keywords: Schiff base, metal complex, spectroscopy, DFT.

1. INTRODUCTİON

Schiff bases were first synthesized by German chemist H. Schiff in 1864. In 1933 it was used as a ligand by Pfeiffer [1]. Schiff bases are condensation reaction products of aldehydes or ketones with primary amine groups [2,3]. The Schiff bases, compounds containing the group of the indications (> C = N-), can be represented as RCH = NR '. Where R and R 'may be an aromatic or aliphatic group. Schiff bases are used different area such as antibiotics, antitumor, antimanthar, antiallergic products, the plastic and dye industries, magnetism, molecular architectures and liquid crystal technology [4–8]. As is known, Schiff bases are considered as a very important class of organic compounds due to their ability to form complexes with transition metal ions. It has even been proven that metal complexation of Schiff bases can strongly influence their activity as well as their optoelectronic properties.

2. METHODS

Gaussian 09 software package has been used to perform geometry optimizations and total energy calculations by DFT (B3LYP) method with the LANL2DZ basis set [9]. Visualization of the structure and the analysis of the outputs have been carried out with Gauss-View software [10]. The harmonic vibrational frequencies were calculated at the same level of theory for the optimized structure and the obtained frequencies were scaled by 0.9611 (B3LYP).].

3. RESULTS AND DİSCUSSİON

3.1. Structural Properties

[Ni(C15H11BrN4O2)]C3H7NOH2O, (I) → {4-bromo-2-[({N0-[(2-oxidobenzylidene) amino]carbamimidoyl}imino)methyl]phenolato}nickel(II) N,N-dimethylformamide, BCPND. Studied molecule crystallizes in the triclinic space group P1 with one molecule per asymmetric unit [11]. The initial molecular geometry of ligand compound was taken cif. [5] and figured by using Gauss-View. We figure out geometry optimizations as seen Fig. 1.

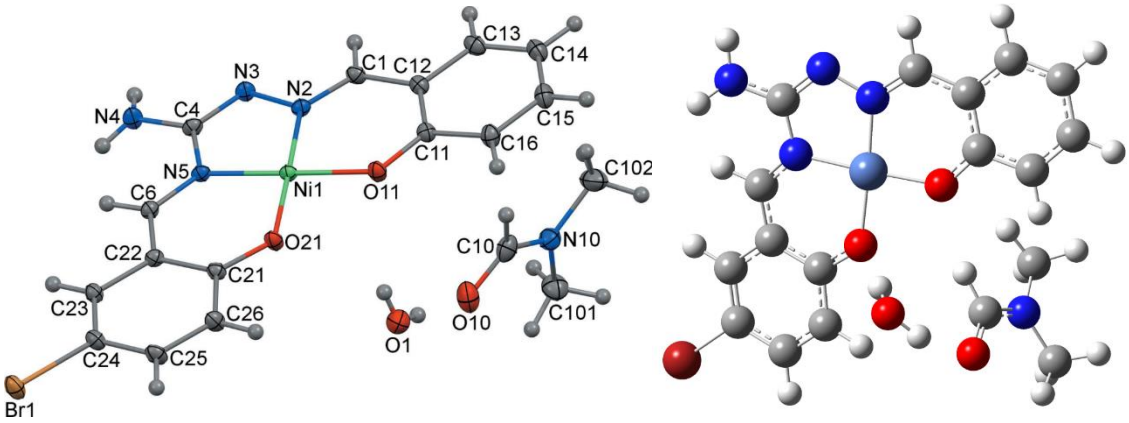


Fig. 1. (left) Molecular structure and atom labelling of [NiL]C3H7NOH2O (I), with displacement ellipsoids at the 50% probability level [11] and (right) theoretical optimized structure.

In this study, nickel complex based on a Schiff base structure is performed and investigated the structural, spectral, optical and electronic properties using quantum mecanic methods. The energy nickel complex compound (E) = -2585 Hartree for DFT(B3LYP with LANL2DZ). The optimized bond length, bond angles and dihedral angles were obtained by B3LYP methods combining with LANL2DZ basis set for title compound were listed in Table 1-3. These values were in agreement with the experimental values [11]. As can be seen, most of the bond distances are slightly longer than the experimental distances. Comparing the experimental and calculated bond lengths for the molecule, the theoretical values bigger than experimental values. For the bond angles, there are difference. The observed differences in bond parameters can be explained by the fact that the intra and intermolecular interactions with the neighboring molecules are absent in gas phase, whereas the experimental result corresponds to interacting molecules in the crystal lattice. As known, the biggest differences of bond lengths and bond angles mainly occur in the groups involved in the hydrogen bonds [i.e.,] for the title compound, which is related to intra and intermolecular interactions present in the crystal.

Table 1. Comparative bond lenghts and bond angles.

Parameters *Bond lengths (Å)*	Exp [11].	B3LYP	*Parameters* *Bond angles (°)*	Exp [11].	B3LYP
Ni1—N2	1.8383 (11)	1.86250	N2—Ni1—N5	83.08 (5)	84.02307
Ni1—N5	1.8494 (11)	1.88537	N5—Ni1—O21	95.25 (5)	94.58463
Ni1—O21	1.8515 (10)	1.86168	N2—Ni1—O11	95.35 (5)	94.40787
Ni1—O11	1.8562 (10)	1.85578	N5—Ni1—O11	178.29 (5)	177.16859
Br1—C24	1.9044 (14)	1.96908	O21—Ni1—O11	86.30 (4)	87.04074
C11—O11	1.3142 (17)	1.33957	O11—C11—C16	119.03 (13)	118.17952
N2—N3	1.3926 (16)	1.41252	C11—O11—Ni1	126.59 (9)	127.84638
N3=C4	1.3069 (18)	1.32091	N3=C4—N5	117.40 (12)	118.83176
C4—N5	1.4133 (17)	1.41463	C23—C24—Br1	119.43 (11)	120.21009

3.2. Vibrational Properties

The IR spectra contain some characteristic bands of the stretching vibrations of the C-H, O-Ni, C-Br, NH2, C=O, C=C, C-C,CH3, H2O and C=N groups. In table, especially Exp. C=N) and metal (O=R1) values are agree theoretical values (as Table 2 and Fig.2).

Table 2. Selected some experimental and calculated vibrational frequencies (cm^{-1}) *:Ref.[6]

Assignments[a]	B3LYP Scaled(0.9611)	Exp.
ν (N-H2) s	3496	3502
ν (C−H) Arom. s	3111	3134
ν (C−H) as	3058	3062
ν (CH) Alif.	2960	2958
ν (CH3)	2918	2930
α(H2O)	1628	1668
α(NH2)	1617	1610
ν (C=N) s	1572	1584
ν (C=N) s	1541	1536
ν (C=C)	1503	1512
δ (C−H)	1445	1452
ω (CH3)	1414	1412
ν (C−N)s	1381	1384
ν (NH2-C-N) as	1330	1356
ν (O=R1)	1276	1246
ν (CH3-N-CH3)	1223	1206
α(CH) R1	1153	1152
ν (N−N)s+ γ (NH2)	1101	1106
ω(CH3)+ ν (N−C)	1071	1066
ν (N−N)s γ(NH2)	994	990
ν(C-N-Ni)	950	948
ν (N−CH3)ν	831	826
ω(C-H) (R1,2)	751	754
ω(H2O)	682	690
ν (N-Ni-O)	663	668
ν (Br-C)	630	656
ν (Ni-O)	610	616
γ (N−H2)	570	582
β(R1+Ni)	556	550
γ (O−H2)	532	532
ω (R)	470	462
τ (NiNC)	440	448

a ν, stretching; α , scissoring; γ, rocking δ, twisting;; ω, wagging; β, bending; τ, torsion; s, symmetric; as, asymmetric, Abbreviations: R, ring.

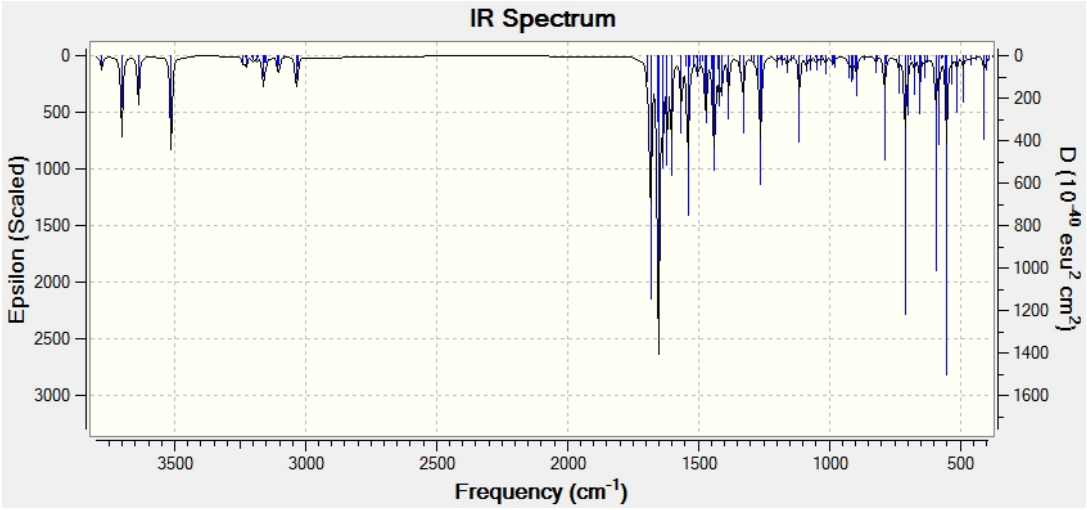


Fig. 2. The calculated theoretical vibrational frequencies.

The energy gap between HOMO and LUMO is a critical parameter in the determination of molecular electrical transport properties.

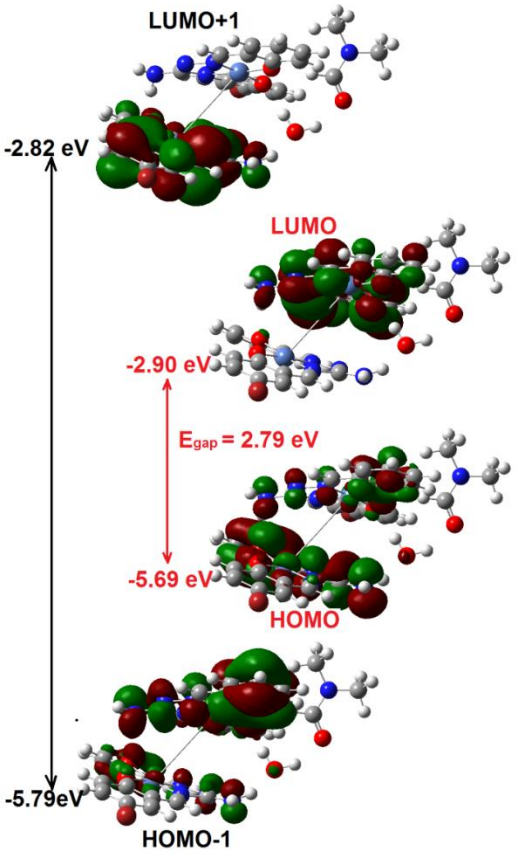


Fig. 3. FMO analysis.

An electronic system with a larger energy difference between HOMO–LUMO orbital (Egap) should be less reactive than one having a smaller gap. The energy gaps (Egap) is calculated 2.79 eV for DFT method (Fig. 3). I is the ionization potential, A is the electron affinity, χ is electronegativity .

Table 3. The measured electronic parameters of molecules.

Parameters (eV)	**B3LYP**
$\mathbf{E_{LUMO}}$	-2.90
$\mathbf{E_{HOMO}}$	-5.69
$\mathbf{\Delta E = E_{LUMO}-E_{HOMO}}$	2.79
$\mathbf{I = -E_{HOMO}}$	5.69
$\mathbf{A = -E_{LUMO}}$	2.90
$\mathbf{\chi = (I+A)/2}$	4.29
$\mathbf{\mu=-\chi}$	-4.29
$\mathbf{\eta = (I-A)/2}$	1.39
$\mathbf{S = 1/2\eta}$	0.70
$\mathbf{w= \mu^2/2\eta}$	6.60
$\mathbf{\mu_D}$ **(Debye)**	5.137

It should be noted that, as the electronic chemical potential (μ) difference increases the global electron density transfer will have a lower polar character. The resistance of a molecule to exchange electron density with the environment is defined as the chemical hardness(η). A large HOMO–LUMO gap (ΔE_{H-L}) indicates a harder molecule and small a ΔE_{H-L} indicates a softer molecule. It is possible to relate the stability of the molecule to η, which indicates that the molecule with least ΔE_{H-L} means it is more reactive and less stable (as seen Table 3). The high value of electrophilicity index w indicates that the molecule is highly stable and dye solutions containing that molecule has higher resistance to fading when exposed to light, which is a property known as light-fastness.

3.3. Molecular electrostatic potential

MEP mapping is very useful in understanding sites for electrophilic attack and nucleophilic reactions as well as hydrogen bonding interactions.

The MEP clearly indicates that the electron rich centres were found around the O atoms, proton rich centres were found around the N atoms and slighly H atoms. For O atoms, the max. negative V(r) values are -0.045 ,a.u.and N atoms the max. V(r) values are 0,040 a.u for B3LYP method in Fig 4.

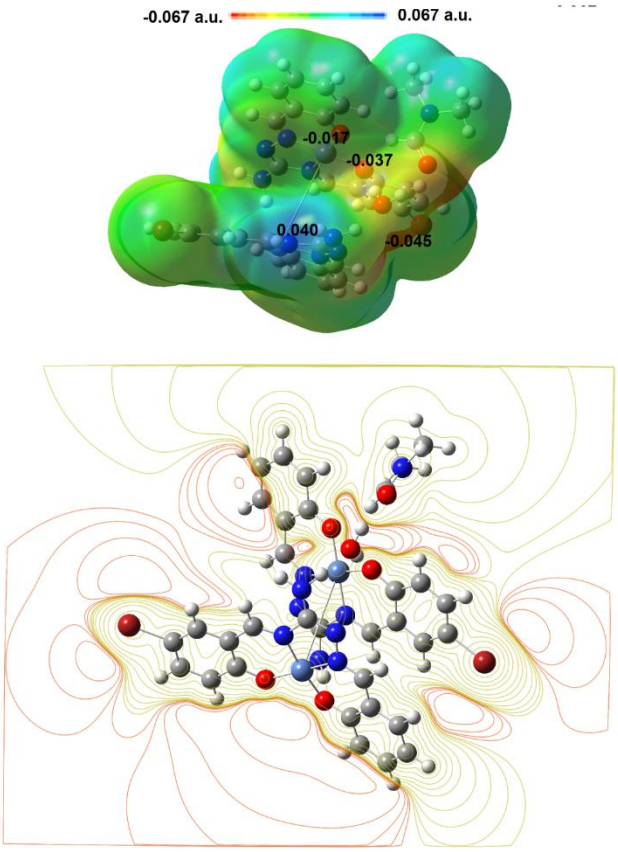


Fig. 4. Total electron density mapped (up) and contour(down) of the compound

3.4. Atomic charges

Atomic charges affect the dipole moment, molecular polarizability, electronic structure, and a lot of other properties of molecular systems. Therefore, the Mulliken atomic charge calculation is

important in the application of quantum chemical calculations to such a system. It is clear that the Mulliken populations provide the simplest picture of the charge distribution, and Mulliken charges render "net" atomic populations in the molecule (as seen Fig. 5).

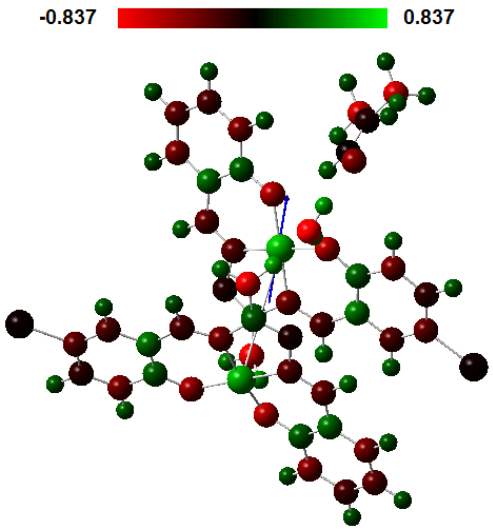


Fig. 5. Mulliken charges and dipol moment vector.

3.5. NLO properties

Nonlinear optic (NLO) study is at the focus of common research because of its wide application in data storage technology, signal processing, laser technology, optical communication and optical interconnections areas. DFT has been used extensively as an effective method to investigate organic NLO materials. Here we investigated non linear optical properties of all molecules using B3LYP. Superior values of dipole moment, molecular polarizability and hyperpolarizability are required for a molecule to act as a better NLO material. Dipole moment (μ) of a molecule gives a signature about charge distribution and geometry of the molecule. In here μ is also bigger than urea, which is important optical properties are listed in Table 7. For example, urea is a prototypical molecule in the study of the NLO properties and therefore it is frequently being used for comparative studies. The calculated values of μ, α, β for molecule are μ = 5.1369 D, α = 88.89 $Å^3$ and β= 4.4937E-30 cm^5/esu, which are greater than those of urea (α = 3.883504 $Å^3$ and β = 4.1157 $\times 10^{-31}$ cm^5/esu) as obtained by B3LYP/LANL2DZ method. A key aspect for an NLO system is the magnitude of molecular polarizability and hyperpolarizability. As a result, this molecule is a good candidate as a NLO material.

Table 4. Dipol moment, molecular polarizability and hyperpolarizability for B3LYP.

Dipol	**Ni-complex**	**HyperPolar**	**Ni-complex**
μ_x	0.59	β_{xxx}	-942.02
μ_y	3.48	β_{xxy}	78.13
μ_z	-3.73	β_{xyy}	519.41
μ_T	5.1369	β_{yyy}	-116.95
Polar		β_{xxz}	261.48
α_{xx}	782.87	β_{xyz}	-50.93
α_{xy}	-183.53	β_{yyz}	-233.85
α_{yy}	655.63	β_{xzz}	-42.81
α_{xz}	69.47	β_{yzz}	-8.37
α_{yz}	97.14	β_{zzz}	-254.79
α_{zz}	363.05	β_T	4.4937E-30
α_T	88.89806		

4. CONCLUSION

The Schiff base Ni metal complex compound investigated. The calculated geometric parameters are good agreement with the experimental data. Detailed vibrational assignments of the title compound are ascribed to their structural vibrations, which show that the theoretical harmonic frequencies are in good agreement with their observed spectral features. The MEP map indicates that hydrogen atoms is positive while the O atom is the negative. These sites give information about the region from where the molecule can have intermolecular interactions and metallic bonding. This molecule is also a good candidate as an NLO material.

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ICOSAHEDRON Cu_6Zn_6Al, Cu_6Al_6Zn ve Zn_6Al_6Cu TOPAKLARINDA MERKEZ KATKI ATOMUNUN ELEKTRONİK ÖZELLİKLERİ ÜZERİNE ETKİSİ

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ÖZET

Şekil hafızalı alaşımlar (SMA'lar) çeşitli uygulamalarda farklı alanlarda kullanılmaktadır. Bazı şekil hatırlamalı alaşımlar, şekil hatırlama özelliğinden dolayı gözlükler, kateterler ve ortodonti gibi endüstri alanlarında ayrıca birçok medikal uygulamada da kullanılmaktadır. Son yıllarda CuZnAl üçlü alaşımlar ile ilgili çalışmalar yapılmaktadır. Mikroyapısal çalışmalarda da CuZnAl alaşımlarının daha iyi anlaşılması sağlanmıştır [1, 2, 3]. Yapılan çalışmalarda alfa çökeltileri ve martensit yapılar gözlenmiştir. CuZnAl alaşımlarının yapısal, kristolografik, termal, mekanik özellikleri gibi birçok özellikleri incelenmiştir [4, 5]. Ancak, nano boyutta CuZnAl alaşımları ile ilgili teorik çalışmalara az rastlanılmaktadır. Bu çalışmada ikosahedral CuZnAl alaşımının elektronik özellikleri kuantum mekaniksel metod kullanılarak çalışılmıştır. DFT hesaplamaları ile bir dizi 13 atomlu CuZn nanoalaşım topakları incelenmiştir ve sonuçlar, bakırca zengin topakların yapılarının kompakt, genellikle ikosahedral olma eğilimindeyken, çinko bakımından zengin topakların, tamamlanmamış bir kabukla çevrili kompakt bakır çekirdeklere sahip olduğunu göstermektedir. Cu_6Zn_7 topağı literatürde ikosahedron yapıdadır [6, 7]. Bu çalışmada katkılı merkez atomun, ikosahedron Cu_6Zn_6Al, Cu_6Al_6Zn ve Zn_6Al_6Cu topaklarının elektronik özellikleri üzerindeki etkisi yoğunluk fonksiyonel teorisi kullanılarak incelenmiştir [8]. İlk olarak, tüm nanoalaşım topaklarının global minimumu elde edilmiştir. Daha sonra Al, Cu ve Zn ikili alaşım topaklarının global minimum yapılarına merkez atomu katkılandırılmıştır. Elde edilen verilerden; topakların yapısal, elektronik özellikleri ve elektrostatik potansiyel yüzeyleri analiz edilmiştir.

Anahtar Kelimeler: Cu-bazlı Alaşım, Topak, Katkılı, DFT.

EFFECT OF THE DOPED CENTRE ON THE ELECTRONIC PROPERTIES OF ICOSAHEDRON Cu_6Zn_6Al, Cu_6Al_6Zn and Zn_6Al_6Cu CLUSTER

ABSTRACT

Shape memory alloys (SMAs) are used in different fields in various applications. Some shape memory alloys are also used in many medical applications in industrial areas such as eyeglasses, catheters and orthodontics due to their shape memory feature. In recent years, about CuAlNi and CuZnAl ternary alloys works are being done. CuZnAl alloys with better mechanical properties are the most popular among the Copper-based SMA [1, 2, 3]. A better understanding of CuZnAl alloys has also been made in microstructural studies. In studies were observed alpha precipitates and martensite structures**.** Many properties of CuZnAl alloys such as structural, crystallographic, thermal and mechanical properties were investigated [4, 5]. In this study, the electronic behavior of CuZnAl alloy was studied. A series of 13-atom Cu-Zn nanoalloy clusters was also studied by DFT calculations, and the results indicate that structures of copper rich clusters tend to be compact, often icosahedral, whereas zinc rich clusters have compact copper cores surrounded by an incomplete shell of solvated Zn atoms. Cu_6Zn_7 structure is based on the icosahedron in literatüre [6, 7]. In this study, the doped effect of centre atom on the electronic properties of icosahedron Cu_6Zn_6Al, Cu_6Al_6Zn and Zn_6Al_6Cu cluster are studied by using density functional theory [8]. Firstly, the global minimum of all nanoalloy clusters are obtained. Then, Al, Cu and Zn is doped the global minimum structures of binary alloy clusters. From obtained data; the electronic properties and electrostatic potential surfaces of the clusters are analyzed.

Keywords: Cu-based Alloy, Cluster, Dope, DFT.

INTRODUCTİON

Metals and their alloys have an important place in technology because they exhibit different properties under different physical effects. In terms of technological developments in the world, the acquisition and development of new materials is of great importance. These developments should not only be aimed at obtaining materials, but also they should be able to add new functions to the materials and increase the functionality of the material by expanding its usage area. Cu-based alloys are interesting materials because they can potentially be combined with other alloying elements, thereby allowing the preparation of different alloys with reasonable properties [1]. Cu-based alloys are widely used in many fields because of their good combination of high thermal and electrical conductivities as well as their high strength. In particular, Cu-based alloys with high performance are required in field of electronic materials, such as substrate and lead frame in printed board, interconnection and so on, because the electronic packageing has a tendency to miniaturization [2]. Shape memory alloys have attracted attention as very attractive materials in recent years due to their technological importance and interesting physical properties. Permeability and sensitivity have been frequently investigated in recent years [3]. In studies on alloys, the surface, crystallographic, thermodynamic, magnetic and mechanical properties of alloys have been extensively studied. however, there are very few studies on the electronic properties of alloys. Recently, studies have been carried out on the electronic properties of alloys. For this reason, the electronic properties of the alloy studied in this study were studied and the data obtained were discussed by comparing them with the literature. However, geometry optimizations at the PBE/LANL2DZ level reveal that the most stable structures of Cu_6Zn_7 and Cu_8Zn_5 clusters are icosahedra. Structures of copper rich clusters tend to be compact, often icosahedra, whereas zinc rich clusters (Zn8Cu+5, Zn9Cu4, Zn11Cu2) have compact copper cores surrounded by an incomplete shell of solvating Zn atoms. The icosahedral structure, low total energy, and large hardness of Zn7Cu6 indicate that it has special stability among ZnxCuy clusters. However, Zn_7Cu_6 has many low lying isomers and a small cohesive energy compared to brass, which suggest that it is not stable in a broader sense [4]. In another study inclued the newly located Global minimum (GM) and low-energy isomers of Cu_6Zn_7 and Cu_8Zn_5 at the BP86-D3/def2-TZVP level [5].

METHODS

Gaussian 09 program package has been used to perform geometry optimizations and total energy calculations by DFT with BPV86/LANL2DZ basis set [8]. Visualization of the structure

and the analysis of the outputs have been carried out with Gausswiev software [9].

RESULTS AND DİSCUSSİON

4.1. Electronic Properties

In literature geometry optimizations both at the PBE/LANL2DZ and BP86-D3/def2-TZVP level reveal that the most stable structures of Cu_6Zn_7 cluster is icosahedra [4,5]. In here we analysed electronic properties doped effect in center atom. In all cases, the energies are given relative to the lowest energy structures found for Cu_6Zn_7 , Zn_6Cu_7, Al_6Zn_7, Zn_6Al_7, Cu_6Al_7, Al_6Cu_7, Cu_6Zn_6Al, Zn_6Al_6Cu and Cu_6Al_6Zn (as seen in Table 2). From the all clusters we selected the lovest energy structures: Cu_6Zn_6Al, Zn_6Al_6Cu and Cu_6Al_6Zn.

Table 1. The energy values (eV) of all molecules.

Energy	**Cu_6Zn_7**	**Cu_6Zn_6Al**	Cu_7Zn_6	Cu_6Zn_6Al	Zn_6Al_7	Zn_6Al_6Cu	**Zn_7Al_6**	**Zn_6Al_6Cu**	**Cu_6Al_7**	**Cu_6Al_6Zn**	Cu_7Al_6	Cu_6Al_6Zn
E (a.u.)	-44620	-42879	-48166	-42879	-11159	-16446	-12899	-16446	-32434	-34174	-37720	-34174
LUMO	-3.54	-3.50	-3.46	-3.49	-3.12	-3.74	-3.29	-3.11	-3.62	-4.04	-4.12	-4.04
HOMO	-4.23	-3.89	-4.00	-3.89	-4.47	-4.23	-4.37	-4.41	-4.60	-4.51	-4.51	-4.51
$\Delta E = E_{LUMO}-E_{HOMO}$	0.69	0.40	0.54	0.40	1.35	0.50	1.07	1.30	0.99	0.47	0.38	0.47

The quantum molecular descriptors such as electron affinity (A), ionization potential (I), electronegativity (χ), chemical potential (μ), chemical hardness (η) and softness (S) and electrophilicity index (W) were computed similarly using the HOMO and LUMO energies, as summarized in Table 2. It should be noted that, as the electronic chemical potential (μ) difference increases the global electron density transfer will have a lower polar character. As

seen in Table 2, Cu6Al6Zn has a larger chemical potential than other doped cluster. In order to investigate the chemical stability and reactivity behavior of clusters, chemical hardness (η) and softness (S) were also performed. Considering the chemical hardness, small HOMO–LUMO gap (ΔEH-L) means a soft molecule and large ΔEH-L means a hard molecule. One can also relate the stability of the molecule to hardness, which means that the molecule with less gapH-L means it is more reactive and less stable. According to ΔEH-L values, Zn6Al6Cu is hardest molecule. The calculated values of ELUMO, EHOMO, gapH-L, η, S, μ and other parameters computed. When it is compared to the Table 2, the doped alloy is more soft than bimetallic alloys except for Zn7Al6 and Cu7Al6. The calculated electrophilicity index value of doped is WZn> WAl >WCu. The high value of w indicates that the molecule is highly stable and dye solutions containing that molecule has higher resistance to fading when exposed to light, which is a property known as light-fastness.

Table 2. The measured parameters of molecules Cu_6Zn_6Al, Zn_6Al_6Cu and Cu_6Al_6Zn.

Parameters (eV)	**Cu_6Zn_6Al**	**Cu_6Al_6Zn**	**Zn_6Al_6Cu**
E_{LUMO}	-3.50	-4.04	-3.11
E_{HOMO}	-3.89	-4.51	-4.41
$\Delta E = E_{LUMO}-E_{HOMO}$	0.40	0.47	1.30
$A = -E_{LUMO}$	3.50	4.04	3.11
$I = -E_{HOMO}$	3.89	4.51	4.41
$\chi = (I+A)/2$	3.69	4.27	3.76
$\mu = -\chi$	-3.69	-4.27	-3.76
$\eta = (I-A)/2$	0.20	0.24	0.65
$S = 1/2\eta$	0.10	2.12	0.77
$w = \mu^2/2\ \eta$	34.30	38.68	10.89
μ_D	0.0050	0.0021	0.0020

4.2. Atomic Charges

It is clear that the Mulliken populations provide the simplest picture of the charge distribution, and Mulliken charges render “net” atomic populations in the molecule. The Mulliken [10] charge distributions of atoms are shown in Fig. 1. As shown in Fig. 1, while the the Zn and Al atoms have positive charges in doped Al, Cu atoms have negative charges. We also compared the effect of doped atom change in Fig. 2.

Dipole moment (μ) of a molecule gives a signature about charge distribution and geometry of the molecule. μ are listed in Table 2. For example, urea is a prototypical molecule in the study

of the NLO properties and therefore it is frequently being used for comparative studies. The calculated values of μ, for ıcosahedran, doped it Al, Zn and Cu are μ = 0.0050, 0.0021 and 0.0020 Debye, which are smaller than those of urea (μ = 1.3732 Debye) as obtained by B3LYP/6-31G(d) method. A key aspect for an NLO system is the magnitude of dipol moment, molecular polarizability and hyperpolarizability. As a result, this clusters may not candidate as a NLO material.

Table 3. Mulliken charges of the title compound.

Atom(dope)	Cu_6Zn_7	$Cu_6Zn_6Al(1)$	**Atom(dope)**	Cu6Al7	$Cu_6Al_6Zn(2)$	**Atom(dope9**	Zn_7Al_6	$Zn_6Al_6Cu(3)$
Cu1	-0.664308	-0.019062	**Cu1**	-0.538326	-0.588423	**Al1**	0.101611	0.147520
Cu2	-0.662567	-0.046961	**Cu2**	-0.539618	-0.588846	**Al2**	0.100686	0.090783
Zn3	0.224057	-0.106074	**Al3**	0.425579	0.235562	**Zn3**	0.039701	0.219444
Cu4	-0.664387	0.017540	**Cu4**	-0.580255	-0.678025	**Al4**	0.101181	0.147376
Zn5	0.223504	-0.105959	**Al5**	0.498957	0.396515	**Zn5**	0.039252	-0.084906
Zn6	0.227305	-0.008278	**Al6**	0.497205	0.394644	**Zn6**	0.040353	0.221035
Cu7	-0.664151	0.017569	**Cu7**	-0.538856	-0.587460	**Al7**	0.100778	0.092870
Zn(Al)8	2.634093	0.006231	**Al(Zn)8**	0.474373	1.655642	**Zn(Cu)8**	-0.845591	-1.483359
Zn9	0.225618	0.022380	**Al9**	0.424848	0.234335	**Zn9**	0.039975	0.220960
Cu10	-0.664753	0.044129	**Cu10**	-0.541194	-0.588855	**Al10**	0.101567	0.146223
Cu11	-0.663005	-0.046297	**Cu11**	-0.579938	-0.677957	**Al11**	0.101176	0.146534
Zn12	0.226259	0.022352	**Al12**	0.497354	0.395395	**Zn12**	0.039433	-0.084049
Zn13	0.222335	0.383448	**Al13**	0.499872	0.397471	**Zn13**	0.039879	0.219569

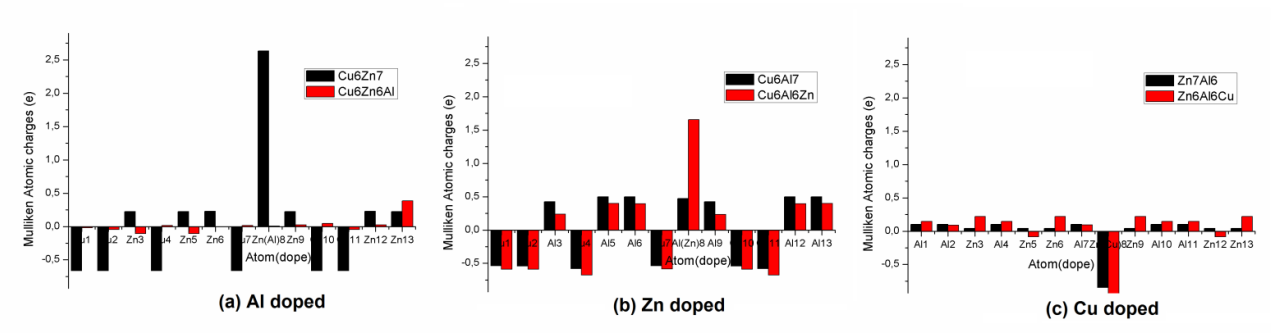


Fig 1. The corresponding Mulliken's column graffic.

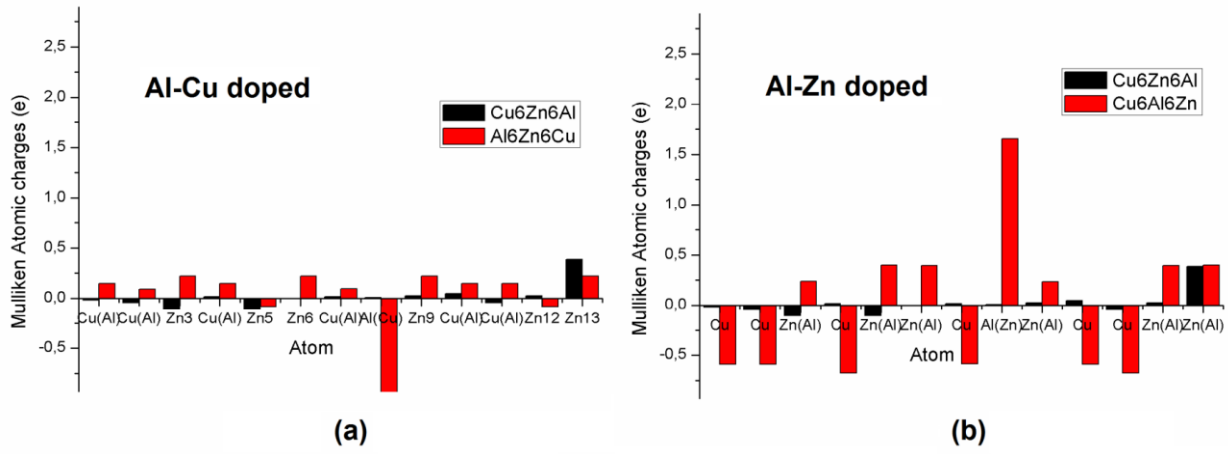


Fig 2. The corresponding Mulliken's column graffic:the effect of doped atom change.

According to the investigation on the frontier molecular orbital (FMO) energy levels of the title compound, we can find hat the corresponding electronic transfers happened between the highest occupied molecular orbital (HOMO) and the lowest unoccupied molecular orbital (LUMO), HOMO and LUMO orbitals.

4.3. FMO and MEP analysis

The FMOs play an important role in the electric and optical properties [11]. According to the investigation on the frontier molecular orbital (FMO) energy levels of the title compound, we can find that the corresponding electronic transfers happened between the highest occupied molecular orbital (HOMO) and the lowest unoccupied molecular orbital (LUMO), HOMO and LUMO orbitals (Fig 3 left).

MEP mapping is very useful in understanding electron rich centres and proton rich centers. For molecule, V(r) values scaled from max. negative to max. positeve as seen color pub in Fig 3 (right). For center atom, V(r) values seen in every figures.

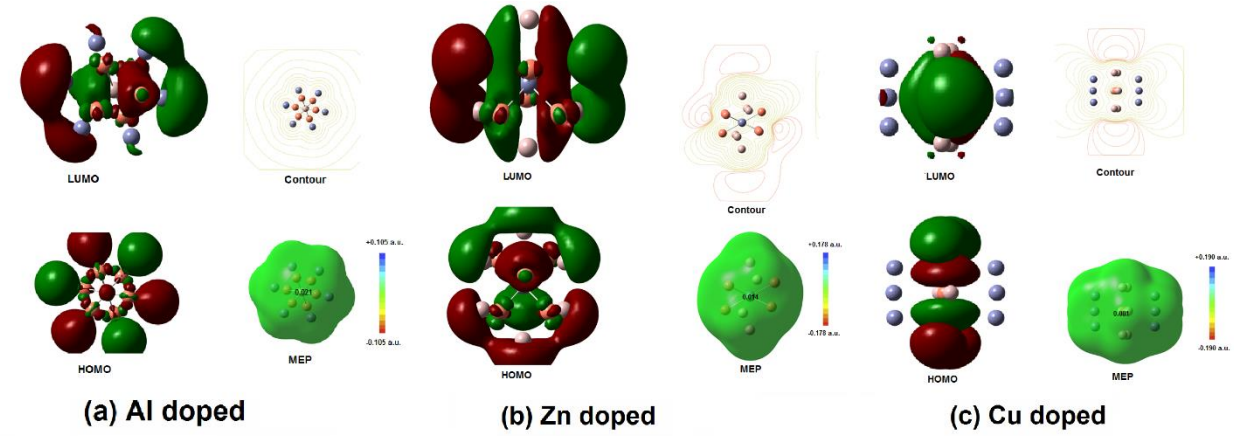


Fig 3. HOMO and LUMO electron clouds(left), contour (up right),MEP (down right).

CONCLUSION

By understanding the ternary alloy structure of the title cluster in which the experimental and theoretical results support each other. Density functional study and the doped effect of icosahedran has been studied. The doped alloy is more soft than bimetallic alloy. According to ΔE_{H-L} values, Zn_6Al_6Cu is hardest molecule. Electronic transfers happened between the highest occupied molecular orbital (HOMO) and the lowest unoccupied molecular orbital (LUMO), HOMO and LUMO orbitals.

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DİJİTAL EKONOMİDE EĞİTİM VE NİTELİKLİ İŞGÜCÜNÜN ÖNEMİ

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ÖZET

Küreselleşmenin son aşaması, firmaların ve hanehalkının teknoloji ile olan ilişkisini hızlandırmış, teknolojik gelişmeler hem üretim hem de tüketim alanında etkisini arttırmaya başlamıştır. 2000'li yılların başından itibaren bir yandan internet kullanımının global düzeye yayılması ile nesnelerin interneti (IOT) kullanımı günlük yaşamımıza yerleşmiş, diğer yandan emek/kas gücünün yerini makinalaşmanın alması olgusu artık beyin gücünün yerini yapay zekanın almaya başlamasına dönüşmüş, bu dönüşüm de üretime yeni bir boyut kazandırmıştır. Sanayi 4.0 ve şimdilerde Sanayi 5.0 tartışmaları ile teknoloji ve üretim-tüketim ilişkileri yeniden tanımlanırken, değişen üretim teknolojisi ve tüketim alışkanlıkları ekonomide de yapısal bir değişimi tetiklemiş, bir başka deyişle ekonomiyi dijitalleştirmeye başlamıştır. Dijital ekonomi yeni bir olgu olmamakla birlikte, özellikle Covid-19 pandemisinin de etkisiyle önemli bir sıçrama yaşamıştır. Sadece birkaç yıl içerisinde hızla büyüyen alışveriş platformlarından e-ticarete, uzaktan çalışma modüllerine, sosyal medya uygulamalarına, paylaşım ekonomilerine, block-zincir teknolojisine varan sayısız gelişme ile birlikte dijital ekonominin tüketiciler arasında uygulama sahası genişlerken yapay zeka, kodlama, otomasyon gibi uygulamalar da sınai üretimde hem yapısal değişikler doğurmuş hem de bilgi toplumuna uyum sağlayabilen nitelikli iş gücü ihtiyacını ortaya çıkarmıştır. 'Bilgi çağı'nın kaçınılmaz bir sonucu olarak dijitalleşme, günlük dilimizi, istek ve ihtiyaçlarımızı, yaşam tarzlarımızı, iş hayatımızı ifade etme biçimini etkilemeye devam ederken, ülkelerin verimlilik üzerine kurulu büyüme stratejilerinin de temel öğesine dönüşmüştür. Sanayi üretiminden tüketiciyle iletişime, pazarlamaya, veri analizine, ürün satışına kadar birçok alanda kullanılan bilgi teknolojilerinde ilerleme gelişmekte olan ve gelişmiş ülkelerin gündeminde öncelikli sıralarda yer almaya başlamıştır. Günümüzde gelişmekte olan ülkelerin teknoloji ve dijital dönüşüm olarak gelişmiş ülkelerin teknolojisine büyük ölçüde bağımlı olmaları önemli bir sorun olarak devam etmektedir. Bu nedenle, bir yandan dijital dönüşüm bir zorunluluk olarak kendini dayatırken bunu gerçekleştirebilecek nitelikli iş gücü ve emek faktörü diğer üretim faktörlerinden daha kritik bir noktada yer almaktadır. Bilgi çağının gerektirdiği inovasyon ve üretim faktörlerinin verimli kullanılması, nitelikli iş gücünün varlığına bağlıdır. Dijitalleşen dünyada nitelikli iş gücünün gelişimi, klasik eğitim sisteminin değişmesi ve yeni eğitim modüllerinin geliştirilmesi ile mümkün görünmektedir. Araştırma, geliştirme ve uygulamanın, yenilikçi düşünce biçiminin teşvik edildiği eğitim sistemi altyapısına oluşturmak ve güçlendirmek, nitelikli bir eğitim ile nitelikli iş gücünü yetiştirmek dijitalleşmenin hız kesmeden devam ettiği bilgi çağında ekonomik büyüme ve kalkınma için elzemdir.

Bu çalışmada, ekonominin dijitalleşmesiyle birlikte eğitim ve nitelikli iş gücünün değişen dinamiklerine ve önemine odaklanılacaktır.

Anahtar Kelimeler: Dijital Ekonomi, Nitelikli İşgücü, Bilgi Teknolojileri, Eğitim.

THE IMPORTANCE OF EDUCATION AND QUALIFIED LABOR FORCE IN DIGITAL ECONOMY

ABSTRACT

The last stage of globalization has accelerated the relationship of companies and households with technology, and technological developments have begun to increase their impact on both production and consumption. While the use of the internet has spread to the global level since the early 2000s and the use of the internet of things (IoT) has settled in our daily lives, the fact that labor power has been replaced by mechanization has now turned into the replacement of brain power with artificial intelligence. This transformation has added a new dimension to production. While technology and production-consumption relations are redefined with the Industry 4.0 and now Industry 5.0 discussions, the changing production technology and consumption habits triggered a structural change in the economy, in other words, it has started to digitize the economy. Although the digital economy is not a new phenomenon, it has experienced a significant leap especially with the effect of the Covid-19 pandemic. In just a few years, the application field of the digital economy has expanded among consumers with the numerous developments ranging from rapidly growing shopping platforms to e-commerce, remote working modules, social media applications, sharing economies, block-chain technology. In the meantime, applications such as artificial intelligence, coding and automation have brought structural changes in industrial production as well as the need for qualified workforce that can adapt to the information society. As an inevitable result of the 'information age', digitalization has turned into a fundamental element of the growth strategies of countries, besides continuing to affect our daily language, the way we express our wishes and needs, our lifestyles, and our business life. Advances in information technologies, which are used in many fields from industrial production to communication with consumers, marketing, data analysis, and product sales, have started to take place in the agenda of developing and developed countries. Today, the fact that develoing countries are highly dependent on the technology of developed countries in terms of technology and digital transformation continues as a crucial problem. For this reason, while digital transformation imposes itself as a necessity, the qualified labor factor, that can achieve this, is at a more critical point than other factors of production. The efficient use of innovation and factors of production required by the information age depends on the availability of qualified labor. The development of qualified labor in the digitalized world seems to be possible with the change of the classical education system and the development of new education modules. To create and strengthen the education system infrastructure that research, development, practice and innovative thinking are encouraged, and to train a qualified labor with a qualified education is essential for economic growth and development in the information age, where digitalization continues unabated. This study will focus on the changing dynamics and importance of education and qualified labor with the digitalization of the economy.

Keywords: Digital Economy, Qualified Labor, Information Technologies, Education.

1.GİRİŞ

Bilgi teknolojilerinin üretimden tüketime, iletişime, eğitime kadar tüm alanlarda kullanımı ile gelişen ekonominin dijitalleşmesi beraberinde potansiyel iş gücü üzerinde önemli etkileri de getirmektedir. Dijitalleşme, bir yandan bazı istihdam alanlarının ve mesleklerin ortadan kalkmasına yol açarken diğer taraftan yeni iş alanları ve meslekleri ortaya çıkarmaktadır. Bununla birlikte, nitelikli iş gücü talebi dijital çağda istihdam için diğer dönemlerde olduğundan daha fazla öne çıkmaktadır.

İlk Sanayi Devrimi'nden itibaren makinaların kas/emek gücünün yer almasının başlattığı süreç, dijital çağda yerini insansız fabrikalar, insansız araçlar, mekana bağlı olmayan istihdam ile yapay zeka ve robotlara bırakmaktadır. Bu durum, firmaların ve iş sektörünün, yenilikçi ve değişime açık, otomasyon, yazılım ve veri analizi konusuna hakim iş gücüne olan talebinin artacağını göstermektedir. Firmaların ve iş sektörünün teknoloji girdisi ile verimliliği arttırmak için ihtiyaç duyduğu bu iş gücü, dijital çağ ile uyumlu eğitim politikaları ile karşılanabilir. Devletlerin, dijital ekonominin ve dijital dönüşümün gerekliliklerini göz önünde tutacak şekilde merkezi düzeyde uygulamaya koyacakları eğitim politikaları aracılığı ile yetiştirecekleri nitelikli iş gücü ülkelerin verimlilik, büyüme ve kalkınma göstergelerine de etki edeceği düşünülmektedir.

Bu çalışmada, dijital ekonominin tanım ve içeriği ile dijital ekonomide eğitim ve nitelikli iş gücünün önemi açıklanmaya çalışılacaktır.

2. DİJİTAL EKONOMİ

Etkileşim ve iletişimlerin, iş faaliyetlerinin ve modellerinin daha fazla dijital hale dönüştürülmesini ifade eden dijitalleşmenin (Yıldırım ve Bostancı, 2022: 32) bir çıktısı olarak ekonominin dijitalleşmesi, bir diğer deyişle dijital ekonomi 2000'li yılların başından itibaren internetin dünyada yaygın kullanımına başlanmasıyla kaçınılmaz olmuştur. Kısa bir zaman dilimi içerisinde banka kartlarıyla pos cihazlarından yapılan şifreli ödemelerden günümüzde temassız-karekodlu ödemelere, internet üzerinden temassız bir biçimde alışveriş yapmaya, üretimin yapay zeka, otomasyon ve algoritma gibi teknolojik uygulamalarla dönüşümüne uzanan bu süreçte dijital ekonomi günlük yaşamımızın bir parçası haline gelmiştir.

Tanımı üzerinde henüz bir uzlaşı bulunmamakla birlikte dijital ekonomi terimi, internet, mobil bağlantı, bulut bilişim, büyük veri, makine öğrenimi, yapay zeka (AI), blok zinciri, nesnelerin interneti (IoT) gibi dijital teknolojilerden giderek daha fazla etkilenen ekonomi sistemi olarak açıklanabilir (Yıldırım ve Bostancı, 2022: 32). Bir diğer tanıma göre, dijital ekonomi,

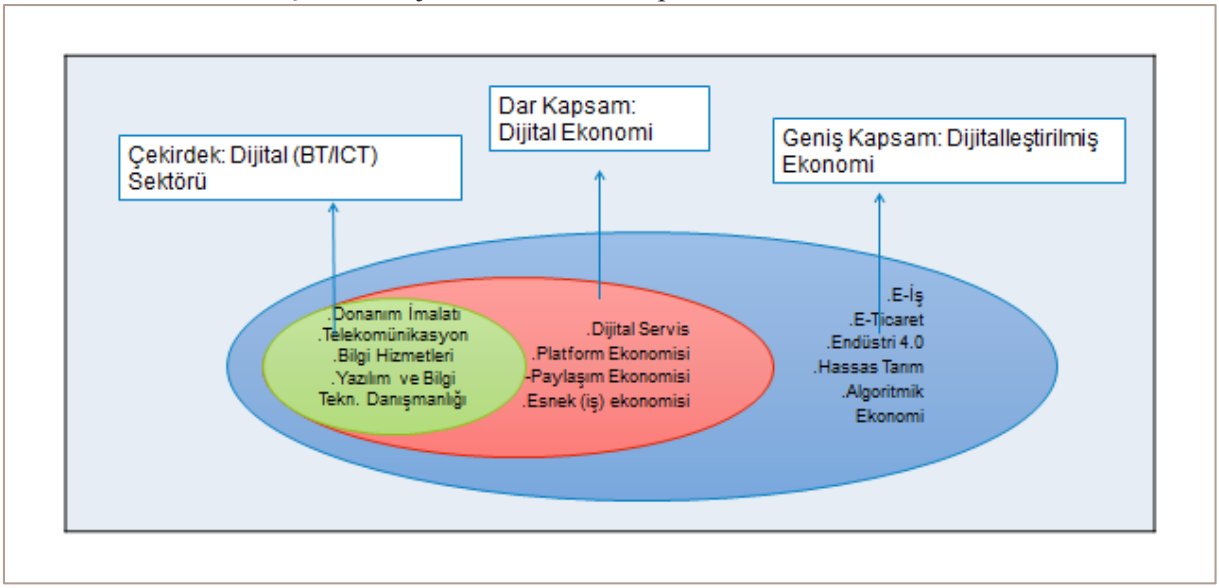
otomasyon teknolojilerinin bir sonucu olarak verimlilik artışının ve maliyetlerin azalmasının meydana geldiği yeni bir ekonomik sistem olarak tanımlanabilir (Civelek, 2020: 183).

Dijital ekonominin, çevrimiçi gerçekleştirilen, bilgi ve iletişim teknolojisinin (BİT) kullanımı ile ilgili bir dizi ekonomik, sosyal ve kültürel bir faaliyet olarak ele alındığı tanımlar da bulunmakta ve ekonominin, bilişimin, (tele)iletişimin, bilgi işlem ve dijitalleşmenin yakınsaması olarak da nitelendirilmektedir. Bu çerçevede, dijital ekonominin temel unsurları; dijitalleşme, yüksek düzeyde BİT kullanımı, bilginin piyasa değerine dönüştürülmesi ve ekonomik olarak işlenmesi, iş ve üretim süreçlerinin organize edilmesi şeklindedir (Dikkaya ve Aytekin, 2019: 1286).

Dijital ekonominin tanımı ve kapsamı üzerinde uzlaşının olmaması, dijital ekonominin ölçülmesinde ve hangi faaliyetlerin dijital ekonomi çerçevesinde değerlendirileceği konusunda zorluklar da yaratmaktadır. Özellikle ekonominin tüm sektörlerinin bilginin bilgisayar destekli sayısallaştırılmasıyla yakın zamanda ve hala büyük ölçüde gerçekleştirilmemiş dönüşümüne atıfta bulunan dijital ekonominin (Bukht-Heeks, 2017: 4) konsepti Bukht ve Heeks tarafından Şekil 1'deki gibi düzenlenmiştir.

Dijital ekonomin kapsamının belirlenmesi şemasında, şu an için dijital ekonominin çekirdeğini bilgi teknolojileri ve bilgi iletişim teknolojilerinin oluşturduğu, dar ve geniş anlamda dijital ekonominin de başta Sanayi 4.0 olmak üzere üretim teknolojilerini de kapsayan bir yapının bu çekirdeği de içerdiği görülmektedir.

Şekil 1: Dijital Ekonominin Kapsamının Belirlenmesi



Kaynak: Bukht ve Heeks. (2017).

Veriye dayalı dijital ekonominin temelinde ülke içi ve ülke dışı veri akışı olduğunu belirten Birleşmiş Milletler UNTCAD raporu geleneksel ekonominin birçok ilke ve parametresinin dijital ekonomiye kolayca aktarılabilirken, aynı zamanda yeni dijital alanda aynı şekilde kullanımda olmayabilecek ve uyumlanması gereken birçok ekonomik fikir de olduğunu ifade etmektedir. Bu kapsamda, dijital ekonomide esas olan veridir. Herhangi bir ürün veya faaliyetin sayısallaştırılması, onu "sıfırlar" ve "birler" ile bir dile dönüştürülmesi veya kodlanması anlamına gelmektedir. İnternetin ve dijital ekonominin işleyişi temel olarak bu sayısallaştırılmış verilerin ülke içi ve ülkeler arasında nasıl aktığı üzerine kuruludur (UNTCAD, 2021: 3-5).

Bilgi teknolojileri ve iletişim teknolojileri ilk endüstri devriminden beri aslında ekonomide önemli yer tutmaktaydı. Birinci Endüstri Devrimi'nde su ve buhar gücü ana enerji kaynaklarıyken matbaa iletişim teknolojisi açısından önemli bir yer tutuyordu. İkinci Endüstri devriminde ise petrol ve elektrik ana enerji kaynakları iken telefon, telgraf, radyo bağlantıları vd. yenilikler iletişim teknolojilerinin itici gücüydüler. Üçüncü Endüstri Devrimi'nde geldiğimizde ise, güneş enerjisi, rüzgar enerjisi gibi yenilenebilir enerji kaynakları önem kazanmıştı. Çağın en önemli iletişim teknolojisi internetin, ana bilgisayarların ve kişisel bilgisayarların kullanımıydı (Yüksekbilgili ve Çevik, 2018: 423-425). Sanayi devriminin buharlı makine ("Sanayi 1.0") ile başlayıp elektrik ("Sanayi 2.0") ve otomasyon ("Sanayi 3.0") ile devam eden serüveni robotik üretim, akıllı fabrikalar gibi dijital üretim düzenlerini kapsayan Sanayi 4.0'la devam etmektedir (Kaya, 2021: 66-67). Yeni yüzyılda hem sanayi üretimin hem de diğer ekonomik faaliyetlerin ayrılmaz bir parçası olan bilgi iletişim teknolojileri (ICT/BiT)) bilgi, bilgisayar ve iletişim arasındaki ilişkiye dayanmaktadır (Dikkaya ve Aytekin, 2019: 1281).

Endüstri 4.0 olarak da adlandırılan Dördüncü Sanayi Devrimi ise henüz yenidir ve içinde bulunduğumuz süreçte Üçüncü Sanayi Devrimi'nden gelen internet ve üretim teknolojileri başta olmak üzere gerçekleştirilen her inovasyon bu sanayi devriminin birer parçası olmaktadır. Tanımlar ve görüşler üzerinden de anlaşılacağı üzere dijital ekonomi, bilginin bilgi teknolojileri aracılığıyla dijitalleşmesi ve işlenmesi ile başta üretim, pazarlama, sağlık, sosyal yaşam vb. tüm alanlarda kullanılmasını ve bu kullanım ile ekonomik bir değer yaratılmasını içerir. İletişim amaçlı kullandığımız çok sayıda sosyal medya platformunun aynı zamanda birer reklam, tanıtım, tüketici tercihlerinin ve verilerinin işlendiği dijital ekonomi alanı olduğu da değerlendirilebilir.

3. DİJİTAL EKONOMİDE EĞİTİM VE NİTELİKLİ İŞGÜCÜ

Eğitim, bireyin yaşadığı toplumda yeteneğini, tutumlarını ve olumlu değerdeki diğer davranış biçimlerini geliştirdiği süreçler toplamı olarak ele alınabilir ve sonuçların elde edilmesi uzun bir süre alır. Eğitim-ekonomi arasındaki ilişki ise eğitimin, ekonominin ihtiyaç duyduğu insan gücünü yetiştirmesi olarak özetlenebilir (Öz, 2021).

Mevcut eğitim sisteminin temel aldığı kamusal eğitim, ilk olarak 19. yy.'ın ortalarında aydınlanma kültürüyle, sanayi devriminin ekonomik koşullarında düşünülmüştür (Kandır, 2019). Sanayi toplumunda işleyen bir eğitim sisteminden mezun olanlar için temel nitelikler kararlılık, zeka, yüksek disiplin, yüksek bir mesleki düzeye ulaşma konusunda açık bir istek olurken, böyle bir eğitim sisteminin avantajı, ekonomi için gerekli yeterliliklere sahip nitelikli bir uzmanın yetişme olasılığının yüksek olmasıdır (Barykin, Naumova vd., 2022: 2).

İnternet ve üretim kavramıyla ortaya çıkan, üretimdeki makinelerin her alandan bilgi sistemleri ve üretim süreçleriyle birbirleriyle bağlantılı olması olarak açıklanabilecek Endüstri 4.0 (Çoban ve Uzun, 2022: 101), bilgi toplumu ve ekonominin dijitalleşmesi ile birlikte iş modelleri de değişmiştir. Dünya deneyimleri, iş gücü potansiyelinin devletlerin rekabetçiliğini modernize etme ve arttırmada ana faktör olduğunu göstermektedir (Igorevna, Vasilevna vd. 2019: 226). İşgücü, Sanayi 4.0'ın merkezi konularından biri olurken, teknik ve kişisel bilgi ve becerilerle beşeri sermaye yeni ekonomik çağın sürdürülebilirliği için bir girdi haline gelmektedir. Bu anlamda, dijital çağda, çalışanların uluslararası pazarlarda rekabet edebilmesi için yenilik ve yaratıcılık yönlerinden profesyonel becerilere sahip olması gerekmektedir (Cerya ve Mustika, 2018: 539).

Ülkelerin küresel ölçekteki değişimlere uyum sağlamaları ve rekabet edebilmeleri ancak nitelikli insan kaynağı ile mümkün olabilmektedir. Bunu sağlamanın yolu, eğitim yoluyla mevcut eğitim sisteminin ve insan kaynağının kalitesini yükseltmektir (Çoban ve Uzun, 2022: 99). Yeni iş gücünün nitelikli bir hale getirilmesi, dijitalleşen ekonominin ihtiyaçlarına cevap verecek düzeyde olması eğitim politikaları ile doğrudan ilişkilidir. Dijitalleşmenin artmasıyla, eğitim, sadece okulda ve belli yaş aralıklarında görülen örgün eğitim ile sınırlı kalmamakta, meslek eğitimleri, uzaktan eğitimler ve hayat boyu öğrenme gibi eğitim programlarını da kapsamaktadır.

Bilgi toplumunda, eğitim sistemi mezunu için temel nitelikler, mezunun eğitimci kimliği, gerekli bilgiyi üretebilme yeteneği ve yenilik yaratabilme yeteneği olarak öne çıkmaktadır. Bu nedenle, bilgi toplumunda faaliyet gösteren eğitim sisteminin rekabetçi bir mezunu bilgi teknolojisi yardımıyla bilgiyi kullanma becerisi başta olmak üzere bazı kilit parametrelere sahip olmak durumundadır (Barykin, Naumova vd., 2022: 2). Dünya Ekonomik Forumu tarafından

hazırlanan "The Future of Jobs" raporunda COVID-19'un iş gücü piyasasının beklenenden daha hızlı değişmesine neden olduğu belirtilirken, önümüzdeki beş yıl içinde gerekli temel becerilerin %40'ının değişeceği ve tüm çalışanların %50'sinin yeniden beceri kazanması gerektiği, vurgulanmaktadır. Bu kapsamda, Makine Öğrenimi Uzmanı, Büyük Veri Uzmanı, Dijital Pazarlama ve Strateji Uzmanı, Proses Otomasyon Uzmanı, İş Geliştirme Uzmanı ve Bilgi Güvenliği Analisti gibi mesleklere talebin artması beklenmektedir (Ayata, 2021: 56). TTGV'nin 2018 yılı çalışmasına göre o yıl ilkokula başlayacak olan çocukların %65'i gelecekte henüz mevcut olmayan, tamamen yeni iş türlerinde çalışmaya başlayacaklardır. Böyle hızlı gelişen bir istihdam manzarasında, 'gelecekteki beceri gereksinimlerini öngörme ve hazırlama yetisi' işletmeler, hükümetler, bireyler için bu eğilimler tarafından sunulan fırsatları tam olarak kontrol edebilmek ve istenmeyen sonuçları hafifletebilmek nedeniyle kritik bir önem arzetmektedir (Türkiye Teknoloji Geliştirme Vakfı (TTGV), 2018: 75). Benzer şekilde, McCinsey Enstitüsü'nün 2017 yılındaki araştırmasında yer alan öngörüye göre dünyada 400-800 milyon arası kişinin 2030 itibariyle işlerini kaybedebileceği ileri sürülüyor olmakla birlikte bu işsiz kalanlardan 375 milyona yakının yeni iş sahalarında istihdam edileceği ifade edilmektedir (Çark, 2020: 26).

Kalkınma Bakanlığı tarafından gelecekte yeni teknolojiler ve yeni meslekler üzerine yapılan çalışmanın sonuçları Tablo 1'de özetlenmiştir. Endüstri 4.0 dönüşümünü tetikleyen teknolojiler ekonomiyi yönlendirecek teknolojiler olarak da kabul edilirken, bu teknolojilerin yaygınlaşması ve sanayide yoğun kullanımlarına bağlı olarak ortaya çıkmış veya yakın gelecekte ortaya çıkması öngörülen yeni meslekler Tablo 1'deki gibidir (T.C. Kalkınma Bakanlığı, 2018: 28-29).

Tablo 1: Yeni Teknolojiler ve Yeni Meslekler

Yeni Teknolojiler	**Yeni Meslekler**	
1. Büyük veri ve analizi 2. Robot teknolojileri 3. Nesnelerin interneti 4. Bulut bilişim 5. Yapay zeka, sanal gerçeklik, artırılmış gerçeklik 6. Eklemeli üretim (örneğin 3 boyutlu baskı) 7. Siber güvenlik 8.Yatay/dikey yazılım entegrasyonu 9. Mobil ve internet teknolojileri 10. Sektörel çözümler 11. Blockchain teknolojiler 12. Akıllı teknolojiler	1. Robot* 2. Siber güvenlik* 3. Nesnelerin interneti* 4. İş zekası* 5. Veri ve analitik bilimcisi 6. Bulut bilişim* 7. Blockchain* 8. Sanal/artırılmış gerçeklik* 9. Yapay zeka* 10. Uç/kenar hesaplama (Edge computing)* 11. Dijital üst düzey yönetici (CDO-Cheef Digital Officer) 12. Dijital öğrenme* 13. İnsansız sistemler yöneticisi* 14. Giyilebilir teknolojiler* 15. Bilişsel çözüm geliştiricisi*	16. İçerik geliştiricisi* 17. Nano teknoloji* 18. 3D yazıcı* 19. Kitle kaynak (Crowdsourcing) yöneticisi 20. Ödeme sistemleri 21. Teknoloji filozofluğu 22. Yazılım basitleştiriciliği uzmanı 23. Nöro psikolog 24. Dijital arabulucu 25. Entegre değer sistemleri yöneticiliği *Bu alanda alt meslekler: tasarım uzmanı, yazılım uzmanı, operasyon uzmanı, yöneticisi, bakım uzmanı.

Kaynak: T.C. Kalkınma Bakanlığı, 2018.

On Birinci Kalkınma Planı Dijital Ekonomide Meslekler ve Yetkinlikler Çalışma raporunda ülke çapında proaktif bir önlem alınmazsa, teknolojideki bu dönüşüme uyum sağlayamayan birey, kurum veya kuruluşların çok kısa bir süre diliminde küresel rekabete ayak uyduramayarak yok olmalarının kaçınılmaz olduğu ifade edilmiştir. Raporda, "Dijital Ekonomide Meslekler ve Yetkinliklerde Türkiye'nin 15 Yıllık Uzun Vadeli Hedefleri ve Vizyonu" başlığı altında 2033 yılı hedefleri Tablo 2'de sıralanmıştır (T.C. Kalkınma Bakanlığı, 2018: 28-41).

Tablo 2: Dijital Ekonomide Meslekler ve Yetkinliklerde Türkiye'nin 15 Yıllık Uzun Vadeli Hedefleri.

Hedef 1:	Dijital ekonomiye yönelik yeni mesleklerin oluşturulması, var olan mesleklerinuyumlaştırılması ve sürdürülmesi için ulusal strateji ve eylem planlarının belirlenmesi.
Hedef 2:	Meslekler üzerinde teknolojik gelişmelerin etkisini belirlemek ve yeni meslekleri tanımlayabilmek, istihdam ihtiyacını önceden belirleyebilmek için teknolojiyi ve dijital ekonomiyi sürdürülebilir şekilde yönetecek ve yönlendirecek sistemin belirlenmesi ve kurumsal yapının oluşturulması.
Hedef 3:	İşgücü olarak değerlendirebileceğimiz beşeri sermayenin güçlendirilerek yeni meslek ve yeterliklere uyumunun ve istihdamının sağlanması.
Hedef 4:	Eğitim öğretim kurumları müfredatlarının mevcut mesleklerdeki değişimlere ve yeni oluşabilecek mesleklere uyumlu hale getirilmesi.
Hedef 5:	Dijital ekonominin dışında kalmış bireylerin ve meslek sahibi olduğu halde kendini geliştirmediği takdirde dijital ekonominin dışında kalmaya aday risk altındaki bireylerin yeterliklerinin geliştirilerek dijital dönüşüme uyumunun sağlanması.
Hedef 6:	Dijital ekonomide ortaya çıkan insan gücü ihtiyacının karşılanabilmesi için kamu, özel sektör, üniversite, eğitim kurumları ve STK'ların birbirleriyle işbirliği yapması.
Hedef 7:	Küresel rekabette ileri teknoloji ürünleri/hizmetleri geliştirebilecek dijital yetkinlikleri içeren yeni meslekleri destekleyecek, fon ve ekosistemin oluşturulması.

Kaynak: T.C. Kalkınma Bakanlığı, 2018.

Endüstri toplumunda üretim, maddi mallarda ve fabrikalarda yoğunlaşırken, enformasyon/bilgi temelli bir ekonomiye dayanan endüstri sonrası toplumlarda, bilgi öne çıkmış, bilgiyi yaratan, kullanan ve saklayan elektronik cihazlar ile bilgisayarlara odaklanılmıştır. Bu dönüşüm, çalışma yaşamında da belli değişimlerle beraber iş gücünün yapısını da değiştirerek bazı meslekleri ortadan kaldırmıştır (Yankın, 2019: 7-8). Ancak, post-endüstriyel toplum yapısının gelişmiş, gelişmekte olan ve en az gelişmiş ülkelerde eşit olmaması, bu sürecin tüm dünyada aynı erişim ve bilgi düzeyinde gerçekleşmemesi de yeni eşitsizliklerin habercisidir. 2019 yılı sonunda dünya nüfusunun neredeyse yarısı internete halen erişememiş ve bilgi ve iletişim teknolojisinin dönüştürücü gücünden faydalanamamıştır. Bu açık, kentsel nüfusun sadece %25'i ile kırsal nüfusun ise sadece %10'unun internete erişebildiği az gelişen ülkelerde akut durumdadır. Dijital dönüşümün ülkeler arasında eşit olmayan bir şekilde yayılması, farklı mesleki ve sektörel yapılarla birleştiğinde, farklı gelişme ve teknoloji benimseme aşamalarındaki ülkeler arasında eşit olmayan istihdam etkileri olacağı anlamına gelmektedir (International Labour Organisation (ILO), 2021: 16). Dolayısıyla, Kuzey-Güney arasında dijital dönüşümdeki eşit olmayan yayılma, dijital ekonominin getirilerinin de eşit olmayan bir biçimde dağılımını tetikleyecektir.

Uluslararası Çalışma Örgütü (ILO)'nün raporuna göre, gelişmekte olan ülkelerde, herhangi bir dijital teknolojinin etkin kullanımı ve dijital becerilerin geliştirilmesi için temel bir ön koşul

olan temel okuryazarlık konusunda ilerleme kaydedilmesi gerekmektedir. Örneğin, Afganistan ve Nijer'de yetişkinlerin yaklaşık yüzde 70'i okuma yazma bilmemektedir. Yine, Afrika'da interneti kullanmayan pek çok insanın yaklaşık yüzde 70'i interneti nasıl kullanacağını ve hatta birçoğu internetin ne olduğunu bile bilmemektedir (ILO, 2021: 16). Tablo 3'te yer alan 2022 yılı I. Çeyrek tahmin verilerinden de görüleceği üzere dünya üzerinde internete erişimde eşitsizlik devam etmekte, bu eşitsizlik Sanayi 4.0 ve dijital ekonominin eşit gelişimine de negatif etkide bulunmaktadır.

Tablo 3: Dünya İnternet Kullanımı ve Nüfus İstatistikleri

Dünya İnternet Kullanımı ve Nüfus İstatistikleri 2022 Yılı-I. Çeyrek Tahminleri						
Bölgeler	**Nüfus (2022 Tahm.)**	**% Dünya Nüfusu**	**İnternet Kullanıcıları 31 Aralık 2021**	**Penetrasyon Oranı (% Nüfus)**	**Büyüme 2000-2022**	**%İnternet Dünya**
Afrika	1,394,588,547	17.6 %	601,327,461	43.1 %	13,220 %	11.5 %
Asya	4,350,826,899	54.8 %	2,790,150,527	64.1 %	2,341 %	53.1 %
Avrupa	841,319,704	10.6 %	743,602,636	88.4 %	608 %	14.2 %
Latin Amerika /Karayipler	663,520,324	8.4 %	533,171,730	80.4 %	2,851 %	10.1 %
Kuzey Amerika	372,555,585	4.7 %	347,916,694	93.4 %	222 %	6.6 %
Ortadoğu	268,302,801	3.4 %	205,019,130	76.4 %	6,141 %	3.9 %
Okyanusya/ Avustralya	43,602,955	0.5 %	30,549,185	70.1 %	301 %	0.6 %
Dünya Toplam	7,934,716,815	100.0 %	5,251,737,363	66.2 %	1,355 %	100.0 %

Kaynak: Internet World Stats (Erişim Tarihi: 20.10.2022).

Geleceğin istihdam alanları ve iş gücü ihtiyaçları üzerine yapılan araştırmalar, meslekler kadar beceri ve nitelikleri de araştırmaktadır. TTGV'nin "geleceğin fabrikalarında çalışan işçilerin nitelik ve becerileri" çalışmasında, dijital dönüşüm ile iş gücünün sahip olması beklenen teknik ve kişisel nitelik ve beceriler Tablo 4'deki gibi tablolaştırılmıştır **(**TTGV, 2018: 50-51).

Tablo 4: Geleceğin Fabrikalarında Çalışan İşçilerin Nitelik ve Becerileri

	Zorunlu	**Gerekli**	**Olabilir**
Teknik N&B	Bilişim Teknolojileri (IT) bilgi ve becerileri	Bilgi yönetimi	Bilgisayar programlama ve kod yazımı
	Veri ve malumat (information) işleme ve analizi	Teknoloji ve örgütlenme hakkında disiplinler arası genel bilgi	Teknoloji hakkında uzmanlık bilgisi
	İstatistiki bilgi	İmalat faaliyetleri ve süreçleri hakkında uzmanlık bilgisi	Ergonomi hakkında farkındalık
	Kurumsal işleyiş ve süreçlere ilişkin anlama (kavrama)	IT güvenliğine ve verilerin korunması ile ilgili farkındalık	Hukuki işlere yönelik bilgi ve anlama
	Modern arayüzlerle etkileşime girme becerisi (insan-makina/insan-robot)		
Kişisel N &B	Öz yönetim ve zaman yönetimi	Yeni teknolojilere güvenme	
	Değişimlere ayak uydurma becerisi	Sürekli gelişim ve yaşam boyu öğrenmeye yatkınlık	
	Ekip çalışması becerileri		
	Sosyal beceriler		
	İletişim becerileri		

Kaynak: TTGV, 2018.

Toplumların refahının en önemli belirleyicilerinin maddi olmayan kaynaklar olduğunu ve bu kaynakların temelinde de insani gelişim ve yetkinleşmenin yattığını vurgulayan TÜSİAD'ın "Eğitim Politikaları Hakkkında TÜSİAD Görüş ve Önerileri" belgesinde, bilgi toplumuna dönüşümde ve dijital çağın eşiğinde bilimsel düşünme, sorgulama, araştırma ve yorumlama becerisi kritik önemde olduğu belirtmiştir. TÜSİAD ilgili belgede, dijital dönüşüm dikkate alınarak; mesleki ve teknik eğitim ve iş gücünün ihtiyacı olacak ve/veya sektörler bazında değer yaratacak ek yetkinliklerin kazandırılmasının uzun vadeli eğitim programlarının bir parçası olması (TÜSİAD, 2022: 2-3) gerektiğini ifade etmiştir.

SETA Vakfı'nın çalışmasında, OECD tarafından 2014'te hazırlanan "Eğitimde İnovasyonun Ölçülmesi" raporunda Türkiye'nin eğitimde inovasyona yönelik "ürün veya servis" ve "teknoloji, araç veya gereç kullanımı" alanlarında Birleşik Krallık'tan sonra en yüksek ortalamaya sahip ülke konumunda olduğunu, "Bilgi ve metodoloji" temalı alanda ise dünya ortalamasının üzerinde ancak değerlendirilen diğer ülkeler arasında on ikinci sırada yer aldığını belirterek, Türkiye'nin eğitimde inovasyon konusunda niceliksel gelişimini tamamlamış, bununla birlikte niteliksel gelişmeye muhtaç göründüğünü ifade etmektedir (Akgün, 2019: 1-2). Bu kapsamda, niteliksel dönüşümü sağlamak için öğrenme süreçlerinin dijital içerik ile desteklenmesi ve etkililik beceri odaklı değerlendirilmesi; bu ve buna bağlı yan amaçlar doğrultusunda kurulan Dijital Dönüşüm Ofisi, Türkiye'nin geleceği açısından planlı, amacına

uygun tasarlanmış, erişilebilir ve 21. yüzyıl bireylerine özgü şekilde hazırlanacak eğitim sistemleri ve içerikleri üretmesi bakımından önemlidir (Akgün, 2019: 2).

2023 Sanayi Strateji Belgesi de, sanayide hedeflenen dijital dönüşümün Türkiye'nin iş gücü maliyetleri açısından avantajlı durumunu yitirmesine yol açabileceğini, gerekli Ar-Ge ve yenilik yatırımlarının yapılması ve ihtiyaç duyulan nitelikli insan kaynağını karşılayacak tedbirlerin alınmasının üretimdeki uluslararası rekabet avantajını korumak için elzem olduğunu vurgulamaktadır. Belgede; üniversite öncesi eğitim aşamalarından başlayarak, yenilikçiliğin ana unsurları olan 'ilişkilendirmek', 'sorgulamak', 'gözlemek', 'paylaşmak', 'denemek' ile ilgili alışkanlık ve 'kritik düşünme', 'adaptasyon', 'takım çalışması', 'programlama', 'veri okuryazarlığı' gibi beceri sağlamaya yönelik programlarla yetkinliklerin artırılması gerektiğini belirtmektedir (T.C. Sanayi ve Teknoloji Bakanlığı, 2019: 46).

Özetle, hem dünyada hem de Türkiye'de dijitaleşen ekonominin emek ve istihdam üzerine etkileri ile nitelikli iş gücü talebinin karşılanması, üzerinde yoğunlaşılan ve politikalar üretilmesi hedeflenen alanlardan biridir. Eğitim politikalarının revizyonu, klasik eğitimden dijital çağ ile uyumlu eğitim modellerine geçiş ve geleceğin istihdam alanlarına yönelik nitelikli iş gücünü yetiştirmek de devletlerin öncelik alanları içerisindedir. Ancak, yapısal diğer eşitsizliklerin yanısıra teknolojiye erişimde ve teknolojinin kullanımda dünya genelinde var olan eşitsizliğin, dijital ekonominin ve gelecekteki istihdam sorunlarının dünya genelinde dağılımını da etkilemesi beklenmektedir.

4. ÖNERİ VE GÖRÜŞLER

Sanayi 4.0 ile yeni gelişen koşullara yönelik eğitim ve nitelikli iş gücü yetiştirme ve dijital dönüşüm/dijital ekonomiye uyumlanma ile ilgili aksiyon alınabilecek çok sayıda faaliyet ve üretim alanı bulunmaktadır. Çalışmamızda bu kapsamda birkaç başlığa değinilecektir.

Rifkin, The End of Work kitabında küresel işsizliğin gelişen teknoloji nedeniyle hızla tırmandığını ve bu tırmanışın devam edeceğini belirtirken Bilgi Çağı'nın geldiğini ve önümüzdeki yıllarda yazılım teknolojilerinin uygarlığı neredeyse işçi olmayan bir dünyaya giderek yaklaştıracağını vurguluyordu. Rifkin'e göre tarım, imalat ve hizmet sektörlerinde, makineler hızla insan emeğinin yerini alacağını ve yirmi birinci yüzyılın ortalarında neredeyse otomatikleştirilmiş bir üretim ekonomisi vaat ediyordu (Rifkin, 1995: 15). Barykin, Naumova vd., ekonomide ve kamusal yaşamda büyük ölçekli dijitalleşmenin artmasının, uzun vadede bir işçinin ortalama düzeyde niteliklerini gerektiren halihazırda mevcut işlerin sayısında bir azalmaya ve aynı zamanda vasıflı ve vasıfsız işçiler arasındaki ücret seviyelerindeki eşitsizliğin artmasına yol açacağını ifade etmişlerdir (Barykin, Naumova vd., 2022: 1). ILO, raporunda

dijital dönüşümün, büyük istihdam zorlukları getirdiği ve dijital devrimin toplam istihdam etkisini öngörmenin zor olduğu, teknolojinin daha geniş çapta benimsenmesinin net iş kayıplarına yol açma veya ücretler üzerinde aşağı yönlü baskılar uygulama olasılığının daha yüksek olduğuna dair araştırmalar olduğunu belirtmektedir (ILO, 2021: 26). Olumsuz etkilerden biri olan işini kaybetme veya ücret eşitsizliğinin artmasına ilişkin devletlerin politikalarını bu eşitsizliği gidermeye ve yeni istihdam alanları açmaya yönelik düzenlemesi gerekmektedir. İşlerini kaybetme potansiyeli yüksek olan gruplardan başlamak üzere istihdam politikaları geliştirilmeli, özellikle yoksulluk, açlık, geleceğe yönelik kaygı ve güvensizlik gibi işsizliğin yıkıcı etkilerinin azaltılması açısından çalışmalar yürütülmelidir (Çark, 2020: 30).

Modern koşullarda eğitim sisteminin niteliksel gelişiminin en önemli yönlerinden biri, dijital teknolojilerin eğitim sürecinde yaygın olarak kullanılmasıdır. Dijital teknolojiler, insanların uzaktan eğitim yoluyla çeşitli yeni bilgi ve beceriler edinmelerine yardımcı olur. Bu bilgi ve beceriler, hem çalışanların kendi niteliklerini geliştirmek hem de yeni mesleklerde ustalaşmak için kullanılır. Çevrimiçi kurslar, öğrencilerin kendileri için en uygun olan bir zaman modunda bir dizi yeni bilgi edinmelerini sağlar. Tüm dersleri tamamlamanın sonuçlarına göre, öğrenciler belirli bir elektronik eğitim modülünde ustalaşmak için elektronik veya kağıt sertifikalar alabilirler. (Barykin, Naumova vd., 2022: 6)

Endüstri 4.0 ile birlikte değişen ve dönüşen iş ortamları, örgüt yapıları ve bu yapıların ihtiyacı olan geleceğin mesleklerinin ve iş gücünün durumunun ne olacağının analiz edilmesi gerek kamu gerekse özel sektördeki aktörlerin vereceği kararlara yardımcı olacaktır. Bu perspektifle Türkiye'de İŞKUR her yıl iş gücü piyasasının talep yapısını ortaya koymak adına, 81 il düzeyinde iş gücü Piyasası araştırmaları gerçekleştirmektedir. Bu sayede, iş gücü piyasası sistematik olarak izlenebilmekte ve meydana gelen gelişmeler karşısında etkin politikalar oluşturulabilmekte ve mesleki eğitim kurslarının standartlarını araştırmaları kapsamında belirlemektedir (Ayata, 2021: 56-61). Yapılan inceleme ve değerlendirmeler sonucunda, özellikle dijital okur yazarlığın bu dönüşüme hazırlıklı olabilmek açısından oldukça önemli olduğu anlaşılmaktadır. Bu nedenle dijital dönüşümün bireysel-örgütsel ve toplumsal yıkıcı etkilerinden korunmak amacıyla eğitim ve kurslar ile dijital okur yazarlığın geliştirilmesi sağlanmalıdır (Çark, 2020: 31).

Bilgi toplumunda işleyen eğitim sisteminin en önemli avantajı, bu sistemin sürekli dönüşebilmesidir. Bilgi toplumunda eğitim sisteminin sınırları şeffaflaşmakta, herhangi bir kişi fiziksel mekanın herhangi bir noktasında bulunurken herhangi bir zamanda eğitim sistemine katılabilir (Barykin, Naumova vd., 2022: 2-3). Bu şeffaflık, başta hayat boyu öğrenme ile birçok konuyu aynı anda öğrenme, kendini geliştirme ve niteliği arttırma fırsatları açığa çıkmaktadır.

Teknolojiye ve internete erişimde yukarıda anlatıldığı gibi bir fırsat eşitsizliği söz konusudur. Bu da ülkelerin gerekli teknolojik altyapıya sahip olmalarını ve bunu tüm vatandaşlarının eşit faydalanabileceği bir hale getirmelerini elzem kılmaktadır. Aynı şekilde, teknoloji kullanımında/teknolojiye erişimde erkeklere göre daha dezavantajlı olan kadın ve kız çocuklarına projelerde/eğitimlerde teşvik ve pozitif ayrımcılık yapılması, teknolojide toplumsal cinsiyet eşitliğinin sağlanması ve böylece üretim süreçlerine katılan nitelikli iş gücünün arttırılması ülkelerin fırsat eşitliği politikalarında yer almalıdır.

Eğitim müfredatlarının klasik eğitimin zaman, mekan ve üretim olarak sınırlayıcı-kısıtlayıcı biçimlerinden uzaklaşarak, Sanayi Strateji Belgesi'nde de belirtildiği gibi üniversite öncesi eğitim aşamalarından başlayarak, yenilikçiliğin ana unsurları olan 'ilişkilendirmek', 'sorgulamak', 'gözlemek', 'paylaşmak', 'denemek' ile ilgili alışkanlık ve 'kritik düşünme', 'adaptasyon', 'takım çalışması', 'programlama', 'veri okuryazarlığı' gibi beceri sağlamaya yönelik programlarla yetkinliklerin artırılması (T.C. Sanayi ve Teknoloji Bakanlığı, 2019: 46) gerekmektedir.

Hem örgün hem de mesleki eğitime ayrılan bütçede artış, eğitim politikalarının siyaset üstü olması, mesleki eğitimlerin ve örgün eğitimin inovasyona yoğunlaşması, kursların «hayat boyu öğrenme» çerçevesinde geniş kitlelere hitap etmesi ülkelerin nitelikli iş gücü geliştirmesi açısından kritik önemdedir. Eğitim müfredatında ve materyallerde değişiklik ve dijital çağa uyum güçlü bir bütçeye de ihtiyaç duymaktadır.

Dijital teknolojileri kullanabilmekten yoksun olan emeğin verimli olamayacağı için teknolojinin gereklerine uygun yetiştirilmesi bunun için sanayideki üretimin daha dinamik bir vaziyette desteklenebilmesi için sürekli gelişim ve hayat boyu öğrenmenin önemi her geçen gün artmaktadır (Çark, 2020: 26). Başta İŞKUR ve üniversitelerin sürekli eğitim merkezleri olmak üzere, mesleki eğitim veren ve hayat boyu öğrenmeyi de içeren kurumların dijitalleşme kapsamında eğitim programlarını güçlendirmeleri, yapılan araştırmalar kapsamında yeni istihdam alanlarına yönelik nitelikli iş gücü yetiştirmeleri gerekmektedir.

5. SONUÇ

Ekonomide yüzyıllar içerisinde yaşanan değişimler istihdam biçimleri, iş gücünde aranan nitelikler ve beceriler, üretim fonksiyonları, çıktı miktarları, istek ve ihtiyaçlar gibi olguları da değiştirmiştir. Sanayi Devrimi öncesi ve sonrasında ihtiyaç duyulan nitelik ve beceriler ile insanların çalışma biçimleri, çalışma saatleri, örgütlenme biçimleri arasında birçok fark vardır. Aynı durum, diğer Sanayi Devrimleri ve nihayetinde Sanayi 3.0'ın bilgi ve birikimlerinin temelini oluşturduğu Sanayi 4.0 için de geçerlidir. Küreselleşme ile eş zamanlı ilerlediğini

söyleyebileceğimiz Sanayi 3.0, teknolojinin tarihte hiçbir dönemde rast gelinmediği bir hızla ilerlediği, yeni buluşların gerçekleştirildiği, var olan ürünlerin yeni biçimlere evrildiği (telefon, bilgisayar vb.) ve teknolojinin bireyin üzerinde taşıyabileceği ebatlara getirildiği; aynı zamanda iş gücünün daha önceden farklı olarak farklı ülkelerde istihdam edilebildiği, internet aracılığı ile mekansız istihdam olanaklarının adımlarının atıldığı bir dönem olmuştur. Bu ve daha birçok gelişme, bugünün Sanayi 4.0'ının temellerini oluşturmuştur.

Eğitim, bu çerçevede, nitelikli iş gücü ve teknolojik ilerleme ile verimliliğin artışında kilit konumda olmuştur. Gelişen ülkelerde zamanın ihtiyaçlarına göre şekillenen, araştırma ve geliştirmeye, inovatif düşünceye dayalı eğitim sistemleri, doğal bir sonuç olarak, gelişen ülkelerin gelişmekte olan ve en az gelişmiş ülkeler üzerinde teknolojik açısından tahakküm sahibi olmalarına, teknolojik bağımlılığın artmasına yol açmıştır. Bunun da, Sanayi 4.0 gibi tamamen teknoloji endeksli, makina-ağ-üretim ilişkisine dayalı bir sıçramanın çok geriden izlenmesine ve ekonomik gelişmişlik endeksleri arasındaki uçurumun büyümesine yol açacağı tahmin edilmektedir. Gelişen koşullara adapte edilmiş eğitim politikaları ile yetiştirilecek nitelikli iş gücünün üretim sürecinde alacağı aktif rol ile verimlilik artışı arasındaki pozitif ilişki, her platformda önemlidir. Eğitim politikalarına diğer politika alanlarından daha fazla bütçe payı ayrılması ve eğitim politikalarının siyaset üstü olarak seçim kaygılarından uzak uzun dönemli planlanması, nitelikli iş gücü ile birlikte araştıran, sorgulayan, üreten ve inovasyon odaklı bireyler yetiştirilmesi için eğitim sistemlerinin yeniden tasarımı ve uygulanması devletlerin öncelikli hedeflerinden olmalıdır.

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#BEDENEĞİTİMİNEADALET HASHTAG'I İLE ATILAN TWİTLERİN ANALİZİ İLE BEDEN EĞİTİMİ ÖĞRETMENLERİNİN DUYGU DURUMLARI

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ÖZET
Bu çalışmanın amacı, toplumda önemli bir ağ aracı olarak yer edinen Twitter'de atanmayı bekleyen beden eğitimi öğretmenlerinin atanmalarına yönelik duygu durumlarını analiz etmektir. Bu kapsamda twitter platformunda gerçekleşen "#BedenEğitimineAdalet" adlı hashtag etiketi kullanılarak elde edilen 10.000 tweet üzerinden atanmayı bekleyen beden eğitimi öğretmenlerinin duygu durumlarını öğrenmek amaçlanmaktadır. 10000 tweetin çekildiği veri seti arasından yapılan ayıklama sonucunda toplam 6019 tweet belirlenmiş ve bu veri üzerinden analiz yapılmıştır. Veri çekme esnasındaki temel sınırlılık, programın sadece son yedi gün içerisinde atılmış tweetleri çekilebilmesidir. Nitel araştırma yöntemlerinden durum deseni çerçevesinde gerçekleştirilen araştırmada elde edilen verilerin analizinde MAXQDA analiz programının 2022 sürümünden yararlanılmıştır. Atılan tweetlerin tür, zaman, beğeni ve takipçi durumuna göre analiz yapıldıktan sonra duygu durumları ortaya konularak, kelimelerin frekans değerlerine göre kelime bulutu oluşturulmuştur.

Anahtar Kelimeler: Adalet, Beden Eğitimi, Beden Eğitimi Öğretmeni, Duygu Durumu, İnternet, Twitter.

EMOTIONAL STATUS OF PHYSICAL EDUCATION TEACHERS BY ANALYSIS OF TWITS WITH THE #BEDENEĞİTİMİNEADALET HASHTAG

ABSTRACT
İt is aimed to learn the emotional states of physical education teachers who are waiting to be appointed over 10,000 tweets obtained by using the hashtag "#BodyEgitimineJustice" on the twitter platform. As a result of the selection made from the data set from which 10000 tweets were drawn, a total of 6019 tweets were determined and analysis was made on this data. The main limitation during data extraction is that the program can only extract tweets posted within the last seven days. The 2022 version of the MAXQDA analysis program was used in the analysis of the data obtained in the study, which was carried out within the framework of the case pattern, which is one of the qualitative research methods. After analyzing the tweets according to type, time, likes and followers, a word cloud was created according to the frequency values of the words by revealing the emotional states.

Keywords: Justice, Physical Education, Physical Education Teacher, Emotional State, Internet, Twitter.

GİRİŞ

Bugün bireyler gündelik yaşamlarına ilişkin duygu durumları, fikir ve kanaatlerini kişilerarası iletişim veya geleneksel yöntemlerden ziyade dijital ağlar üzerinden paylaşmakta, tartışmakta, reddetmekte veya kabul etmektedir (Bulut, 2020). Günümüze kadar varan süreçte internetin gelişmesi bireylerin fikirlerini paylaşabilecekleri sosyal platformlara olanak sağlamıştır. Özellikle de Twitter gibi sosyal paylaşım ağlarının yaygın kullanılması buralardan elde edilecek verilerin değerini arttırmaktadır. Twitter, API aracılığıyla kolayca veri erişimine izin veren bir platformdur. Ancak Twitter yapı itibariyle düzenlenmesi gereken bir veriye sahiptir. Bu nedenle verilerin bazı ön işlemlerden geçmesi ve kullanılacak yöntemlere yapısal olarak uyabilecek hale getirilmesi gerekmektedir (Akgül ve ark., 2016). Duygu analizi günümüzde birçok alanda kullanılmaktadır. Literatürde de duygu analizine dayalı örnekler yer almaktadır (Gound ve ark., 2018). Bu bilgiler ışığında araştırmanın amacı; Toplumda önemli bir ağ aracı olarak yer edinen Twitter'de atanmayı bekleyen beden eğitimi öğretmenlerinin atanmalarına yönelik duygu durumlarını analiz etmektir. Bu kapsamda twitter platformunda gerçekleşen "#BedenEğitimineAdalet" adlı hashtag etiketi kullanılarak elde edilen 10.000 tweet üzerinden atanmayı bekleyen beden eğitimi öğretmenlerinin duygu durumlarını öğrenmek amaçlanmaktadır.

YÖNTEM

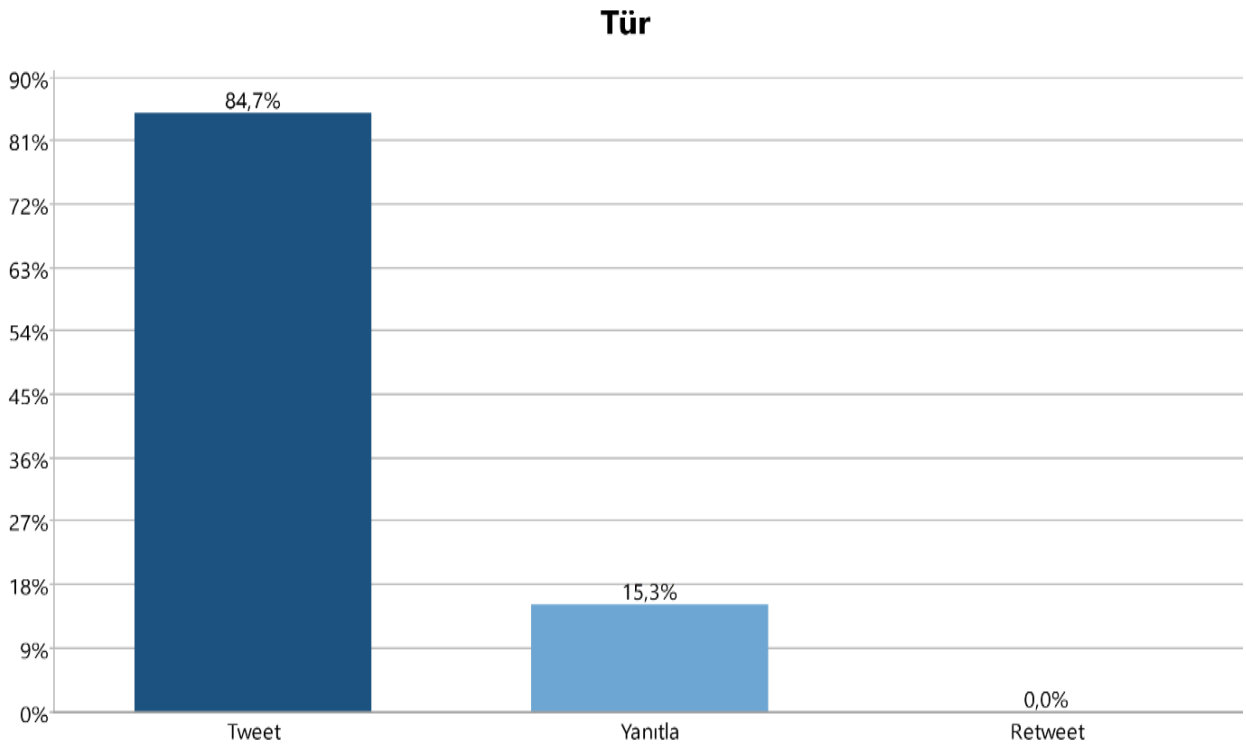
Bu bağlamda çalışma, nitel araştırma yöntemlerinden durum deseni çerçevesinde gerçekleştirilmiştir. Araştırmanın amacı doğrultusunda durum çalışması desenlerinden bütüncül tek durum deseni benimsenmiştir. Tekli durum deseni genellikle bir kuramı veya kavramı doğrulamak, kendine özgü bir durumu incelemek veya daha önce araştırılmamış konuları incelemek için kullanılmakta ve analiz birimi bir durumdan oluşmaktadır (Yıldırım ve Şimşek, 2008).

Verilerin Analizi

Bu araştırma 17.10.22 – 24-10-2022 tarihleri arasında Twitter'da "#BedenEğitimineAdalet" adlı hashtag kullanılarak elde edilen 10.000 tweet üzerinden atanmayı bekleyen beden eğitimi öğretmenlerinin duygu durumlarını öğrenmeyi amaçlamaktadır. 10000 tweetin çekildiği veri seti arasından yapılan ayıklama sonucunda toplam 6019 tweet belirlenmiş ve bu veri üzerinden analiz yapılmıştır. Veri çekme esnasındaki temel sınırlılık, programın sadece son yedi gün içerisinde atılmış tweetleri çekilebilmesidir. Nitel araştırma yöntemlerinden durum deseni çerçevesinde gerçekleştirilen araştırmada elde edilen verilerin analizinde MAXQDA analiz programının 2022 sürümünden yararlanılmıştır.

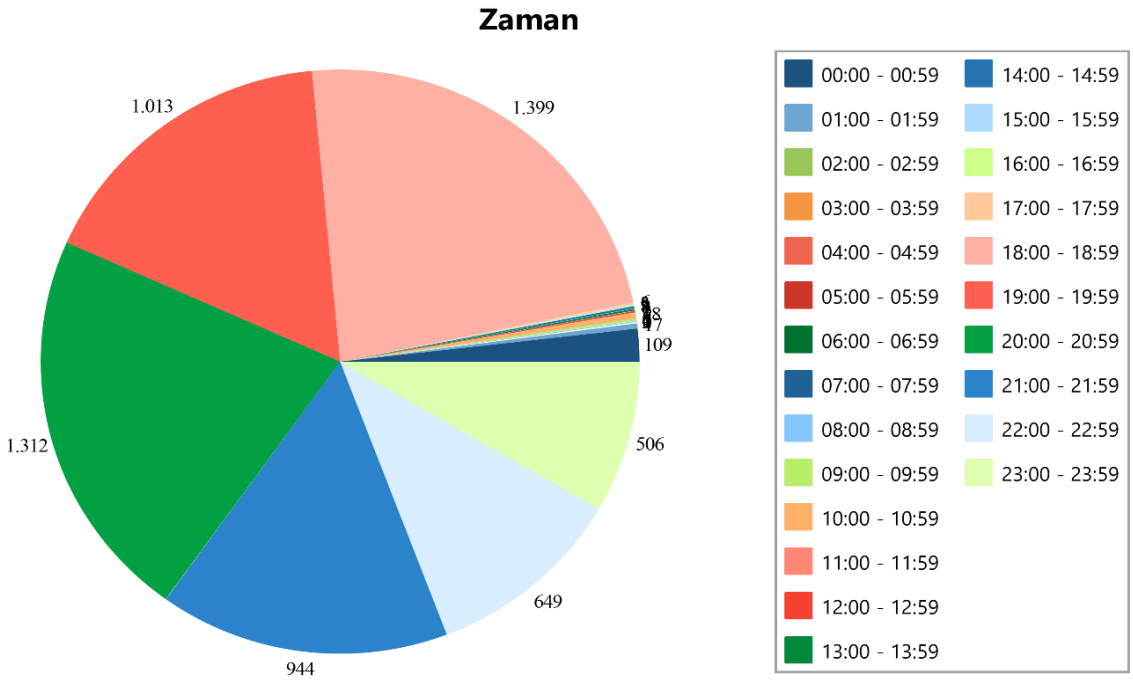
BULGULAR

Bu çalışmada Twitter'daki #BedenEğitimineAdalet hashtag'i kapsamında elde edilen verilerin analizi grafikler halinde verilmiştir.



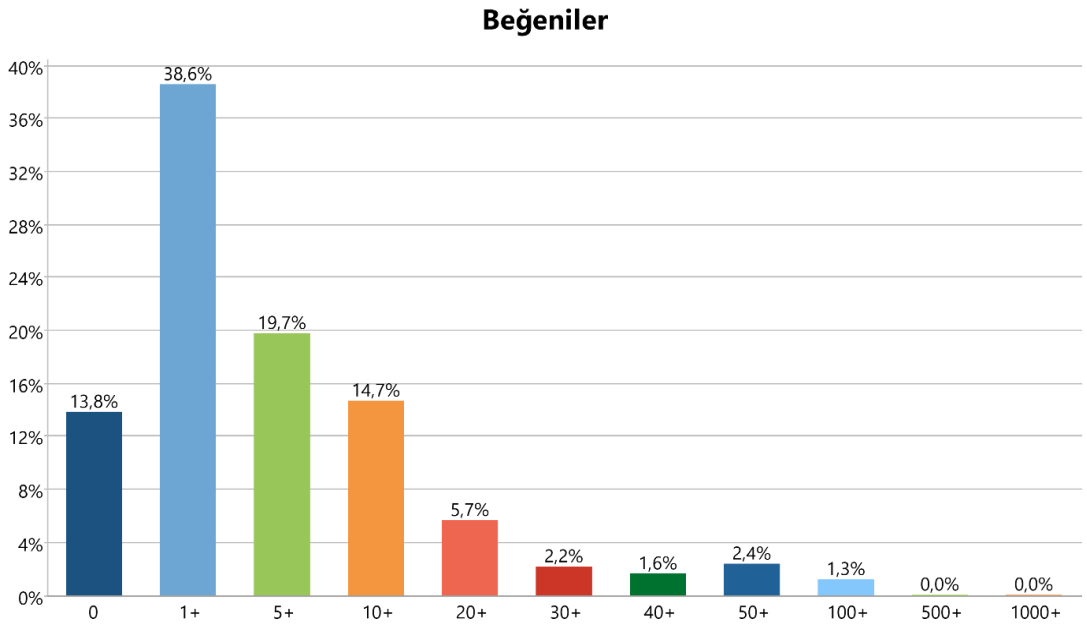
Grafik 1. Tweetlerin Türlerine Göre Dağılımı

Atılan tweetlerin türlerine göre dağılımına baktığımızda %84.7 (n=5101) tweet %15.3 (n=918) yanıt olduğu görülmektedir.



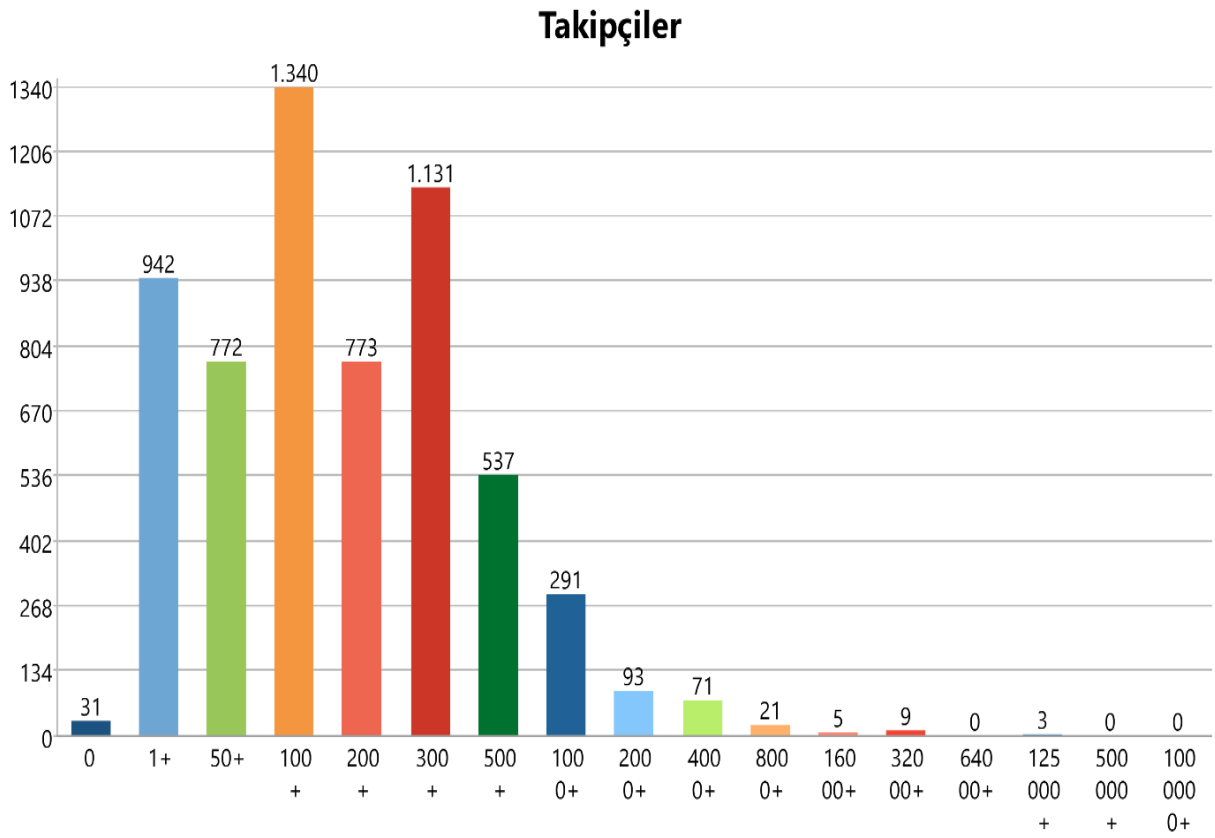
Grafik 2. Tweetlerin Atıldığı Zaman Dilimine Göre Dağılımı

Grafiğe bakıldığında tweetlerin daha çok saat 18:00 ile 23:59 saatleri arasında atıldığı görülmektedir. 18:00-18:59 saatleri arasında %23.2 (n= 1399), 19:00-19:59 saatleri arasında %16.8 (n=1013), 20:00-20:59 arasında %21,8 (n=1312), 21:00-21:59 arasında %15,7 (n=944), 22:00-22:59 arasında %10,8 (n=649), 23:00-23:59 arasında %8,4 (n=506), 00:00-00:59 saatleri arasında ise %1,8 (n=109) tweet atılmıştır.



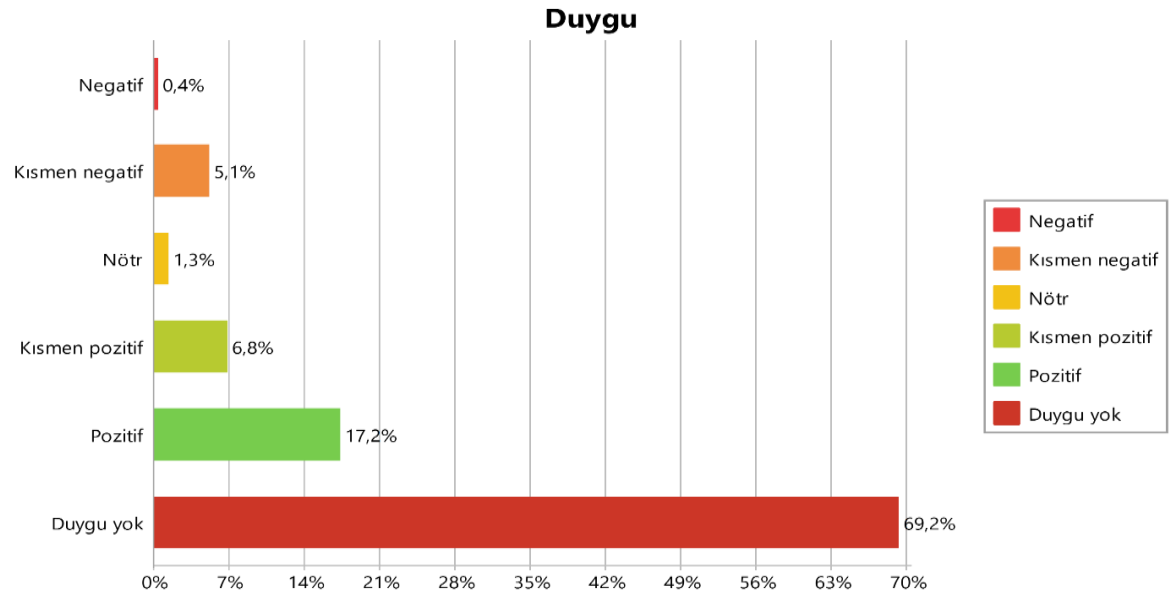
Grafik 3. Tweetlerin Beğeni Durumuna Göre Dağılımı

Tweetlerin Beğeni Durumuna Göre Dağılımına baktığımızda 1 tweetin 1000 üzeri 3 tweetin 500 üzeri beğeni aldığı görülmektedir. Atılan tweetleri geri kalan beğeni durumuna baktığımızda 100+ beğeni alan %1,3 (n=76), 50+ beğeni alan %2,4 (n=142) , 40+ beğeni alan %1,6(n=96), 30+ beğeni alan %2,2(n=133), 20+ beğeni alan %5,7 (8n=342), 10+ beğeni alan %14,7(n=884), 5+ beğeni alan %19,7(n=1188), 1+ beğeni alan %38,6(n=2322) ve hiçbir beğeni almayan tweet sayısı ise %13,8 (n=832) olduğu görülmektedir.



Grafik 4. Takipçi Sayısına Göre Atılan Tweetlerin Dağılımı

Takipçi sayısına göre atılan tweetlerin durumuna baktığımızda 125000+ takipçi olan 3 tweet attığı 32000+ takipçisi olanın 9 tweet, 16000+ takipçisi olanın 5 tweet, 8000+ takipçisi olan 21 tweet, 4000+ takipçisi olan 71 tweet 1000+ takipçisi olan 291 tweet atıldığı geri kalanın 0 ile 500 takipçi arasında olan kişilerin tweet attıkları görülmektedir.



Grafik 5. Tweetlerin Duygu Durumuna Göre Dağılımı

Atılan tweetlerin duygu durumuna göre dağılımı baktığımızda, Negatif %0,4 (n=24), kısmen negatif % 5,1 (n=305), Nötr %1,3 (n=76), Kısmen pozitif %6,8 (n=411), Pozitif %17,2 (n=1038), Duygu yok %69,2 (n=4165) tweet atıldığı görülmektedir.



Şekil 1. Tweetlerin En Sık Kullanılan Sözcüklere Yönelik Kelime Bulutu

Şekil 1'de kullanıcıların en çok hangi ifadeleri kullandığı da analiz edilmiştir. Bu analiz türünün önemi bir olay, gündem ya da konuyu takip eden kullanıcıların amacını, eğilimini, istem ve arzularını, inanç ve tahminlerini anlamlandırmaya yarayacak sonuçlar vermesidir. Kelime bulutu şekillenirken kullanıcıların en çok yinelediği sözcük bulutun merkezinde konumlanmıştır. Puntolarının büyüklüğüne göre en sık yinelenen kelimeler en büyük olacak şekilde büyükten küçüğe doğru sıralanmaktadır (Bulut, 2020). Kelimelerin Frekans Değerlerine Göre Kelime Bulutu Görseline baktığımızda beden eğitimi öğretmenlerinin en çok tekrar ettiği 10 kelime; beden (f=3294), eğitimi (f=2593), spor (f=1278), istiyoruz (f=911), kontenjan (590), öğretmenleri (f=582), ders (f=463), öğretmenlerinin (f=413), sporun (f=373) ve büyük (f=355) olarak belirlenmiştir. Şekil 1'e göre, kelime bulutunda yer alan bazı kelimeler bağlamında incelendiğinde; beden, eğitimi, spor, adalet, ilkokulda, atama, hakkımızı, branş, milli, kontenjan, kademede, temelden gibi birçok kavramın yer aldığı görülmektedir. Bu bağlamda #bedeneğitimineadalet hasthag çerçevesinde bu kavramların örtüştüğü gözlenmektedir.

TARTIŞMA VE SONUÇ

Atanmayı bekleyen beden eğitimi öğretmenlerinin #bedeneğitimineadalet hastagi ile attıkları twitlerin analizin sonucunda atılan twitlere 1000'e yakın beğeni alınmış lakin twit atılması sonucu daha fazla etki yaratabileceklerinin farkında olmadıkları sonucuna ulaşılabilir.

Beğeni durumuna baktığımızda beden eğitimi mezunlarının atılan twitleri beğenme oranının çok düşük olduğu atılan 1 twittin 1000 üzeri beğeni aldığı görülmektedir. Bu da öğretmenlerin birbirini destek olma konusunda çok zayıf olduğu sonucunu göstermektedir.

Takipçi sayısına göre atılan twit analizinde ise beden eğitimi öğretmenlerini destekleyen büyük kitlelere ulaşabilecek takipçi sayısına sahip herhangi birinin olmadığı görülmektedir. En fazla 125 bin takipçisi olan 3 twit atıldığı tespit edilmiştir. Öğretmenlerin bu konuda bir çalışma yapması gerektiği görülmektedir.

Duygu durumuna bakıldığında 4 üzeri twitin herhangi bir duygu durumunun olmadığı 1038 tanesinin pozitif 305 negatif duygu durumuna sahip olduğu görülmektedir. Atılan twitlerin kelime frekans değerlerine göre oluşturulan kelime bulutuna baktığımızda atanmaya yönelik ya da sporun önemine can alıcı bir kelimenin bulunmadığı görülmektedir.

Sonuç olarak atanmayı bekleyen beden eğitimi öğretmenlerinin sosyal medya da fazla bir etkileşim yaratamadıklarını ve birlik-beraberlik içinde olmadıklarını söyleyebiliriz. Bu konuda seslerini duyuracak bir yapılanmanın olmadığı da ortaya çıkmaktadır.

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ÖZET

Bu çalışmanın amacı, spor yapan bireylerin zorbalık eğilimlerinin çeşitli değişkenlere göre incelenmesidir. Araştırmanın çalışma grubunu farklı branşlarda aktif olarak spor yapan ve çalışmaya gönüllü olarak katılan çocuklar oluşturmuştur. Verilerin toplanmasında "Kişisel Bilgi Formu" ve "Zorbalık Eğilim Ölçeği (ZEÖ)" kullanılmıştır. Orijinal ölçek Olweus (1996) tarafından okullarda zorbaca davranışların belirlenmesi amacıyla geliştirilmiş toplam 40 maddeden oluşan ''Zorba/Mağdur Anketi''dir. Ölçeğin Türkçeye uyarlama çalışması Dölek (2002) tarafından gerçekleştirilmiştir. 26 maddeden oluşan yeni ölçeğin 10 maddesi ters kodlanmıştır. Ölçek 6 faktörden oluşmaktadır. Bu alt boyutlar sırasıyla Olumsuz Yansıtma (5), Duygusal Paylaşım Eksikliği(6), (Zorbalığı) Haklı Görme (4), Üzmek (4), Güçlü Kullanma (6) ve Rahatsız Olmama (1) olarak adlandırılmıştır. Ölçeğin güvenirlik analizleri için alt ve üst çeyreklikler madde analizi ve test tekrar test analizleri yapılmıştır. Sonuç olarak Dölek (2002) 26 maddeden oluşan ölçeğin geçerli ve güvenilir bir ölçme aracı olduğunu belirtmiştir. Verilerin analizinde; ölçeğin çarpıklık ve basıklık değerlerinin normal dağılım gösterdiği tespit edilmiştir. Katılımcıların demografik verilerinin dağılımının belirlenmesi için yüzde (%) ve frekans (f) analizleri, iki grubun karşılaştırılması için t-testi ve grupların karşılaştırmaları için tek yönlü varyans analizi (ANOVA) kullanılmıştır. Gruplar arası farkın hangi gruplardan kaynakladığını tespit etmek için ise Tukey testi yapılmıştır. Yapılan tüm değerlendirmelerin anlamlılık düzeyi $p<0.05$ olarak dikkate alınmıştır.

Anahtar Kelimeler: Zorbalık Eğilimi, Spor, Sporcu.

SPORTS AND BULLYING TENDENCIES: A RESEARCH ON SPORTS INDIVIDUALS

ABSTRACT

The aim of the study is to examine the bullying tendencies of individuals who play sports according to various variables. The study group of the research consisted of children who actively engaged in sports in different branches and voluntarily participated in the study. "Personal Information Form" and "Bullying Tendency Scale (BTS)" were used to collect data. The original scale was the "Bully/Victim Questionnaire" consisting of 40 items developed by Olweus (1996) to determine bullying behaviors in schools. The Turkish adaptation of the scale was carried out by Dölek (2002). 10 items of the new scale consisting of 26 items were reverse coded. The scale consists of 6 factors. These sub-dimensions were named as Negative Projection (5), Lack of Emotional Sharing (6), Entitlement (Bullying) (4), Sadness (4), Vigorous Use (6), and Not Being Disturbed (1), respectively. For the reliability analysis of the scale, lower and upper quartile item analysis and test-retest analyzes were performed. As a result, Dölek (2002) stated that the scale consisting of 26 items is a valid and reliable measurement tool. In the analysis of data; It was determined that the skewness and kurtosis values of the scale showed normal distribution. Percentage (%) and frequency (f) analyzes were used to determine the distribution of demographic data of the participants, t-test was used to compare the two groups, and one-way analysis of variance (ANOVA) was used to compare the groups. Tukey test was used to determine from which groups the difference between the groups originated. The significance level of all evaluations was taken into account as $p<0.05$.

Keywords: Bullying Tendency, Sport, Athlete.

GİRİŞ

Saldırgan bir davranış türü olan zorbalık Baldry ve Farrington'a (2000) göre sıradan, şaka yollu alay etme, boğuşma ve okul bahçesindeki kavgalardan çok farklıdır. Bu farklılık olayların sürekliliği ve olaylara karışan çocukların fiziksel yapı, güç ve güç dengesizliğinden kaynaklanmaktadır. Ergenlik döneminde bireyler çocukluk dönemlerinden farklı olarak yeni ilişkiler kurma çabası içindedirler. Çocukluk yıllarından farklı olarak, ergenlik yıllarında sosyal ilişkiler değişime uğrar. Bu dönemde önem kazanan konulardan biri de akran ilişkileridir (Bayhan ve Işıtan, 2010). Akran ilişkileri, olumlu ve olumsuz davranış örneklerini içeren çok boyutlu bir ilişki biçimidir. Bu ilişkiler toplumsal yaşamda farklı sosyal ilişkilerle de etkileşim halindedir. Akran yapısında olmayan yetişkinler, çocuklarının akran gruplarını etkileyebildikleri gibi onlardan da etkilenebilmektedirler (Rodkin ve Hodges, 2003).

Besag (1995)'e göre eylemin zorbalık olarak kabul edilebilmesi için bu davranışın aşağıdaki koşulları sağlaması gerektiğini belirtmiştir. Bunlar;

- ✓ Saldırganlık eyleminin fiziksel, sözel veya zihinsel bir içeriği olmalı,
- ✓ Kişiler arasında mutlaka güç farkı olmalı,
- ✓ Zorbalığa uğrayanlara gelecekte benzer davranışlara maruz kalacaklarını hissettirmeli,
- ✓ Zorbalık içeren eylemler toplum tarafından kabul görecek şekilde yapılmalıdır.

Pilz'e (2002) göre spor, oyun ve hareketin rolü şiddeti önlemede değerlidir. Spor enerji tüketerek, düşünceleri uzaklaştırarak, deşarj ederek saldırganlığı önleyen bir etkinliktir (Şenyüzlü, 2013). Bu bilgiler ışığında araştırmanın amacı; spor yapan bireylerin zorbalık eğilimlerinin çeşitli değişkenlere göre incelenmesidir.

YÖNTEM

Araştırmanın Modeli

Bu bağlamda çalışma tarama modelinde betimsel bir araştırma niteliğini taşımaktadır. Tarama modelleri, geçmişte ya da halen var olan bir durumu var olduğu şekliyle betimlemeyi amaçlayan araştırma yaklaşımlarıdır (Karasar, 2005).

Çalışma Grubu

Araştırma; 134 erkek ve 103 kadın olmak üzere toplam 237 katılımcıdan oluşmuştur.

Veri Toplama Aracı

Katılımcılara; "Kişisel Bilgi Formu" ile "Zorbalık Eğilim Ölçeği" uygulanmıştır.

"Zorbalık Eğilim Ölçeği (ZEÖ)"

Orijinal ölçek Olweus (1996) tarafından okullarda zorbaca davranışların belirlenmesi amacıyla geliştirilmiş toplam 40 maddeden oluşan ''Zorba/Mağdur Anketi''dir. Ölçeğin Türkçeye

uyarlama çalışması Dölek (2002) tarafından gerçekleştirilmiştir. 26 maddeden oluşan yeni ölçeğin 10 maddesi ters kodlanmıştır. Ölçek 6 faktörden oluşmaktadır. Bu alt boyutlar sırasıyla Olumsuz Yansıtma (5), Duygusal Paylaşım Eksikliği(6), (Zorbalığı) Haklı Görme (4), Üzmek (4), Güçlü Kullanma (6) ve Rahatsız Olmama (1) olarak adlandırılmıştır. Ölçek 4'lü Likert tipi derecelendirme (1= Hiç Katılmıyorum, 4= Kesinlikle Katılıyorum) üzerinden cevaplandırılmaktadır. Bu çalışma için ölçeğin tamamına ilişkin iç tutarlılık katsayısı (Cronbach's Alpha) 0,958 olarak hesaplanmıştır.

Verilerin Analizi

Çalışmada SPSS 23,00 paket programı kullanılmıştır.

- Demografik verilerin değerlendirilmesinde; yüzde (%) ve frekans (f) analizleri,
- İkili karşılaştırmalar için Bağımsız t- testi,
- Çoklu olan karşılaştırmalar içinde ANOVA testleri uygulanmıştır.
- Farklılığın tespitinde ise Tukey post-hoc testi kullanılmıştır.

BULGULAR

Tablo 1. Katılımcıların yüzde ve frekans dağılımları

		f	%	Toplam
Cinsiyet	Erkek	134	56,5	**237**
	Kadın	103	43,5	
Yaş	15	56	23,6	**237**
	16	65	27,4	
	17 18 19	48 29 39	20,3 12,2 16,5	
Spor dalı	Bireysel sporlar Basketbol Voleybol Futbol Badminton	117 36 33 24 27	49,4 15,2 13,9 10,1 11,4	**237**
Lisans durumu	Evet Hayır	114 123	48,1 51,9	**237**

Tablo 2. Zorbalık eğiliminin cinsiyet değişkenine göre incelenmesi

Alt boyutlar	Cinsiyet	n	Ort.	SS	t	p
Olumsuz yansıtma	Erkek	134	2,443	0,865	1,781	0,076
	Kadın	103	2,254	0,763		
Duygusal paylaşım eksikliği	Erkek	134	2,500	1,205	1,689	0,093
	Kadın	103	2,276	0,826		
Haklı görme	Erkek	134	2,384	0,883	2,753	**0,006***
	Kadın	103	2,101	0,696		
Başkalarını üzmek	Erkek	134	2,453	1,073	4,900	**0,000***
	Kadın	103	1,895	0,669		
Güç kullanma	Erkek	134	2,570	0,891	3,390	**0,001***
	Kadın	103	2,200	0,785		
Rahatsız olmama	Erkek	134	2,656	1,451	1,893	0,060
	Kadın	103	2,320	1,277		

*p<0,05

Tablo 2 incelendiğinde cinsiyet değişkenine göre zorbalık eğilimi alt boyutları arasında istatistiksel olarak haklı görme(t=2,753; p=0,006), başkalarını üzmek (t=4,900; p=0,000) ve güç kullanma (t=3,390; p=0,001) boyutlarında anlamlı bir fark bulunmaktadır. Farkın hangi gruplardan kaynaklandığını incelediğimizde erkek öğrencilerin aritmetik ortalamalarının kadın öğrencilerin aritmetik ortalamasından daha yüksek olduğu tespit edilmiştir.

Tablo 3. Zorbalık eğilim puan ortalamalarının spora branşı değişkenine göre incelenmesi

Alt Boyutlar	Gruplar	n	Ort.	SS	F	P	Fark
Olumsuz yansıtma	Bireysel	117	3,0547	,27496	174,893	**,000***	B>Bas>BM>F>V
	Basketbol	36	2,0500	,63133			Bas>F>V
	Voleybol	33	1,3636	,19010			BM>F>V
	Futbol	24	1,4500	,44233			
	Badminton	27	1,8000	,67254			
Duygusal paylaşım eksikliği	Bireysel	117	3,2265	,49055	105,038	**,000***	B>Bas>BM>F>V
	Basketbol	36	2,1111	1,08306			Bas>BM>F>V
	Voleybol	33	1,2424	,20871			BM>Bas
	Futbol	24	1,4167	,57735			
	Badminton	27	1,5185	,79841			
Haklı görme	Bireysel	117	2,8953	,58652	88,576	**,000***	B>Bas>F>BM>V
	Basketbol	36	1,8125	,50841			Bas>F>BM>V
	Voleybol	33	1,4318	,11307			
	Futbol	24	1,6875	,55291			
	Badminton	27	1,6389	,48205			
Başkalarını üzmek	Bireysel	117	3,0299	,61339	145,418	**,000***	B>Bas>BM>V>F
	Basketbol	36	1,4792	,39359			
	Voleybol	33	1,3864	,39573			
	Futbol	24	1,3438	,40252			
	Badminton	27	1,4167	,39831			
Güç kullanma	Bireysel	117	3,1724	,32894	194,886	**,000***	B>Bas>BM>F>V
	Basketbol	36	1,8333	,60945			Bas>V
	Voleybol	33	1,5152	,34198			
	Futbol	24	1,6042	,49591			
	Badminton	27	1,6852	,46302			
Rahatsız olmama	Bireysel	117	3,3959	3,6981	84,838	**,000***	B>Bas>BM>F>V
	Basketbol	36	1,6303	2,5364			Bas>BM>F>V
	Voleybol	33	1,0000	1,0000			
	Futbol	24	,9470	1,8030			
	Badminton	27	1,1093	1,7796			

*p<0,05

Tablo 3 incelendiğinde, spor branşı değişkeni ile zorbalık eğilimi arasından Olumsuz yansıtma (F (4;232) = 174,893 p<0.00), Duygusal paylaşım eksikliği (F (4;232) = 105,038; p<0.00), Haklı görme (F (4;232) = 88,576; p<0.00), Başkalarını üzmek (F (4;232) = 145,418; p<0.00), Güç kullanma (F (4;232) = 194,886; p<0.00), Rahatsız olmama (F (4;232) = 84,838; p<0.00) anlamlı farklılık tespit edilmiştir.

Tablo 4. Zorbalık eğiliminin lisans durumu değişkenine göre incelenmesi

Alt boyutlar	Lisans durumu	n	Ort.	SS	T	p
Olumsuz yansıtma	Evet	114	1,7368	,65679	-16,120	**0,000***
	Hayır	123	2,9398	,46865		
Duygusal paylaşım eksikliği	Evet	114	1,6316	,88177	-14,880	**0,000***
	Hayır	123	3,1179	,62315		
Haklı görme	Evet	114	1,7171	,59078	-12,906	**0,000***
	Hayır	123	2,7663	,66046		
Başkalarını üzmek	Evet	114	1,5000	,60693	-15,784	**0,000***
	Hayır	123	2,8699	,72736		
Güç kullanma	Evet	114	1,7193	,58257	-18,432	**0,000***
	Hayır	123	3,0501	,52442		
Rahatsız olmama	Evet	114	1,5263	1,04932	-14,381	**0,000***
	Hayır	123	3,4228	,97517		

*p<0,05

Tablo 4 incelendiğinde lisans değişkenine göre zorbalık eğilimi alt boyutları arasında istatistiksel olarak Olumsuz yansıtma (t=-16,120; p=0,000), Duygusal paylaşım eksikliği (t=-14,880; p=0,000), Haklı görme (t=-12,906; p=0,000), Başkalarını üzmek (t=-15,784; p=0,000), Güç kullanma (t=-18,432; p=0,000), Rahatsız olmama (t=-14,381; p=0,000) boyutlarında anlamlı bir fark bulunmaktadır. Farkın hangi gruplardan kaynaklandığını incelediğimizde lisansı olmayan katılımcıların aritmetik ortalamalarının lisansı olan katılımcıların aritmetik ortalamasından daha yüksek olduğu tespit edilmiştir.

Tablo 5. Zorbalık eğilim puan ortalamalarının spora yönlendirilme durumuna göre incelenmesi

Alt Boyutlar	Gruplar	n	Ort.	SS	F	P	Fark
Olumsuz yansıtma	Ailem	30	2,3000	,82001	1,170	,325	
	Akraba	17	1,9647	,83437			
	Arkadaş	62	2,4161	,89757			
	Öğretmen	72	2,4083	,79395			
	Kendim	56	2,3929	,77971			
Duygusal paylaşım eksikliği	Ailem	30	2,3333	1,20105	3,473	**,009***	Arkadaş>Akraba
	Akraba	17	1,5882	,62671			Öğretmen>Akraba
	Arkadaş	62	2,5000	1,00816			Kendi>Akraba
	Öğretmen	72	2,5972	1,08437			
	Kendim	56	2,3304	1,02074			
Haklı görme	Ailem	30	2,2500	,88083	1,200	,312	
	Akraba	17	1,9706	,85642			
	Arkadaş	62	2,4194	,83442			
	Öğretmen	72	2,2083	,69581			
	Kendim	56	2,2500	,88933			
Başkalarını üzmek	Ailem	30	2,2500	1,09071	1,276	,280	
	Akraba	17	1,7206	,85642			
	Arkadaş	62	2,3024	1,01741			
	Öğretmen	72	2,2292	,88687			
	Kendim	56	2,2143	,92740			
Güç kullanma	Ailem	30	2,4167	,96267	1,632	,167	
	Akraba	17	1,9020	,91488			
	Arkadaş	62	2,4355	,91504			
	Öğretmen	72	2,4792	,82694			
	Kendim	56	2,4435	,76229			
Rahatsız olmama	Ailem	30	2,5000	1,52564	4,851	**,001***	Aile>Akraba
	Akraba	17	1,2941	,46967			Arkadaş>Akraba
	Arkadaş	62	2,4516	1,37516			Öğretmen>Akraba
	Öğretmen	72	2,8750	1,37316			
	Kendim	56	2,4821	1,33473			

*p<0,05

Tablo 5 incelendiğinde, spora yönlendirilme durumu ile zorbalık eğilimi arasından Duygusal paylaşım eksikliği (F (4;232) = 3,473; p<0.00), Rahatsız olmama (F (4;232) = 4,851; p<0.00) anlamlı farklılık tespit edilmiştir.

Tablo 6. Zorbalık eğilim puan ortalamalarının kardeş sayısı değişkenine göre incelenmesi

Alt Boyutlar	Gruplar	n	Ort.	SS	F	P	Fark
Olumsuz yansıtma	Yok	48	2,5500	,70921	1,171	,321	
	1	77	2,2883	,79239			
	2	57	2,3684	,93104			
	3 ve üzeri	55	2,2909	,84837			
Duygusal paylaşım eksikliği	Yok	48	2,7292	,96733	3,072	**,029***	Yok >1 kardeş
	1	77	2,1948	1,06527			
	2	57	2,5263	1,06243			
	3 ve üzeri	55	2,2818	1,07481			
Haklı görme	Yok	48	2,3281	,81316	,569	,636	
	1	77	2,1786	,97369			
	2	57	2,3421	1,01498			
	3 ve üzeri	55	2,2364	,97759			
Başkalarını üzmek	Yok	48	2,0313	1,09071	1,745	,159	
	1	77	2,1429	,85642			
	2	57	2,4342	1,01741			
	3 ve üzeri	55	2,2318	,88687			
				,92740			
Güç kullanma	Yok	48	2,4896	,64266	,612	,608	
	1	77	2,3355	,86834			
	2	57	2,5000	,96978			
	3 ve üzeri	55	2,3515	,92222			
Rahatsız olmama	Yok	48	2,9375	1,21000	2,347	,074	
	1	77	2,2727	1,36340			
	2	57	2,5263	1,47727			
	3 ve üzeri	55	2,4545	1,41183			

*p<0,05

Tablo 6 incelendiğinde, kardeş sayısı değişkeni ile zorbalık eğilimi arasından Duygusal paylaşım eksikliği ($F(3;233) = 3,072$; $p<0.029$) anlamlı farklılık tespit edilmiştir.

Tablo 7. Zorbalık eğilim puan ortalamalarının gelir durumu değişkenine göre incelenmesi

Alt Boyutlar	Gruplar	n	Ort.	SS	F	P	Fark
Olumsuz yansıtma	Düşük Orta Yüksek	87 42 108	1,7586 2,3714 2,8426	,69760 ,80556 ,58072	63,370	**,000***	Orta>Düşük Yüksek>Orta>Düşük
Duygusal paylaşım eksikliği	Düşük Orta Yüksek	87 42 108	1,6954 2,3095 3,0093	,91929 1,06660 ,76727	53,666	**,000***	Orta>Düşük Yüksek>Orta>Düşük
Haklı görme	Düşük Orta Yüksek	87 42 108	1,7672 2,2500 2,6644	,58667 ,94191 ,70393	38,136	**,000***	Orta>Düşük Yüksek>Orta>Düşük
Başkalarını üzmek	Düşük Orta Yüksek	87 42 108	1,5603 1,9643 2,8310	,64920 ,96520 ,76031	69,452	**,000***	Orta>Düşük Yüksek>Orta>Düşük
Güç kullanma	Düşük Orta Yüksek	87 42 108	1,7299 2,4524 2,9414	,65948 ,66390 ,68636	78,247	**,000***	Orta>Düşük Yüksek>Orta>Düşük
Rahatsız olmama	Düşük Orta Yüksek	87 42 108	1,6207 2,3571 3,2870	1,13344 1,30331 1,13608	49,633	**,000***	Orta>Düşük Yüksek>Orta>Düşük

*p<0,05

Tablo 7 incelendiğinde gelir durumu değişkeni ile zorbalık eğilimi arasında, Olumsuz yansıtma ($F(2;234) = 63,370$; $p<0.000$), Duygusal paylaşım eksikliği ($F(2;234) = 53,666$; $p<0.000$), Haklı görme ($F(2;234) = 38,136$; $p<0.000$), Başkalarını üzmek ($F(2;234) = 69,452$; $p<0.000$), Güç kullanma ($F(2;234) = 78,247$; $p<0.000$), Rahatsız olmama ($F(2;234) = 49,633$; $p<0.000$) boyutlarında anlamlı farklılık tespit edilmiştir.

Tablo 8. Zorbalık eğilim puan ortalamalarının anne eğitim durumu değişkenine göre incelenmesi

Alt Boyutlar	Gruplar	n	Ort.	SS	F	P	Fark
Olumsuz yansıtma	Okuryazar değil İlk-Ortaokul Lise Üniversite	42 70 68 57	2,1000 2,5029 2,4235 2,3053	,64354 ,85176 ,79215 ,91971	2,340	,074	
Duygusal paylaşım eksikliği	Okuryazar değil İlk-Ortaokul Lise Üniversite	42 70 68 57	2,0833 2,5357 2,5147 2,3421	1,12934 1,04715 1,00609 1,06552	1,972	,119	
Haklı görme	Okuryazar değil İlk-Ortaokul Lise Üniversite	42 70 68 57	1,8571 2,4750 2,3787 2,1579	,63232 ,84715 ,79819 ,81918	6,165	**,000***	İLK-ORT>OYD LİSE>OYD
Başkalarını üzmek	Okuryazar değil İlk-Ortaokul Lise Üniversite	42 70 68 57	1,4821 2,5679 2,3603 2,1316	,67938 ,94209 ,84242 1,00346	13,964	**,000***	İLK-ORT>OYD LİSE>OYD ÜNİ>OYD
Güç kullanma	Okuryazar değil İlk-Ortaokul Lise Üniversite	42 70 68 57	2,0119 2,6119 2,4608 2,3947	,72545 ,86613 ,86200 ,88508	4,511	**,004***	İLK-ORT>OYD LİSE>OYD
Rahatsız olmama	Okuryazar değil İlk-Ortaokul Lise Üniversite	42 70 68 57	2,1429 2,5714 2,7941 2,3684	1,37169 1,39950 1,36654 1,35793	2,213	,087	

*p<0,05

Tablo 8 incelendiğinde anne eğitim durumu değişkeni ile zorbalık eğilimi arasında, Haklı görme (F (3;233) = 6,165; p<0.000), Başkalarını üzmek (F (3;233) = 13,964; p<0.000), Güç kullanma (F (3;233) = 4,511; p<0.004) boyutlarında anlamlı farklılık tespit edilmiştir.

TARTIŞMA VE SONUÇ

Spor yapan bireylerin zorbalık eğilimlerinin çeşitli değişkenlere göre incelenmesi amacıyla yapılan bu araştırmada yapılan analizler sonrasında elde edilen bilgiler ışığında aşağıdaki yorumlamalara yer verilmiştir.

Bulgular ışığında incelendiğinde cinsiyet değişkenine göre zorbalık eğilimi alt boyutları arasında istatistiksel olarak haklı görme (t=2,753; p=0,006), başkalarını üzmek (t=4,900; p=0,000) ve güç kullanma (t=3,390; p=0,001) boyutlarında anlamlı bir fark bulunmaktadır. Dölek (2002) ile Gökdurna (2018) araştırmalarında öğrencilerin cinsiyeti ile zorbalık eğilimleri

arasındaki farkı istatistiksel olarak anlamlı bulmamışlardır. Çalışmamız ile zıtlık göstermektedir. Çalışmamıza benzer şekilde, Arslan (2018) erkek katılımcıların zorbalık eğilimlerinin kız öğrencilere göre daha yüksek olduğunu tespit etmiştir. Çayırdağ (2006) erkek öğrenciler lehine zorbalık eğilimini anlamlı bulmuştur. Çalışmamız ile örtüşmektedir. Yine benzer şekilde, Yurtal ve Cenkseven (2006) ile Özen (2006) erkek öğrenciler lehinde fark tespit etmiş olup zorba davranışlara maruz kalma ile cinsiyet değişkeni arasında anlamlı farklılıklar belirlemiştir.

Spor branşı değişkeni ile zorbalık eğilimi arasından Olumsuz yansıtma ($F(4;232) = 174,893$ $p<0.00$), Duygusal paylaşım eksikliği ($F(4;232) = 105,038$; $p<0.00$), Haklı görme ($F(4;232) = 88,576$; $p<0.00$), Başkalarını üzmek ($F(4;232) = 145,418$; $p<0.00$), Güç kullanma ($F(4;232) = 194,886$; $p<0.00$), Rahatsız olmama ($F(4;232) = 84,838$; $p<0.00$) anlamlı farklılık tespit edilmiştir.

Tablo 4 incelendiğinde lisans değişkenine göre zorbalık eğilimi alt boyutları arasında istatistiksel olarak Olumsuz yansıtma ($t=-16,120$; $p=0,000$), Duygusal Paylaşım eksikliği ($t=-14,880$; $p=0,000$), Haklı görme ($t=-12,906$; $p=0,000$), Başkalarını üzmek ($t=-15,784$; $p=0,000$), Güç kullanma ($t=-18,432$; $p=0,000$), Rahatsız olmama ($t=-14,381$; $p=0,000$) boyutlarında anlamlı bir fark bulunmaktadır.

Tablo 5 incelendiğinde, spora yönlendirilme durumu ile zorbalık eğilimi arasından Duygusal paylaşım eksikliği ($F(4;232) = 3,473$; $p<0.00$), Rahatsız olmama ($F(4;232) = 4,851$; $p<0.00$) anlamlı farklılık tespit edilmiştir.

Tablo 6 incelendiğinde, kardeş sayısı değişkeni ile zorbalık eğilimi arasından Duygusal paylaşım eksikliği ($F(3;233) = 3,072$; $p<0.029$) anlamlı farklılık tespit edilmiştir.

Tablo 7 incelendiğinde gelir durumu değişkeni ile zorbalık eğilimi arasında, Olumsuz yansıtma ($F(2;234) = 63,370$; $p<0.000$), Duygusal paylaşım eksikliği ($F(2;234) = 53,666$; $p<0.000$), Haklı görme ($F(2;234) = 38,136$; $p<0.000$), Başkalarını üzmek ($F(2;234) = 69,452$; $p<0.000$), Güç kullanma ($F(2;234) = 78,247$; $p<0.000$), Rahatsız olmama ($F(2;234) = 49,633$; $p<0.000$) boyutlarında anlamlı farklılık tespit edilmiştir. Yönet ve ark. (2016) tarafından yapılan araştırmada aylık gelir düzeyinde anlamlı farklılığın olduğu sonucuna ulaşılmıştır. Yine Kanat (2015) yapmış olduğu araştırmada öğrencilerin aile aylık gelir düzeyine göre anlamlı farklılık tespit etmiştir.

Tablo 8 incelendiğinde anne eğitim durumu değişkeni ile zorbalık eğilimi arasında, Haklı görme ($F(3;233) = 6,165$; $p<0.000$), Başkalarını üzmek ($F(3;233) = 13,964$; $p<0.000$), Güç kullanma ($F(3;233) = 4,511$; $p<0.004$) boyutlarında anlamlı farklılık tespit edilmiştir.

Sonuç olarak çalışmada, spor yapan çocukların zorbalık eğilimleri çeşitli değişkenler perspektifinden farklılaşmaktadır. Cinsiyet değişkeni bağlamında; haklı görme, güç kullanma ve başkalarını üzme alt boyutlarında erkeklerin daha yüksek puan ortalamalarına sahip oldukları belirlenmiştir. İlaveten spor branşı, lisansa sahip olma durumları, spora kimin yönlendirdiği, gelir düzeyi ve anne eğitim durumu Zorbalık Eğilimi üzerinde etkiye sahip olmakta ve farklılık meydana getirmektedir. Yaş değişkeni, ailede spor yapma durumu ve baba eğitim düzeyinin Zorbalık Eğilimi üzerinde bir etkiye sahip olmadığı görülmektedir.

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IO ESASLI ATIKLARDAN AKSESUAR (DÜĞME) ÜRETİMİ VE YIKAMA HASLIK DEĞERLERİNİN İNCELENMESİ

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ÖZET
Geleceğe yönelik eğilimlerin en önemli konularından birisi sürdürülebilirliktir. Bu anlamda özellikle tekstil sektöründe geri dönüşüm, yeniden kullanılabilir malzemeler, tekrar kullanılabilen ürünler, israfın minimuma indirilebilmesi gibi konular önem kazanmıştır. Bu çalışmada, sürdürülebilir döngüyü tamamlamak için tüketim sonrası bir ürün olan çay atığı yeni bir ürün için hammadde olarak kullanılmıştır. Bu yeni ürün tekstil ve moda sektöründe aksesuar alanında kullanılan düğme olarak belirlenmiştir. Çay atığından üretilen düğmeler iki ve dört delikli siyah renkte gömlek, kazak, hırka ve kaban gibi konfeksiyon ürünlerinde kullanılması düşünülmüştür. Üretimi yapılan numunelere yıkama haslığı testleri uygulanmıştır. Sonuçlar, çay kalıntılarından elde edilen düğmelerin haslık değerlerinin (4 (iyi), 4-5 (çok iyi) ve 5 (mükemmel)) tüm lifler (asetat, pamuk, poliamid, polyester, poliakrilik, yün) için uygun olduğunu göstermiştir.

Anahtar Kelimeler: Bio-esaslı atık, sürdürebilirlik, geri dönüşüm, ekolojik moda.

PRODUCTION OF ACCESSORIES (BUTTONS) FROM BIO-BASED WASTES AND INVESTIGATION OF WASHING FASTNESS VALUES

ABSTRACT

One of the most important issues of future trends is sustainability. Therefore; recycling, reusable materials, reusable products and minimizing waste have gained importance especially in the textile industry. In this study, tea waste, a post-consumption product, was used as a raw material for a new product to complete the sustainable cycle. This new product has been determined as the button used in the field of accessories in the textile and fashion industry. Buttons produced from tea waste are intended to be used in ready-made garments such as shirts, sweaters, cardigans and coats in black with two and four holes. Washing fastness tests were applied to the produced samples. The results showed that the fastness values of buttons obtained from tea residues (4 (good), 4-5 (very good) and 5 (excellent)) are suitable for all fibers (acetate, cotton, polyamide, polyester, polyacrylic, wool).

Keywords: Bio-based waste, sustainability, recycling, ecological fashion.

1. GİRİŞ

Geleceğe yönelik eğilimlerin en önemli konularından birisi sürdürülebilirliktir. Doğal kaynakların kısıtlanmasıyla beraber, tüketiciler ve tasarımcılar önlemler konusunda düşünmeye başlamıştır. Bu anlamda geri dönüşüm, yeniden kullanılabilir malzemeler, tekrar kullanılabilen ürünler, israfın minimuma indirilebilmesi gibi konular önem kazanmıştır. Tüketimin ve insan hayatının hızlı akışına uygun yavaş ürünler, birden fazla çözüm üreten ve kullanım kolaylığıyla herkese hitap edecek tasarımlar, kullanıcı/tüketici merkezli, tüketiciyi tasarım aşamasında ön planda tutan etkileşimli tasarımlar gibi birçok çağdaş fikir, tasarım süreçleri içerisine dahil edilerek ve hatta kendilerine yeni disiplinler açarak tasarımın geleceğine ışık tutmaktadır [1]. Son yıllarda "sustainability" (sürdürülebilirlik) kelimesiyle daha geniş bir alanda daha sık karşılaşmaktayız. Sürdürülebilir dünya, sürdürülebilir kalkınma, sürdürülebilir ekonomi derken, "sürdürülebilir tasarım" (sustainable design) kavramı da gündemimizde yer almaktadır. Konuyu ifade etmek için kullanılan "sürdürülebilir tasarım", "ekolojik tasarım", "sürdürülebilir yaşam için tasarım", "çevreye duyarlı tasarım", gibi farklı başlıklar, konunun içeriği hakkında fikir verirken, aynı zamanda konu üzerindeki karmaşayı da yansıtmaktadır [2]. Sürdürebilirlik, global ekonomi politikaları çerçevesinde şekillenen konvansiyonel moda sisteminin kültürel, tarihi, etik ve ekolojik değerleri göz ardı eden üretim yapısına karşı; niteliği nicelikten üstün tutan ve yaşam döngüsü uzun ürünlerin değer kazandığı bir yapıyı savunmaktadır. 1980'lerin tüketim kültürünü takiben 1990'larda ortaya çıkan hareketlerin 2006 yılında Milano'da yayımlanan Yavaş Moda Bildirisi ekseninde daha organize bir yapıya bürünmesiyle yerini sağlamlaştırmıştır. Etik moda kuramcısı, akademisyen Sue Thomas'a göre "Sürdürülebilirlik; çalışanlar, tüketenler, hayvanlar, toplum ve çevre üzerinde pozitif tesiri bulunan tasarımcı, tüketim veya üretim biçimlerine işaret etmektedir. Böylelikle yalnızca ekonomik kaygılardan ibaret olmayan, sosyal sorumluluğun, doğa ve insan dostu üretimin egemen olduğu bütüncül hedefler belirlemektedir [3]. Sürdürülebilirlik konusunun uygulama alanlarından bir tanesini de katı atık yönetimi oluşturmaktadır. Atıkların çevreye duyarlı ve ekonomik biçimde uzaklaştırılması gereği ve yok edilmesi gereken kaynak olarak görülmesi, sürdürülebilir katı atık yönetimi kavramının ortaya çıkmasına sebep olmuştur. Çünkü katı atık yönetimi, geri kazanımı ve kaynakların etkin kullanımını esas alan, sürdürülebilir bir unsurdur. Geri kazanımla birlikte ürünlerin hem hammadde maliyetlerinde hem de üretim maliyetlerinde önemli tasarruflar elde edilecektir.

Doğa ve insan sorunu olarak katı atıklar; atık döngüsü içinde, üretildikleri andan, son uzaklaştırma aşamasına kadar çevre ve insanla doğrudan ya da dolaylı etkileşim içindedir. Evsel organik atıklar meyve, sebze ve diğer bitkisel ürünlerin tüketim amaçlı olarak ev, lokanta ya da

sanayi mutfağında kullanım öncesi atılan kabukları, çiçekleri, yaprakları, çekirdekleri, sap ve kökleri bu grupta değerlendirilebilir [4]. Demlenmiş çay atıkları da evsel organik atıkları kapsamaktadır. Çay, Camellia sinensis yapraklarından üretilen, sudan sonra dünyada en çok tüketilen sıvıdır. Yeşil ve siyah çay'ın tümü bu bitkinin yapraklarından üretilir [5].

Bu çalışmada, sürdürülebilir döngüyü tamamlamak için tüketim sonrası bir ürün olan çay atığı yeni bir ürün için hammadde olarak kullanılmıştır. Bu yeni ürün tekstil ve moda sektöründe aksesuar alanında kullanılan düğme olarak belirlenmiştir. Çay atığından üretilen düğmeler iki ve dört delikli siyah renkte gömlek, kazak, hırka ve kaban gibi konfeksiyon ürünlerinde kullanılacaktır.

2. MATERYAL VE YÖNTEM

2.1 Materyal

Çay bitkisi Theaceae familyasının Camellia (*Camellia sinensis* veya *Thea sinensis*) cinsine aittir. Çay bitkisi nemli iklimlerde yetişen, her mevsim yeşil olan, kısa boylu, çok yıllık, çalı türü bir ağaçtır. Çay bitkisi yaklaşık olarak 40 ülkede yetiştirilmekte olup iklim koşullarına bağlı olarak yarı tropik bir bitki olarak değerlendirilebilmektedir [6]. Çalışmada kullanmış olduğumuz çay bitkisi her gün evlerde kullandığımız çay atıklarından oluşmaktadır. Çay atıkları ile giysi aksesuarı ve süsleme amaçlı giysiye tutturulan üç boyutlu malzeme olan düğme tasarımında kullanılmıştır. Tasarımı yapılan düğmeler 2 ve 4 delikli 13mm ile 30mm arasında ebatlandırılarak üretilmiştir. Düğme kalıpları ise profesyonel amaçlı kullanılan dolgu malzemesi olan silikondan yapılmıştır. Düğmelerin yeterli sertliğe ve mukavemete dayanıklı olabilmesi için epoksit gruplarını içeren çapraz bağlı epoksi reçine ile sağlamlaştırılmıştır. Kullanılan epoksi reçine kimyasal ve çözücülere dayanıklı, mükemmel sertlik özelliği gösteren ve su rezistansı çok iyi olan bir yapıya sahiptir [7].

2.2.Yöntem

Yıkama haslığı testi, boyalı ve/veya baskılı tekstil mamullerinde rengin yıkama şartlarına karşı gösterdiği dayanıklılığı kontrol etmek amacıyla yapılan haslık testidir. Yıkama haslığı testi ISO 105-C06:2019 standardına uygun olarak yapılmıştır (ISO 2019). Test edilecek numune multifiber denilen refakat bezi dikildikten sonra yıkama haslığı makine ve şartlara göre yapılır. Refakat bezi, testin yapılmasına yardımcı olan, boyalı olmayan tekstil mamulüdür. Refakat bezi multifiber denilen, 6 değişik elyaf şeridinden (pamuk, asetat, polyamid, polyester, yün, akrilik) meydana gelmiş kumaştır. Test sonunda multifiber üzerinde meydana gelen kirlenmeler ile mamulün hangi cins elyafı kirletebileceği konusunda bilgi sahibi olunabilmektedir. Testte kullanılan ve numuneye dikilen refakat bezi yardımıyla yıkama ile numunenin renginde

meydana gelen akma gözlemlenir. Yıkama haslığı testi sabun çözeltisi ile 40 °C'de 30 dakika koşullarına gerçekleştirilir. Sabun çözeltisi, litrede 5 g sabun içerir. Yıkama işlemi tamamlandıktan sonra test numunesi, önce damıtılmış su ile sonra soğuk musluk suyu ile 10 dakika durulanır. Sadece bir kısa kenarındaki dikiş kalacak şekilde diğer kenar dikişleri açılır ve birbirine değdirilmeden asılı olarak 60 °C'de kurutulur. Test sonucu, ışık kabininde gri skala ile değerlendirilir. Değerlendirme karanlık odada D65 gün ışığı altında ışık kabininde yapılır. Işık, numuneye 45° açıdan gelmeli fakat bakış, numuneye dik olmalıdır. Numune ışık kabininin içindeki 45° açılı sehpalara yerleştirilerek değerlendirme yapılır. TS 423-2 EN 20105-A02 ve A03:1996 "Tekstil Mamullerinin Renk Haslığı Tayininde Lekelerin (Boya Akması) ve Solmanın (Renk Değişimi)" Değerlendirmesi standardına uygun olarak uygulanmıştır.

3. DENEYSEL VERİLER

3.1. Düğme Tasarımları

Düğme kalıpları için öncelikli olarak, karıştırma kabının içerisine silikonun yapıştırıcı özelliğini kaybetmesi için 200 ml sıvı el sabunu ve 1 litre su karıştırılmıştır. Hazırlanan karışımın içerisine 280 gr soğuk silikon eklenmiştir. Soğuk silikonun yapışma özelliği ile suyun içerisinde çözünmesi sağlanmıştır. Toplanan silikon üzerine farklı ebatlardaki düğmeler yerleştirilerek kalıpları çıkartılmıştır. Kalıplardaki düğmeler iki ve dört delikli olarak hazırlanmıştır. Silikon kalıplarının kuruması için 24-48 saat arasında hava sirkülasyonun olmadığı kapalı bir ortamda bekletilmiştir. Kuruyan silikon kalıpları Şekil 1'de görüldüğü gibi içerisinden düğmeler çıkartılarak kalıplar hazır hale getirilmiştir.



Şekil 1. Düğme Kalıpları

Atık olan demlenmiş çay bitkisi güneş almayan ortam sıcaklığında kurutulmuştur. Atık çay bitkisi kuruduktan sonra toz haline gelinceye kadar kahve öğütücü makinesinden geçirilmiştir. Bir kabın içerisine A birleşeni 60gr (epoksi) ile B birleşeni 30gr (sertleştirici) homojen bir karışım hazırlanmıştır. Hazırlanan homojen karışımın içerisine daha önce kurutulan ve

öğütülen atık çay bitkisi eklenmiştir. Silikon kalıplarının içerisine hazırlanan homojen karışım dökülmüştür. Dökülen karışımın kuruması için hava sirkülasyonunun olmadığı kapalı bir ortamda 24-48 saat arasında bekletilmiştir. Kuruyan homojen karışım kalıplardan çıkartılarak düğme kullanıma hazır hale getirilmiştir (Şekil 2).



Şekil 2. Tasarlanan Düğmeler

3.2. Yıkama Haslığı

Çay atıklarından elde edilen düğmelere üç yıkama sonucunda elde edilen haslık dereceleri Tablo 1'de verilmiştir.

Tablo 1. Yıkama Haslığı

			Yıkama Döngüsü			Renk Değişimi
			1.Yıkama	2.Yıkama	3.Yıkama	
Renk Değişimi			5	5	5	Gözlemlenmememiştir
Lekelenme	Asetat	4-5	4-5	4-5	4-5	Gözlemlenmememiştir
	Pamuk	4-5	4-5	4-5	4-5	Gözlemlenmememiştir
	Poliamid	5	4-5	4-5	4-5	Gözlemlenmememiştir
	Polyester	5	4-5	4-5	4-5	Gözlemlenmememiştir
	Poliakrilik	5	4-5	4-5	4-5	Gözlemlenmememiştir
	Yün	5	4-5	4-5	4-5	Gözlemlenmememiştir

Tablo, üç tekrarlı yıkama sonucunda çay atıklarından tasarlanmış düğmelerdeki renk ve görünüm değişikliği ile refakat bezine akan renk değerleri bakımından incelenmiştir. Tekrarlı yıkamalarda ilk ve ikinci yıkama sonucunda düğmelerde hiçbir renk değişimi ve deformasyon gözlenmemiştir. Ancak üçüncü yıkama sonucunda 4 (iyi) derecede yıkama haslık derecesi ile az miktarda renk değişim gözlemlenmiştir. Düğmelerin refakat bezini lekelemesi bakımından değerlendirildiğinde ise ilk yıkama sonucunda poliamid, polyester, poliakrilik ve yün lifinde 5 (mükemmel), asetat ve pamuk lifinde ise 4-5 (çok iyi) bulunmuştur. İkinci yıkama sonucunda tüm liflerde lekelenme 4-5 (çok iyi) iken üçüncü yıkama sonucunda 4 (iyi) olarak

kaydedilmiştir. Sonuçlar gösteriyor ki yıkama tekrarı arttıkça refakat bezine lekeleme derecesi artış göstermiştir. Düğmelerin yıkama sonucunda su ile temasıyla renklerinde değişim gözlemlenerek yıkama haslıklarının düşük değerlerde çıkmasına sebep olmuştur. Düşük yıkama haslıkları, çay bitkisinin düğme yüzeyine sıkıca tutunmamasından kaynaklanmış olabilir. Su molekülleri, yıkama koşullarının etkisiyle suda çözünür hale gelerek rengin düğmeden çıkarak kumaşa akması olarak sonuçlanmıştır. Sonuçlar, çay kalıntılarından elde edilen düğmelerin haslık oranlarının (4 (iyi), 4-5 (çok iyi) ve 5 (mükemmel)) tüm lifler (asetat, pamuk, poliamid, polyester, poliakrilik, yün) için uygun olduğunu göstermiştir.

4. SONUÇ VE DEĞERLENDİRME

21. yy'ın en önemli gelişimi ekonomide tüm sektörlerde yaşanan hızlı tüketim ve üretim sorunudur. Bu gelişimden etkilenen en önemli sektörde moda ve tekstildir. Bu yüzden sürdürülebilirlik kavramı önem kazanmış ve hızlı moda yerine alternatif olarak yavaş moda hareketi önem kazanmaya başlamıştır. Bu amaçla geliştirilen yenilikçi ve akıllı malzemeler, sistemler ya da üretim yöntemleri; oluşan sürdürülebilirlik farkındalığı ile doğa ile işbirlikçi yeni çözümler yaratma yönünde ilerlemeye başlamıştır. Böylece; teknolojinin sağladığı yeni potansiyellerin doğadan sağlanacak edinimler ile bir arada kullanılmasına olanak sağlanması mümkün olacaktır. Bu açıdan yenilikçi biyoesaslı malzemelerin kullanıldığı tekstil ve moda tasarımı uygulamaları umut vadeden potansiyeller taşımaktadır. Aynı zamanda bu malzemeler sürdürülebilirlik açışından doğal kaynakların korunması, atık yönetiminde iyileştirme, karbon ayak izinde ve sera etkisinde azalma gibi pek çok avantaja sahiptirler ve petrol esaslı ürünlere yenilenebilir hammaddelerden üretilen sürdürülebilir bir alternatif olarak pazarda yer edinmeye başlamışlardır. Ayrıca bu malzemeler özgün karakteristikleri ile de tasarımcılar için yenilikçi potansiyeller yaratmaktadır. Bu noktada, bu malzemeler ile tasarlanan ürünlerde malzeme geliştirme odağının yanı sıra kendi kimliğini yansıtan tasarım ürünleri yaratma kaygısı güdülmelidir. Bu ise beraberinde alternatif bakış açıları getirmektedir.

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FACTOR ANALYSIS OF BEACH SEDIMENT AT DAMLATAS BEACH (ALANYA, TÜRKIYE)

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ABSTRACT
Alanya Beach is located in the south-west of Alanya. The beach has clear and fine sand. There are many hotels in the area. The sandy beach is quite wide. Factor analysis is a statistical method used to describe the difference between variables related to the study subject. The aim of the study is to make factor analysis by multivariate statistical techniques and interpret the chemical analysis data made from the samples belonging to the study area. In this context, beach sediment samples were collected from the west of Damlatas Castle (Alanya, Antalya). Chemical analysis with X-ray fluorescence (XRF) was performed on beach sands and factor analysis was performed on these data. According to the factor analysis results, most of the element was associated with a natural source. Heavy metals such as Al, K, Ti, Cr, Zn, Rb, Tb have been associated with a mixture of natural rocks and surface/sea water found in the region. However, S, Cl, Br and Ba may have come from anthropogenic sources (e.g. industries, shipping vessels, emissions from trucks, domestic and industrial waste disposal and agricultural land use). It is recommended not to allow anthropogenic wastes in the study area and its immediate surroundings, and to carry out the necessary controls and inspections.

Keywords: multivariate statistical analiysis, factor analysis, Damlatas beach, Alanya.

INTRODUCTION

Human being is exposed to radiation from natural sources, including cosmic and terrestrial sources, in addition to artificial radioactivity from fallout from nuclear testing and medical applications [1]. Radionuclides nuclear weapons tests, and nuclear accidents enter the environment during medical and industrial radiation applications. These artificial sources also make a significant contribution to the total radiation exposure of the population. The effect of radiation in the soil on human health, while the whole body is affected by external radiation directly originating from the primitive radionuclides in the soil, the internal body is affected by radiation due to inhalation [2]. Internal exposure to radiation affecting the respiratory tract, soil, sediment, and radon emitted from building materials is due to its decomposition products [3]. Regional enrichments of natural radioactivity in beach sands are observed all over the world. Beach sands are mineral deposits, usually composed of volcanic rocks such as granite, rhyolite and andesite, and these rocks may be rich in minerals containing U and Th. These minerals, as a result of erosion of rocks, migrate with the help of weather conditions and accumulate and enrich on the coasts [4]. The radiation doses created by the beach sands, which contain minerals with high uranium and thorium concentrations such as monazite and zircon, are considerable high. The main source of beach sand comes from metamorphic and igneous rocks. Some metamorphic and igneous rocks contain natural radionuclides that emit radiation to the environment. 99% of the earth's crust consists of elements namely, oxygen, silicon, aluminum, iron, calcium, sodium, potassium and magnesium. These elements constitute low-density minerals, which are the dominant compounds of silicates and aluminosilicates, which make up 80% of the earth's crust. It is likely to be found in high proportions (e.g. chromium, cobalt, nickel, copper and iron; titanium, vanadium, iron and manganese in mafic rocks; tungsten, molybdenum, tin, uranium, thorium and titanium in granite rocks; lead, zinc, copper, cadmium and mercury in acidic volcanic rocks; cadmium, lead, vanadium and uranium in round) in ultramafic rocks [5]. Radionuclide level information in beach sand is of great importance as it provides important information for keeping reference data records to identify possible changes in environmental radioactivity [6]. Dose rates are common in the world environment and are found in formations that vary from place to place in different geological formations such as soil, sand, water and air in varying concentrations depending on geographical and geological conditions [7-10]. Beach sands, which contain coarse materials rich in inorganic silicon, are weather-resistant remnants of geological formations that are transported to their original places, to the shore, after transport mechanisms such as wind, river, and glacier; and accumulates at the seaside with the movements of waves and currents [11-13]. The development of the nuclear

industry, the rapid spread of techniques that increase radioactive pollution, the determination of radiation in our natural environment; This has made it necessary for the creation of standards to protect people and nature from this pollution [14-16]. The coastal areas of the environment receive natural or anthropogenic radioactive pollution through rivers and precipitation [17]. Marine sediments are the main reservoirs for natural and artificial radionuclides due to their diverse composition. The uptake of radionuclides by marine sediments depends on their physical and chemical properties [18]. The concentration and distribution of 226Ra,232Th and 40K in sands is not uniform throughout the world and their distribution in soil depends on the nature of its geological formation [19-20]. The monazite mineral found in beach sands is considered an important geological material because it can contain 0.1–0.3% uranium and 5–7% thorium, which are the main elements used in nuclear power plants [21]. Radioactivity analysis on tourist beaches plays an interesting role. While distinctive studies have been conducted in various countries and regions of the world on the natural radioactivity of the coastline and the doses it creates, scant studies have been conducted in Turkey. Turkey has the largest beach sand system in Europe [22]. In nearly 10% of our total coastline of 8333 km, 845 km, is covered with beach sands.

Samples could be taken from coastal sediments, stream beds, regularly or irregularly according to the purpose. Chemical analysis of the samples was made by X-ray fluorescence (XRF) methods. Geochemical analyzes are based on elements such as lithium, beryllium, sodium, magnesium, potassium, calcium, titanium, vanadium, chromium, iron, manganese, cobalt, nickel, copper, zinc, arsenic, aluminum, silicon, iodine, sulfur, chlorine, selenium, ribidium, strontium, yibidium, zircon, molybdenum, cadmium, tin, antimony, barium, tungsten, gold, mercury, lead, thorium, uranium. Regional observations of soil/rock geochemistry are utilised to determine the extent and magnitude of artificial contamination sources. Element concentrations in soils are caused by parent material (base rock), atmospheric deposition, fertilization, agrochemicals, organic wastes and other inorganic pollutants (mine deposits and tailings). In this study, 50 beach sand samples were collected from the Alanya beach line. To the west of the Alanya Kalesi, 25 samples labelled with initials A (1 – 25) were collected, and to the east of Alanya Kalesi trending southeast, 25 point were samples and labelled with the initial K (26 – 50). The radioactive element of interest include ^{40}K, ^{232}Th and ^{238}U. ^{231}Pa in addition were identified, but was ignored in this study because advanced XRF is not appropriate technique use for the analysis of such elements.

CONCLUSIONS

Their concentrations above detection limit in the Alanya samples (A-group) ranges as follows: ^{40}K 0.24 – 0.73%, ^{238}U 0.00 – 0.0003 ppm and ^{232}Th were not detected. In the Alanya Kalasi samples (K-group), these elements ranges were ^{40}K 0.24 – 2.26%, ^{238}U 0.00 – 0.0024ppm and ^{232}Th 0.00 – 0.0026 ppm. Their average concentration were ^{40}K 0.49%, U 0.000012 ppm in the Alanya samples, and ^{40}K 1.52%, ^{238}U 0.000248 ppm and ^{232}Th 0.000952 ppm. The average mean concentration of ^{40}K, ^{232}Th and ^{238}U were lower in the Alanya group samples compared to those collected after the Alanya Kalesi (Figure 1 a and b) Heavy metal elements such as Al, Fe, Mg Ti, Co, Zn, Ga, R, Y, Ba, Pb, Pa and Tb were slightly lower in the Alanya (A) samples compared to the Kalesi (K) samples. However, Si, Na, Cl, Dy and Tm were higher in the Alanya samples compared to the Kalesi samples.

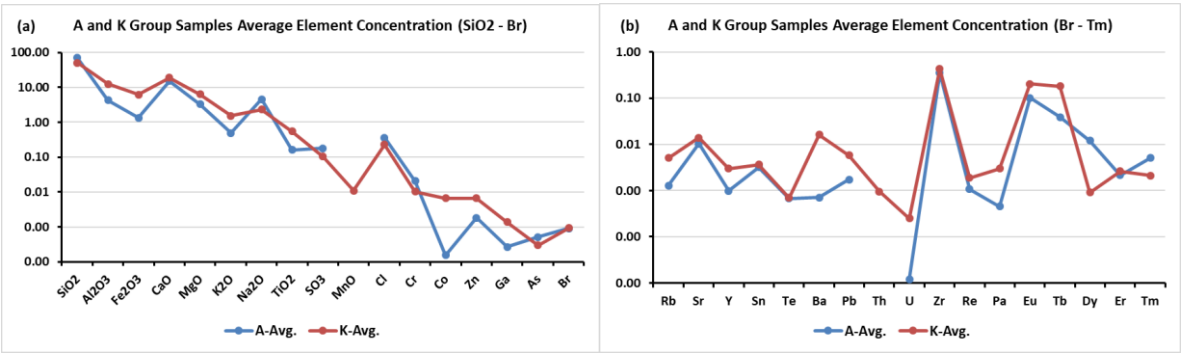


Figure 1. (a) Average Geochemical content of Alanya and Alanya Kalesi Samples; (b) Average Geochemical content of Alanya and Alanya Kalesi Samples

ACKNOWLEDGMENT

The financial support for this research was provided by the Scientific Research Projects Coordination Unit (FDK-2022-5812) of Akdeniz University, Antalya/Turkey.

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EFFECT OF AEROGEL ON MANUFACTURED INSULATION PLATES

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ABSTRACT
Thermal insulation materials are useful to decrease energy consumption for buildings. In current study, thermal insulating plates were developed by using expanded vermiculite and aerogel particles with an inorganic-based binder. The effect of the aerogel on the plates was examined. It has been found that the use of low-density aerogel in the structure reduced the apparent density of the plates from 1.326 ± 0.034 g/cm^3 to 0.856 ± 0.03 g/cm^3. In addition, it has been observed that the materials developed by using aerogel in the structure gained a superhydrophobic character (153 ± 2.5°) and it reduced the plate's long-term water absorption properties from 40.9 ± 0.27 (v%) to 25.5 ± 0.12 (v%).

Keywords: aerogel, insulation, microstructure, physical property

1. INTRODUCTION

Every day, the growing human population and accompanying technological advancements increase the demand for energy. The construction industry, in particular, consumes a significant amount of energy for heating and cooling buildings. The energy consumed for heating or cooling purposes in buildings in the USA constitutes 51% of the total energy consumption and this value is 40% in Europe [1]. For this reason, various thermal insulation materials are being developed in order to minimize energy consumption in buildings [2-4]. Especially, expanded vermiculite and SiO_2 aerogel are suitable candidates in terms of their low thermal conductivity property for insulation applications [5].

In this study, thermal insulation plates were developed by incorporating SiO_2 aerogel into expanded vermiculite particles in the presence of an inorganic-based binder. The effect of the use of superhydrophobic SiO_2 aerogel particles in the prepared materials on the physical, thermal and microstructure of the material was examined.

2. MATERIALS AND METHOD

2.1. Preparation of the plates

80 g of expanded vermiculite particles (V0, Agrekal-Turkey) were mixed with 30 g of binder (the binder was synthesised by Department of Civil Engineering, Akdeniz University) and blended until homogeneous mixtures were obtained. Besides, 30% SiO_2 aerogel (Levron) was the replacement with EV to prepare the new formulation. The prepared mixtures were placed in a cylinder mold (Ø 50mm) and compressed (20 bar) for 1 minute. Then the pressed samples were removed from the mold and cured at 120 °C for 24 hours.

2.2. Characterization of the plates

Apparent densities (ρ, g/cm^3) of the plates were calculated according to BS EN 1602 [6]. Each test was realized in triplicate, and test results were averaged.

Thermal conductivity coefficient (λ) analyses of the prepared plates (Ø 50mm) were performed according to TS EN 12664 [7] standard by FOX50 test equipment at 25 °C.

To determine the hydrophobic properties of the plates, the contact angle values of the samples against water were determined using the Goniometer (Rame-hart).

Long-term water absorption properties of the plates were analyzed according to BS EN 12087 [8].

3. RESULTS AND DISCUSSION

3.1. Apparent density and thermal conductivity

The apparent density of materials is one of the most important factors affecting the thermal properties [9]. For this reason, the apparent densities of the developed plates were analysed. The apparent density of the plates without SiO_2 aerogel was 1.326 ± 0.034 g/cm^3, while the density of the plates containing SiO_2 aerogel was determined as 0.856 ± 0.03 g/cm^3. This decrease in apparent density is due to the high porosity (90-95%) of the SiO_2 aerogel substituted into the composition. In the literature, it has been reported that although the SiO_2 aerogel has a high true density (~2200 kg/m^3), it exhibits low apparent density (~3 kg/m^3) due to the high porosity of the structure [4]. The thermal conductivity coefficient of the plates without SiO_2 aerogel was measured as 0.255 W/m.K, while the thermal conductivity coefficient of the plates with SiO_2 aerogel replacement was 0.112 W/m.K at 25°C. This decrease in the thermal conductivity coefficient is due to the SiO_2 aerogel substituted in the plate composition.

3.2. Hydrophobicity and long-term water absorption

Contact angle analysis was used to determine the degree of hydrophobicity of the developed plates. The contact angle values and the images of the water drop on the surface of the plates are shown in Figure 1. It was measured that the contact angle value of the plates without SiO_2 aerogel was 94 ± 6.8° (see Figure 1-A). On the other hand, the use of SiO_2 aerogel in the plate enabled the plates to gain superhydrophobic properties (153 ± 2.5°).

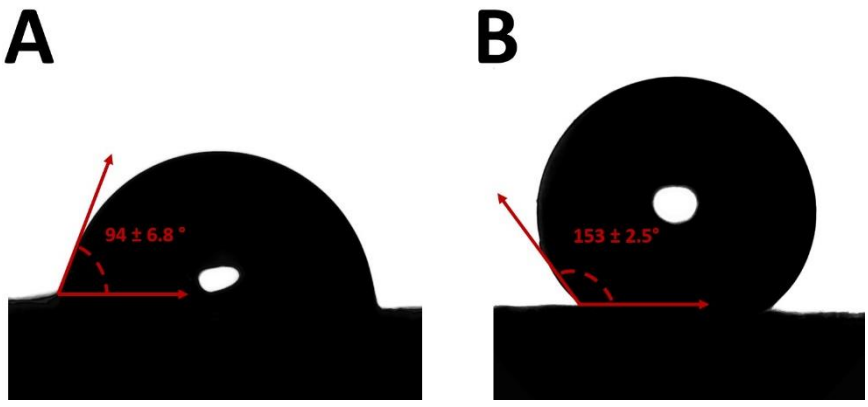


Figure 1. Surface contact angle of plates, A) without SiO_2 aerogel replacement and B) with SiO_2 aerogel replacement.

The penetration of rain, snow water or moisture in the air into the materials causes an increment in the thermal conductivity coefficient of materials. For this reason, it is an important parameter that thermal insulation materials have water-resistance property. Long-term water absorption property of the plates are exhibited in Figure 2. It is clearly seen in the graph that the water

absorption rate of the plates without SiO_2 aerogel was measured as 20.4 ± 1.8 v.% on the 1st day and increased gradually to 40.9 ± 0.3 v.% on the 28th day. In the case of plates containing SiO_2 aerogel, the water absorption ratio was determined as 8.3 ± 0.52 v% in the 1st day and increased to 25.5 ± 0.12 v% in the 28th day. The decrease in the water absorption properties of the plates is due to the superhydrophobic feature of the aerogel-substituted structure.

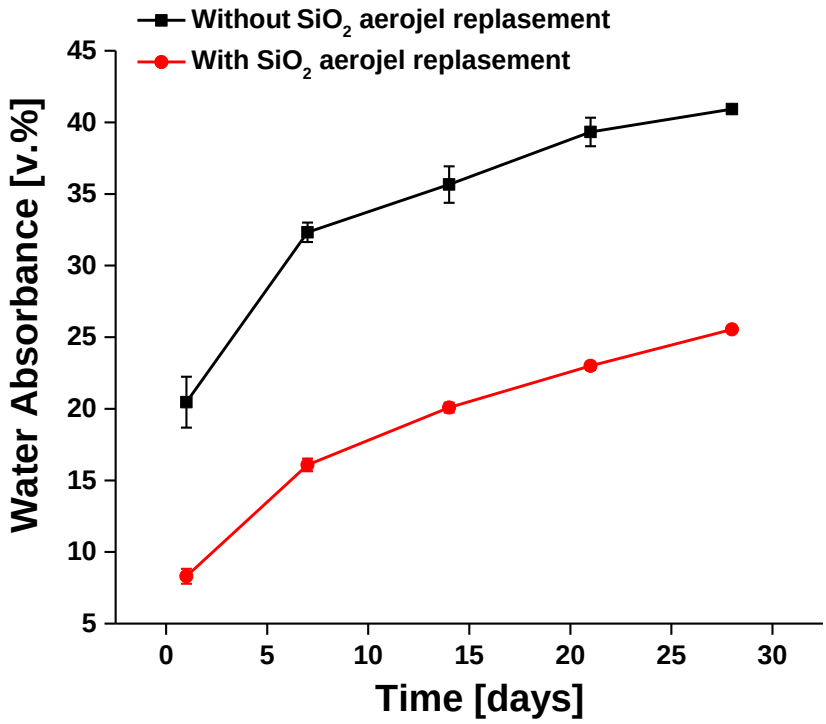


Figure 2. Long-term water absorption of plates.

4. CONCLUSION

In this study, the effect of SiO_2 aerogel on expanded vermiculite base plate was examined. It was found that the use of SiO_2 aerogel in the plates reduced the apparent density and thermal conduction coefficient of the materials. Also, it was observed that the use of the superhydrophobic SiO_2 aerogel in the structure increased the contact angle of the plates. Besides, it was revealed that with this increase in the contact angle, the water absorption of the plates in 28th days could be reduced.

ACKNOWLEDGEMENTS:

This research has received funding from the Scientific Research Projects Coordination Unit of Akdeniz University with the project code: FDK-2020-5230. The authors further acknowledge financial support by The Scientific and Technological Research Council of Türkiye (TÜBİTAK), within the programmes of 2211-C.

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KURAKLIK, ÇÖLLEŞME VE İÇ ANADOLU

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ÖZET
Bulunduğu coğrafik konumu ve jeolojik oluşumu nedeniyle ortaya çıkan olumsuz iklim ve toprak koşulları İç Anadolu Bölgesi'nin önemli bir kısmında doğal bitki örtüsünün bozkır olarak şekillenmesine neden olmuştur. Fakat doğal stebin dışında asıl olumsuzluklar insan kaynaklı olarak ortaya çıkmıştır. Tarih boyunca insanların çeşitli sebeplerle bitki örtüsünü tahrip etmesi sonucu Anadolu'nun ortasında yer alan doğal step alanları giderek genişlemiştir. Bir taraftan yoğun otlatma baskısı diğer taraftan marjinal sahaların tarıma açılması hem koruyucu yer örtüsünü tahrip etmiş hem de toprakta uzun yıllar birikmiş olan organik maddenin ayrışmasını hızlandırarak toprakları besin ve su içeriği bakımından elverişsiz hale getirmiştir. Özellikle 1950'lerden sonra mera alanlarının büyük bir kısmının tarıma açılması bu süreci hızlandırmış ve geniş düzlüklerde koruyucu bitki örtüsünü kaybeden üst-toprak şiddetli rüzgârlarla uzun mesafelere savrulmaktadır. Dolayısıyla İç Anadolu bölgesi Türkiye'nin kuraklık ve çölleşme tehdidi altındaki en hassas ekosistemlerini içermektedir. İç Anadolu'da giderek artan toz fırtınaları nedeniyle 1960'ların başında Karapınar'da kumul durdurma çalışmalarına başlanmıştır. Daha sonra Ağaçlandırma ve Erozyon Kontrol Genel Müdürlüğü'nün de kurulmasıyla Türkiye ormancıları son 70 yılda kumul tespit, toprak koruma ve erozyon kontrol amaçlı kurak bölge ağaçlandırmalarında önemli tecrübeler kazanmıştır. Bu çalışmanın amacı; İç Anadolu Bölgesindeki kuraklık ve çölleşmenin nedenleri ile bunlara karşı alınabilecek tedbirleri değerlendirmektir.

Anahtar kelimeler: İç Anadolu, Kuraklık, Tahrip, Çölleşme

ARIDITY, DESERTIFICATION AND CENTRAL ANATOLIA

ABSTRACT

The adverse climatic and soil conditions that have arisen due to its geographical location and geological formation have caused the natural vegetation to form as a steppe in a significant part of the Central Anatolia Region. However, apart from the natural steppe, the main disadvantages have emerged from human disturbance. As a result of anthropogenic vegetation disturbance throughout history, the natural steppe areas located in the middle of Anatolia have gradually expanded. Intensive grazing and converting marginal grasslands to agriculture use has both destroyed the protective ground cover and accelerated the decomposition of organic matter that has accumulated in the soil for many years, making the soils unfavorable in terms of nutrient and water content. Especially after the 1950s, the opening of a large part of the pasture areas to agriculture accelerated this process, and the topsoil, which lost its protective vegetation cover on the wide plains, has been blown long distances by strong winds. Therefore, the Central Anatolia region contains the most sensitive ecosystems of Turkey under the threat of drought and desertification. Due to increasing dust storms in the Central Anatolia, dune-stopping studies were started in Karapınar in the early 1960s. Later, with the establishment of the General Directorate of Afforestation and Erosion Control, Turkish foresters have gained significant experience in arid region afforestation for dune stabilization, soil protection and erosion control purposes in the last 70 years. The purpose of this study is to evaluate the causes of drought and desertification in the Central Anatolia Region and the measures that can be taken against them.

Keywords: Central Anatolia, Aridity, Disturbance, Desertification

1.GİRİŞ

Tarım ve orman arazilerinin uzun süreli yanlış kullanılmaları tarih boyunca birçok medeniyetin çökmesine de neden olmuştur. İlaveten iklim değişikliğinin giderek artan etkisiyle de çölleşme ve kuraklık bugün dünyada 4 milyar hektara yakın saha ve 100 ülkede yaklaşık 1.2 milyar insanı olumsuz olarak etkilemektedir (Thirgood, 1981; Lowdermilk, 2000; Lean, 2000; Lamers, 2006). Özellikle son elli yılda hızla artan gıda talebini karşılamak için sürdürülebilir olmayan yöntemlerle yapılan ve üst-toprağı tahrip eden faaliyetler sonucu tarım ve mera alanlarının yaklaşık yarısı uzun dönem verimliliklerini hızla yitirmektedir (Rickson, 1994; Brady ve Weil, 1999; Brown ve Wolf, 2002; Molles, 2010). Dolayısıyla birçok bölge gıda üreticisi konumundan gıda tüketicisi konumuna dönüşmektedir (Rickson 1994; Bilen, 2009; Çepel, 1997; Lean, 2000; Çepel ve ark., 2006; Molles, 2010).

Sahel çölünde 1968-74 yıllarında meydana gelen ve 20 bin kişinin ve milyonlarca hayvanın ölmesine neden olan kuraklık ve açlık olaylarından sonra 1977 yılında Nairobi'de BM tarafından çölleşme konferansı (UN Conference on Desertification) düzenlenmiş ve çölleşmeye karşı ilk uluslararası mücadele başlamıştır. Konferansta kuraklık ve çölleşmenin bütün dünyanın ekonomik, sosyal ve çevresel yapısını değiştirebilecek bir sorun olduğu vurgulanmış ve bu amaçla çölleşmeyle mücadele eylem planı hazırlanmıştır. Fakat 1977'deki eylem planı uygulamalardaki hatalar nedeniyle etkisiz kalmıştır.

Aslında Türkiye'de çölleşme ve erozyonla mücadele konusu Nairobi'de yapılan toplantıdan 40 yıl önce 1937 yılında çıkan 3116 sayılı Orman Kanunu'nun 79. Maddesinde yasal olarak yer almıştır. Türkiye'deki önlemler genellikle ağaçlandırma şeklinde gerçekleştirilmekte ve bu amaçla Tokat, Erzincan, Afyon, Adana, Ankara, Isparta ve Konya'da bu doğrultuda başarılı ağaçlandırma çalışmaları yapılmıştır (Anonim, 1975; 1976; 1986; 1987; 1996; 2003; 2004; 2005a; 2007; 2008; 2009; 2012a 2012b; Aşk, 1977).

Türkiye 1994 yılında Paris'te Çölleşmeyle Mücadele Sözleşmesini imzalamış ve 1998 yılında çıkarılan 4340 sayılı kanunla sözleşmeye resmen taraf olmuştur (Anonim, 2009). Sözleşmede Türkiye Kuzey Akdeniz Bölgesel Uygulama Eki'nde (EK-IV) çölleşmeden etkilenen ülkeler arasında yer almaktadır. Bu doğrultuda da 1999 yılında çölleşmeyle mücadele ulusal eylem planı hazırlamıştır. Eylem planında çölleşme ile mücadelenin (ÇM) ülke kalkınma planları içerisinde yer alması ve uygulayıcı kuruluşların programlarında ÇM çalışmalarına yer verilmesinin sağlanması öngörülmüştür (Anonim, 2005a; Anonim, 2006a). Çevre ve Orman Bakanlığı ile TÜBİTAK'ın birlikte çalışmasıyla 2005 yılında yapılan Bilim ve Teknoloji Yüksek Kurulu toplantısında belirlenen ilk 10 yıllık AR-GE yapılacak alanlar ve proje konuları

arasında da kurak alanlar ve çölleşmeyle ilgili konulara oldukça geniş yer verilmiştir (Anonim 2006b).

Dünya çölleşme haritasında Türkiye'nin önemli bölümü çölleşmeye hassas olarak görülmektedir (Ceylan ve ark., 2009). Aslında kuraklık Türkiye'nin kırsal hayatını ve ekonomisini tarih boyunca farklı dönemlerde çok şiddetli şekilde sarsmıştır. Resmi kayıtlara göre 1845, 1874, 1887, 1928, 1935, 1939, 1942 ve 1945 yıllarında yaşanan şiddetli soğuk ve kurak mevsimler mahsullerde en az % 30 kayıplara neden olmuş hatta bazen mahsulün yarıdan fazla düştüğü ve Türkiye'nin buğday ithal ettiği dönemler olmuştur. Bu tür iklim şartlarının etkisi coğrafik yapısı gereği en çok da Orta Anadolu'da yaşanmış ve yaşanmaktadır (Uyanık ve Sarı, 2011; Şekil 1).

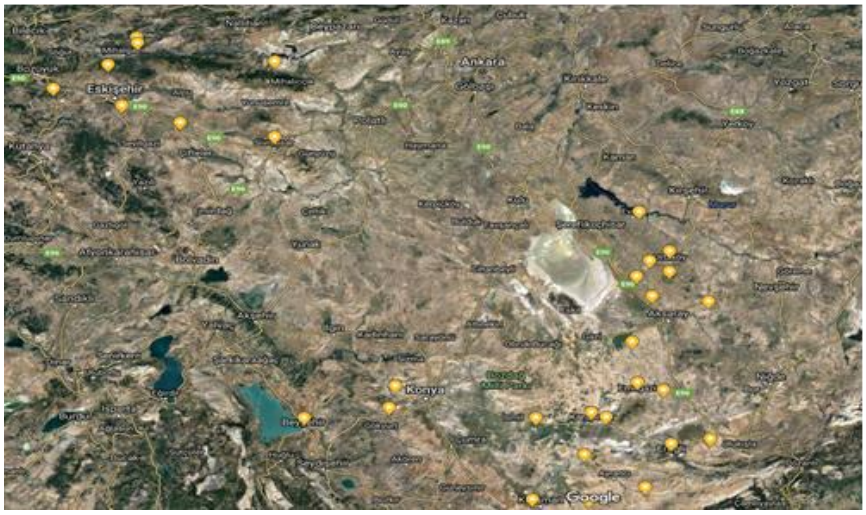


Şekil 1. Otlatma baskısı (Karapınar) ve kuraklık sonucu terk edilmiş bir yerleşim yeri (Aksaray-Ereğli civarı)

Dolayısıyla bu çalışmanın amacı; İç Anadolu Bölgesindeki kuraklık ve çölleşmenin nedenleri ile bunlara karşı alınabilecek tedbirleri değerlendirmektir.

2. MATERYAL VE YÖNTEM

Bu çalışmada İç Anadolu'nun kurak ve yarı-kurak sahalarındaki farklı arazilerde yaklaşık 15 yıldır sürdürülen ulusal ve uluslararası proje çalışmalarından elde edilen veriler değerlendirilerek öne çıkan sonuçlar özetlenmiştir. Çalışmalar ve sonuçları daha çok Tuzgölü havzasında Kuzeyde Acıpınar (Aksaray) ve Ekecek'ten güneyde Ereğli ve Ayrancı-Karaman ile batıda Sazgeçit (Konya) civarındaki yörenin en kurak sahalarını kapsamaktadır (Şekil 2)



Şekil 2. Erozyon ve çölleşme tehdidi altındaki Tuz Gölü havzası ve bölgedeki ağaçlandırma sahaları

3. BULGULAR VE TARTIŞMA

3.1.Konumu, İklimi ve Toprak Yapısı

Türkiye konumu itibariyle dünyadaki çöl biyomlarına enlem olarak yakındır. Ayrıca İç Anadolu bölgesi güneyden Toroslar ve kuzeyden kuzey Anadolu dağları ile çevrilidir. Bu nedenle bulutlar denize bakan yamaçlara nemini bıraktığından yağmur gölgesinde kalan iç Anadolu kısmındaki kuru hava buharlaşmayı ve dolayısıyla nem açığını daha da arttırmaktadır (Şekil 3).



Şekil 3. Torosların güneye bakan kısmına (Bolkar) 1500 mm civarında yağış düşerken hemen arkasında ve yağmur gölgesinde kalan Ereğli civarında yağış 300 mm civarına düşmekte ve bitki örtüsü kurakçıl bir hal almaktadır.

İç Anadolu kapalı havzası üçüncü jeolojik zamanın son bölümü olan pliyosende (5.32 myö-1.81 myö) göller tarafından kaplanmış ve bu çöküntülerde killi ve kireçli lakustrin malzeme milyonlarca yıl birikmiştir (Anonim, 1995; 2005b; Birkman, 1976). Miyosen ile pliyosen bölümlerde yoğun volkanizma olayları sonucu çıkan malzemeler de yer yer göl tabanındaki bu lakustrinlere karışmıştır. Gölün kuruması sonucu da toprak yapısı volkano-sedimenter

malzemeleri içeren ve geniş düzlüklerden oluşan Tuz Gölü ve Konya ovaları ortaya çıkmıştır (Birkman, 1976; Yildiz et al., 2015; 2017; 2018a; 2018b; 2019; Şekil 4).



Şekil 4. Tuz gölü havzasında sedimenteri toprak yapısı ve bitki örtüsünden yoksun erozyona açık geniş düzlükler

Kuzey Afrika ve Arap çöllerinden gelen karasal hava akımları özellikle yaz aylarında bölgede uzun süreli kuru ve sıcak iklim koşullarının oluşmasına neden olmaktadır. Geniş düzlüklerde etkin olan şiddetli rüzgârlar da buharlaşmayı ve dolayısıyla nem açığını daha da arttırmaktadır. Yağışın ve biyolojik aktivitenin azlığına ilaveten sahaların sürekli erozyon etkisinde kalmasından dolayı toprak sürekli olarak erken gelişme safhasında tutulmaktadır. Bu nedenle tekstür, renk, horizon oluşumu üzerinde yukarıda adı geçen ana materyalin etkisi baskın olarak görülmektedir. Kurak dönemlerde ufak taneli ve gevşek topraklar tamamıyla kuruyarak bir toz kitlesine dönüşmektedir (Yildiz et al., 2015; 2017; 2018a; 2018b; 2019). Bu kuru ve aynı zamanda gevşek olan materyal rüzgârlarla kolaylıkla harekete geçirilerek uzun mesafelere taşınmaktadır (Balcı, 1978; Birkman, 1976). Bu nedenle İç Anadolu bölgesinin yaklaşık yarısı erozyon etkisi altındadır (Anonim, 2010; Şekil 5).



Şekil 5. İç Anadolu'da bitki örtüsü tahrip edilen çıplak arazilerde toprak kolayca rüzgarlarla taşınabilmekte ve havada yoğun toz bulutları uzun dalga boylu ışınları yansıttığı için gökyüzü kızıl renkte görünmektedir.

3.2.Tahrip

Bitki yetişmesi açısından olumsuz iklim ve toprak koşulları bu sahalarda doğal bitki örtüsünün bozkır olarak şekillenmesine neden olmuştur. Fakat doğal stebin dışında asıl olumsuzluklar insan kaynaklı olarak ortaya çıkmıştır. Yaklaşık 4000 yıl öncesine kadar Anadolu'nun ortasında yer alan doğal step alanları daha dar bir bölgeyi kapsamakta iken insanların çeşitli sebeplerle bitki örtüsünü tahrip etmesi sonucu step sınırları giderek genişlemiştir. Çepel'in (1995) iddiasına göre M.Ö. 10 bin yıllarında Anadolu yarımadasında step oranı % 17 civarında iken bugün bu oran % 35'e çıkmıştır.

Kurak ve yarı-kurak İç Anadolu'nun sorunlu sahalarında uzun yıllar otlatma ve tarım gibi faaliyetler sonucu sahalardaki bu cılız bitki örtüsü de önemli ölçüde tahrip edilmiştir. Yaz kuraklığından dolayı bitki örtüsünün bozkır olduğu geniş İç Anadolu düzlüklerinde küçükbaş hayvancılığı tarih boyunca en önemli geçim kaynağı olmuştur. İstatistiklere göre Türkiye'de 1956 yılında 50 milyon koyun ve keçi (nüfusun yaklaşık iki katı) bulunmaktadır (Şekil 6).



Şekil 6. İç Anadolu'da bitki örtüsü yoğun otlatma baskısı altındadır

Koyun ve keçi gibi küçükbaş hayvanlar tarafından yapılan yoğun otlatma hassas bitkilerin toprak-üstü kısmını yemekle kalmamakta ayrıca toprağı çiğneyerek sıkıştırmakta ve havalanma ve kök gelişimini olumsuz etkilemektedir (Dyer ve ark., 1993). Bu tahrip sonucu bir taraftan toprağı tutan yer örtücü önemli oranda ortadan kalkarken geriye kalan bitki kompozisyonu da değişmektedir (Birand, 1961; Çetik, 1985; Atalay, 2002).

Yöredeki bir diğer tahrip unsuru da marjinal sahaların kontrolsüz bir şekilde tarıma açılmasıdır. Özellikle 1950'lerde traktör sayısının hızla artmasıyla rüzgarın sürekli estiği düz ya da hafif dalgalı steplerde doğal bitki örtüsünün tarıma açılması durumu daha da kötüleştirmiştir. Avcıoğlu (1979)'na göre Marshall yardımıyla sağlanan traktörler çiftçiye kredi ile dağıtılmış ve 1936 yılında 961, 1948 de 1750 olan traktör sayısı 1955 yılında 40 bin'i aşmıştır. Traktör ve

biçer-döver gibi makinelerin gelmesiyle 1930'larda 6.5 milyon hektar olan ekilebilen arazi miktarı 1950'de 14 milyon, 1956 da ise 22 milyon hektarı aşmıştır. Ekili alan miktarının artması beraberinde mera alanlarının azalmasını da getirmiştir. Aynı dönemde mera arazileri 46 milyon hektardan 1958 'de 38 milyon ve 1960'ta 29 milyon hektara düşmüştür (Avcıoğlu, 1979). Cılız otsularla kaplı marjinal alanların pullukla sürülmesi bir yandan koruyucu yer örtüsünü tahrip ederken toprak taneciklerini bağlayan organik maddenin de zamanla ayrışarak yok olmasına neden olmuştur. Böylece geniş düzlükler şiddetli rüzgâr erozyonuna açık hale getirilmiştir. Tıpkı Orta Amerika'da 1930'larda marjinal sahaların tarıma açılması sonucu yıllarca süren toz fırtınası felaketi gibi Türkiye'nin orta kısmında da şiddetli toz fırtınaları görülmeye başlanmıştır (Leopold, 1966). Tavşanoğlu (1976) 1958 yılında kurak ve çok rüzgârlı geçen ilkbahar aylarında Konya-Karapınar ilçesini toza ve kuma boğan can ve mal kaybına neden olan kum fırtınalarının olduğunu belirtmektedir.

Yöredeki olumsuz koşullara ilaveten tarımdaki gelişme ve yeraltı suyunu çekme tekniklerinin gelişmesiyle milyonlarca yıldır yeraltında biriken sular son yıllarda hızla tüketilmektedir. Dolayısıyla hem üst toprak çabuk kurumakta hem de ağaç türlerinin bile ulaşabileceği toprak derinliklerinde yaz aylarında yeteri kadar nem bulunmamaktadır (Yildiz ve ark., 2015; 2017; 2018a; 2018b; 2019). Bu da sorunu daha da derinleştirmektedir.

4. SONUÇ VE ÖNERİLER

Türkiye'de çölleşmeye karşı yapılan en etkin mücadele çıplak alanların ağaçlandırılmasıdır. Fakat Bu tür sorunlu sahalarda ağaçlandırma çalışmaları hem pahalı bir uygulamadır, hem de sahaların biyolojik bağımsızlığını kazanması uzun yıllar almaktadır. Ayrıca şimdiye kadar yapılan ağaçlandırma çalışmaları genel olarak deneme deseninden yoksun olup farklı tür ve orijinlerin farklı sahalarda farklı yıllarda dikimi şeklinde gerçekleşmiştir. Bu nedenle ortaya çıkan sonuçların tür, orijin ve kültürel tedbirlerin etkisi bakımından istatistiki olarak karşılaştırılması oldukça güçtür. Dolayısıyla tür, orijin ve kültürel tedbirlerin etkisini karşılaştıracak uygun deneme deseni içeren çalışmalar yapılarak pahalı uygulama projelerine bu pilot çalışmaların sonuçlarına göre karar verilmesi hem enerji hem de maliyet bakımından daha uygun olabilir.

Uzun süreler tel örgülerle çevrili (bazen yer yer başarısız) ağaçlandırma sahalarının köylünün kullanımına kapatılması da ayrıca sosyal bir baskı unsuru haline gelmektedir. Örneğin, Türkiye'de yaz mevsimlerinde hayvanlarını açık arazide otlatan köylüler için arazinin ağaçlandırma maksadıyla uzun yıllar kontrol altına alınması eskiden beri istenmeyen bir durum olduğundan bazı yörelerde ağaçlandırma girişimlerine itirazlar olmuştur (Irmak, 1963; Yildiz

ve ark., 2015; 2017; 2018a; 2018b; 2019; Şekil 7). Bu nedenle dikilen fidanların büyüme performansını arttırarak sahaların biran önce biyolojik bağımsızlığını kazandıracak çalışmalar yapılması gerekmektedir.

Yöredeki en önemli sorunlardan biri de ağaçlandırma sahalarının hayvan baskısından korunmasıdır. Yöre halkında ağaçlandırma yapılan sahalarda başarı elde edilirse otlatma alanlarının çoğunun ağaçlandırmaya tahsis edilerek meralarının daralacağına dair bir ön yargı bulunmaktadır. Bu nedenle yapılan çalışmalarda dikilen fidanların söküldüğü ve bazen de otlatıldığı durumlarla sık sık karşılaşılmıştır. Dolayısıyla yöre halkının ağaçlandırma, ağaç himayesinde mera kalitesinin arttırılması ve erozyon konusunda bilinçlendirilmesi gerekmektedir.



Şekil 7. Uzun yıllar otlatmaya kapatılan ağaçlandırma sahaları ağaçlandırmaya karşı sosyal baskıları arttırmaktadır.

Tarımdaki gelişmelere ve teknolojiye bağlı olarak son yıllarda çok sayıda kaçak kuyularla (80 bin civarı olduğu söylenmektedir) su çekilmesi havzadaki taban suyu seviyesinin düşmesine neden olmaktadır. Yazın hızla kuruyan üst toprakta bitkiler suyu bulamayınca daha derinlere giden kök yapısı oluşturmakta ve bu derinlik her yıl artmaktadır. Enerjisinin büyük bir kısmını kök bölgesine sevk eden bitkilerin toprak üstü kısmında büyüme daha düşük olmakta veya bu koşullara uyum sağlayamayan bitkiler zamanla ölmektedir (Yildiz ve ark., 2022). Dolayısıyla bir taraftan ovadaki su kullanımına yönelik kontrollerin arttırılması diğer yandan da farklı dikim teknikleri (çukur dikimi) ve uygulamalarla bitkilerin kurak yaz koşullarını daha az stres altında geçirmelerini sağlayacak model çalışmalara öncelik verilmesi gerekmektedir.

TEŞEKKÜR

Bu çalışma TÜBİTAK 120O688 nolu ve "İç Anadolu Kurak Sahalarında Dikim Çukuru, Hümik asit ve Jasmonik uygulamasının, Toros sediri (*Cedrus libani*), karaçam (*Pinus nigra*), kızılçam (*Pinus brutia*), badem (*Prunus amygdalus*) ve iğde (*Elaeagnus angustifolia*) fidanlarınn tutma ve büyüme başarısına etkisi" adlı proje tarafından desteklenmiştir

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AKDENİZ EKOSİSTEMLERİNDE YANGININ ETKİLERİ

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ÖZET
İklim değişikliğinin de etkisiyle Türkiye'nin Akdeniz kesiminde orman yangınları giderek artmaktadır. Sıklığı ve etkileri artan orman yangınlarına karşı ne gibi tedbirler alınması gerektiği ve yangından sonra ne gibi uygulamalarla ekosistemin arzu edilen hizmetlerinin tekrar sağlanabileceği konusunda bilgi eksikliği bulunmaktadır. Bu çalışmanın amacı yangının Akdeniz ormanlarındaki etkilerini ekosistem bazında ve sosyal açıdan değerlendirmektir. Çalışma için 2021 yılında yaklaşık 150 bin hektar alanın etkilendiği Muğla, Antalya ve Mersin bölgesindeki yanık sahalar ile 2022 yılında Mersin-Gülnar'da meydana gelen yanık sahalar incelenmiştir. Elde edilen sonuçlara göre yangınlar sadece ormanın bitki örtüsünü değil habitatların yok olması nedeniyle birçok canlıyı ve ormanla girift bir hal almış olan tarım alanları ve yerleşim yerlerini de tehdit eder hale gelmektedir. Yangının etkilerini azaltmak için yangın öncesi yapılması gerekler olduğu gibi, sahaların restore edilmesi için ekosistemlerin tahrip öncesi, tahrip sonrası durumlarının iyi analiz edilmesi ve nasıl bir ekosistem yapısının sahaya getirilmesi gerektiğinin iyi planlanması gerekmektedir.

Anahtar Kelimeler: Orman Yangınları, Akdeniz Bölgesi, Tahrip, Türkiye

EFFECTS OF FIRE ON MEDITERRANEAN ECOSYSTEMS

ABSTRACT
Forest fires are increasing in the Mediterranean part of Turkey due to the effect of climate change. There is a lack of information about what preventive measures should be taken against forest fires, the frequency and effects of which are increasing, and what practices can be used to restore the desired services of the ecosystem after the fire. The aim of this study is to evaluate the effects of fire in Mediterranean forests based on ecosystem and social aspects. For the study, burn sites in Muğla, Antalya and Mersin region, where approximately 150 thousand hectares of area were affected in 2021, and burn sites in Mersin-Gülnar in 2022 were examined. According to the results obtained, fires threaten not only the vegetation of the forest, but also wildlife due to the destruction of habitats, as well as agricultural areas and settlements that have become intricate with the forest. In order to reduce the effects of fire, it is necessary to analyze the pre-fire and post-fire conditions of ecosystems well in order to restore the sites and to plan well what kind of ecosystem structure should be brought to the site.

Key Words: Forest Fires, Mediterranean Region, Disturbance, Türkiye

1.GİRİŞ

İnsanların yangını bir araç olarak kullanmasının yanında iklim ve bitki örtüsünün de doğal yangınların meydana gelmesini tetikleyici bir ortam oluşturmasına bağlı olarak yangın Akdeniz havzasında ekosistem yapısını şekillendiren en önemli bileşendendir (Barbero ve ark., 1998; Blondel ve ark., 2010;). Fakat iklim değişikliği ve orman alanlarına olan baskıların giderek artmasıyla birlikte yangın bu ekosistemlerde daha çok bir tahrip unsuru haline gelmiştir Yıldız ve Dönmez, 2021). Yangının Akdeniz ekosistemlerindeki tahribinin şiddeti ve alanı her geçen gün artmaktadır. Örneğin Türkiye'nin Akdeniz kesiminde 2021 yılında kızılçam ormanlarının yaklaşık % 2 'si yanmıştır. Akdeniz ekosisteminin en önemli tahrip unsuru olan yangına karşı alınacak önlemler ile yangın görmüş ekosistemlerin restorasyonu için bu ekosistemlerin iyi analiz edilmesi ve uygulamacılara ve politikacılara yön verecek güvenli ve sürekli verilerin üretilmesi gerekmektedir. Dolayısıyla bu çalışmanın amacı 2021 ve 2022 yıllarında Akdeniz bölgesinde meydana gelen ve yaklaşık 200 bin ha sahada etkili olan orman yangınlarının analiz edilmesi ve uygulamacılara önerilerde bulunulmasıdır.

2.MATERYAL VE YÖNTEM

Çalışma için 2021 yılı Ağustos ayında Muğla, Antalya ve Mersin yöresinde meydana gelen yangın sahaları ile 2022 yılı ağustos ayında Mersin Gülnar yöresinde meydana gelen yangın sahalarında incelemeler yapılmıştır. Yangınlar genel olarak maki alanları ile kızılçam ormanlarını etkilemesine rağmen Antalya yöresindeki yangınlar yaklaşık 1500 metrelere kadar çıkarak göknar sahalarını da kısmen etkilemiştir. Mersin yöresindeki yangınlar ise denize kadar inmiştir.



Şekil 1. Antalya yöresinde yangınlar 1500 metrenin üzerindeki sedir ve göknar ormanlarına kadar çıkmış, Mersin-Aydıncık'ta denize kadar inmiştir.

3.BULGULAR VE TARTIŞMA

3.1.Yangın ve Orman Ekosistemine Etkileri

Yangının ekosisteme etkisi yangının yoğunluğuna ve şiddetine bağlıdır. Birim zamanda veya alanda çıkan enerji miktarı yoğunluk olarak yangının fiziksel yanını ifade ederken, neyi ne kadar tahrip ettiği ise yangının şiddeti diye ifade edilmekte olup yangının ekolojik yanına işaret etmektedir (Fisher ve Binkley, 2000). Yangının yoğunluğu ve şiddeti de yanıcı madde miktarına, nem içeriğine, yanıcı maddenin mekânsal dağılımına ve iklim koşullarına bağlı olarak değişiklik göstermektedir (Agee, 1993; DeBano ve ark., 1998; Binkley, 2021; Yıldız ve Dönmez, 2021). Bu değişkenler zamansal ve mekânsal farklılıklar gösterdiğinden yangının büyük alanlardaki genel tanımı sahalardaki durumu tam olarak yansıtmamakta ve daha düşük çözünürlükteki kaba resmini ifade etmektedir. Akdeniz bölgesinde meydana gelen yangınlar rüzgarın şiddeti ve yön değiştirmesine, meşcere tipine ve topoğrafyaya göre farklılıklar göstermiş ve alan bazında çok farklı yanık saha mozaikleri ortaya çıkmıştır (Şekil 2).



Şekil 2. Yangın her zaman sahadaki bütün bitkileri aynı oranda tahrip etmemektedir.

Dolayısıyla yangınlar genel olarak yoğun, düşük yoğunlukta ve şiddetli veya düşük şiddette yer-, örtü- ve tepe yangını diye tanımlansa da sahaların çoğu bu uç noktalar arasında kalmaktadır. Genç meşcerelerde yangınla tüketilen daha çok ağaç kısmı iken yaşlı meşcerelerde yerle temas kesildiğinden örtü yangınıyla ölü-örtü ve çalı türlerinin yanma olasılığı daha fazladır. Söylem kolaylığı açısından tipi ve alanı ifade eden yangından etkilenme derecesinin sınıflandırılması düşük çözünürlükte olduğundan peyzajdaki birçok lekeler kaçırılmakta ve

genel bir reçete yazıldığından yangın sonrası sistem genel olarak yeknesak bir bitki örtüsüne dönüştürülüp işlevi sadeleştirilmektedir (Yıldız ve Dönmez, 2021).

Ormancılık anlayışımıza bağlı olarak sistemin doğal bir parçası olan yangınların sıklığı ve şiddeti insan etkisi ile değişikliğe uğratılmıştır. Buna bağlı olarak yangının sıklığı ve ekolojik etkileri de önemli oranda değiştirilmiştir. Doğal rejiminde yangın sıklığına uyum sağlamış ormanlarda yanıcı madde birikimi az ve ormanların gençleşen alanları daha küçüktür. Bu da yangının daha düşük yoğunlukta geçmesine ve daha az tepe yangını olmasına olanak sağlayabilir. Fakat uzun süre yangının bastırılması, yanıcı madde birikimine neden olmakta ve çok daha yoğun yer ve örtü yangınına neden olabilmektedir. Ayrıca gençleştirme veya ağaçlandırma adı altında çok geniş alanlara tohum atılması ile sahalara yoğun bir gençlik getirilmektedir. Bu tür uygulama genç meşcerelerde örtü yangınının yere yakın alt dallar sayesinde (ladder) kolayca tepe yangınına dönüşmesine neden olabilir (Şekil 3).



Şekil 3. Alt dalları yere yakın genç meşcereler alt dalları kuruyarak zeminle teması kesilen yaşlı meşcerelere göre örtü yangının tepe yangınına dönüşmesine daha yatkındır

3.2.Yanmış Alanlarda Ormancılık Uygulamaları, Biyoçeşitlilik ve Saha Verimliliği

Genelde yangın sonrası yapılan çalışmalarla çok geniş alanlar aynı yaşlı saf kızılçam meşcerelerine dönüştürülmektedir. Bu kadar büyük alanda saf kızılçam meşcerelerinin kurulması gelecek yıllar için yangına hassas geniş mozaikler yaratacağından çok daha şiddetli yangınlar için ortam oluşturulmaktadır. Ayrıca geniş alanların saf kızılçama dönüştürülmesi saha verimliliğinin de azalmasına neden olmaktadır. Organik maddenin önemli oranda yandığı

durumlarda bitki besin elementlerinde önemli kayıplar olmaktadır. Kaybolan besinin toprağa tekrar kazandırılması çok uzun yıllar almaktadır.

Örtü yangınlarında yangın mineral toprağı açığa çıkararak kızılçamın gençleşmesi için iyi bir tohum yatağı oluşturabilir. Ayrıca ölü örtünün yanması sonucu toprak yüzeyinde mineral besin miktarının aniden artması sonucu çok geniş alanlarda yoğun bir kızılçam gençliği oluşabilir. Yapılan gözlemlerde örtü yangını geçirmiş ve tohum takviyesi yapılmayan çoğu sahalarda bile metrekarede 3-4 fidan olduğu görülmüştür (Şekil 4). Ormancılıkta genel olarak sahada çok sayıda fidan olması gençleştirme başarısının yüksek olduğu şeklinde yorumlanmaktadır. Fakat sahada fazla fidan bulunması hem türü-içi rekabet için olumsuz koşul oluşturabilir hem de bu tür sahaların veriminin birkaç yıl sonra azalmasıyla gençliğin büyümesinde hızlı bir düşüş gözlemlenebilir (stagnation).



Şekil 4. 2021 yangınında tohum takviyesi yapılmayan sahalar metre karede 3-4 fidanın geldiği gözlemlenmiştir.

Bu kadar geniş alanda bu kadar sık kızılçam fidanın bulunduğu sahalara ışık isteği yüksek olan azot bağlayan otsu türlerin gelmesi imkânsız hale gelebilir. Bu nedenle restorasyon çalışmasında sahaların çam fidanlarıyla sık bir şekilde kaplanmasına değil azot bağlayan türlerin de yaşamasına olanak sağlayacak seyreklikte sahaya tohum atılması veya hiç tohumlanmaması daha uygun olabilir (Şekil 5). Tahrip sonucu sistemin besin kapitalinin yenilenmesini sağlayan otsu türlerin sahaya gelme fırsatı engellenirse saha verimliliği uzun vadede düşebilir. Bu tür durumlarda sık kızılçam gençliği varsa da ilk yıllarda gençliğin seyreltilmesi gerekmektedir. Ayrıca yangın öncesinde kızılçam bulunan sahaların dışındaki birçok otsu ve çalı türünü barındıran sahaların da tohumlama ile kızılçam sahalarına dönüştürülmesi biyoçeşitlilik ve yaban hayatı açısından sakıncalıdır. Sadece oduna odaklı

ormancılık anlayışı yerine ekosistemin diğer hizmetlerinin de göz önünde bulundurulması gerekmektedir. Örneğin, yöredeki halkın en önemli kaynaklarından biri keçi ve arıcılıktır. Yangın sonrası geçimini keçicilikle sağlayan göçerlerin ve arıcıların kışlak bulmakta zorladığı gözlemlenmiştir. Bu nedenle yanan alanların tümünün odun üretimi açısından düşünülmemesi ve keçi ve arılar için daha önemli habitatalar oluşturan otsu ve çalı türlerinin de sahaya gelecek şekilde planlanması ekolojik, ekonomik ve sosyal açıdan daha uygun olabilir.



Şekil 5. Yangın sonrası ışık isteği fazla olan türlerin saha verimliliği ve biyolojik çeşitliliğe önemli katkıları olabilir

Ayrıca tarihsel olarak yanan sahalarda farklı büyüklükte ve farklı çağlarda orman varken şimdi çok geniş alanlarda aynı yaşlı orman oluşturulacak bu da ileride yangın çıkma olasılığını ve yangının şiddetini daha da arttıracaktır. Bu nedenle gençleştirmeyi de daha uzun vadeye yaymak faydalı olabilir. Bazı mozaiklerde sahanın belirli bir süre başka türlerle kaplanması 5-10 yıl sonra verimli ormana dönüştürülmesi hem güvenlik hem de biyolojik çeşitlilik açısından daha etkili olabilir. Çalılıklar kolayca yanması ve göreceli olarak daha kolay kontrol edilebilecek yangını yakınındaki ağaçların tepe çatısına aktararak kontrolü daha zor tepe yangınına dönüştürmesi açısından sorun alarak görülebilir. Fakat bu türlerin kendilerini yenilemeleri ve bazı türlerin çimlenip büyümesi için zemine ışık gelmesi gerektiğinden çalılıkların da belirli sıklıkta yangın geçirmeleri gerekmektedir. Dolayısıyla saf kızılçam ormanlarının çalılıklardaki yangınlardan korunması için ekotonlar üzerinde yangın rejimini değiştirecek önlemler alınabilir.

Yangın sonrası vejetasyonun şekillenmesi sistemin iç dinamiklerine bağlıdır. Sık tekrarlanan yangınların bitki örtüsünün şekillenmesi ve süksesyonel aşamaların geçişine etkileri önemli

olmaktadır. Genel olarak yangın öncesi sahada var olan türler vejetasyonun tekrar şekillenmesinde daha etkili olurken çok az öncü türler sahaya gelmektedir. Çoğu sahalarda aktif restorasyon için yükselti ve nem bitki seçimini sınırlandırmaktadır. Dolayısıyla bölge için en iyi seçim zaten doğal olarak var olan türlerdir. Fakat yangın öncesinde sahada bulunan türleri (örneğin kızılçamı) yangın sonrasında çıplaklaşan sahalara hemen getirmek süksesyonel açıdan her zaman doğru bir tercih olmayabilir. Çünkü orman ekosistemleri dinamik bir yapıya sahip olup sürekli değiştiğinden yangın öncesinin süksesyonel aşaması ile yangından hemen sonraki sistemin süksesyonel aşamaları oldukça farklıdır. Yangın gibi geniş alanlarda etkili olan tahripler sistemde kaynak gradiantları oluşturabilir. Sahanın ışık, su ve besin gradiantına göre türlerin özelliklerinde değişiklikler görülebilir. Dolayısıyla yangın sonrası oluşan yetişme ortamı koşulları bitki toplumlarının yapısını ve işlevlerini şekillendirmektedir. Yetişme ortamı koşullarına göre değişen fonksiyonlarını tahmin etmemize yarayan bitki özellikleri (traits) ekosistem restorasyonunda en önemli yol göstericiler olmalıdır.

Özellikle çok geniş alanlar yandıktan sonra bu sahalar tekrar kendi kendini yenileyemeyebilir. Bitkilerin sahaya tekrar gelmesinde yangın sonrası sahada kalan ve tekrar sahanın kaplanmasını sağlayacak kök ve tohum miktarı belirleyici olacaktır. Çok şiddetli olan ve geniş alanları kaplayan yangın sonucunda sahaları tekrar kolonize edecek tohum ve kök sistemi yetersiz kalabilir. Ağaçlandırma ile sadece belirli türler sahaya ekilip dikilmektedir. Bu ekosistemlerdeki çoğu türün tohum veya fidanı fidanlıklarda bulunmamaktadır. Tohumu ve fidanı bulunmayan türlerden de sahaya takviye yapıp sistemin tür bileşiminin zenginleştirilmesi gerekmektedir. Bu nedenle yanmamış sahalardaki farklı türlerden sonbaharda tohum toplanması ve belirli aralıklarla yanan sahalara serpilmesi gerekmektedir. Daha önce yanan küçük alanların hızla bitki türleriyle kaplanmış olması bizi yanıltmamalıdır. Sahaların tekrar bitki örtüsüyle kaplanması öncü türlerin tohumlarının uçma mesafesi ve bazı maki türlerinin köklerinin yanma derecesiyle ilgilidir. Bu nedenle saha kendiliğinden toparlar söylemi her zaman geçerli değildir. Aktif restorasyon stratejileri ile sisteme müdahale gerekebilir.

Sistemde yıllardır biriken besin elementleri yangın sonrası kül içinde savrulmakta veya erozyonla yamaçlardan kaybolduğundan toprak fakirleşmektedir (Şekil 6). Dolayısıyla saha bazında tür seçimi yapılması gerekmektedir.



Şekil 6. Yangın sonucu ölü örtünün küle dönüşmesi ve ölü-örtünün ve tohumların çıplak kalan yamaçlarda erozyona uğraması

Uzun yıllardır biriken besin elementleri yangın sonucu aniden toprağa salındığından su kaynaklarına yoğun besin elementi karışımı olabilir. Dolayısıyla yangın geçirmiş havzalarda suların sürekli analiz edilmesi ve insan ve hayvanlar için içilebilir seviyeye getirilecek tedbirlerin alınması gerekmektedir. Özellikle bu yörelerde keçi ağırlıklı küçükbaş hayvanlarının hamilelik dönemi su kaynaklarının önemli oranda kirlendiği sonbahar aylarına denk gelmektedir. İçme suyunda nitrat miktarı artarsa oksijen yerine alternatif elektron alıcısı olarak kullanılmakta ve düşüklere sebep olmaktadır.

3.3.Yangın Sahalarında Erozyon Riski

Yanan alanların hızlı bir şekilde yeniden ağaçlandırılması amacıyla tıraşlama kesimi yapmak sakıncalı olabilir. Yangın sırasında toprak gözenekleri kül ile tıkandığından yağışın önemli bir kısmı toprağa giremeyip yüzeysel akışa geçebilir. Yangın sırasında ayrışan organik maddeden dolayı toprak gözeneklerinde su-itici bir yapı oluşacağından yine yağmur suyunun toprağa girişi kısıtlanarak yüzeysel akış artabilir. Toprak yüzeyindeki ölü-örtü ile ot ve çalıların yanmasından ötürü mineral toprak yüzeyi çıplak kalmaktadır. Ayrıca daha önce tepe çatısı tarafından tutulup buharlaşan (intersepsiyon) su da yangın sonrası doğrudan toprağa inmektedir. Bu nedenle sonbaharda sahada yağışın şiddetini kesecek sadece ağaçlar kalmaktadır. Çoğu ağaçların ibreleri zarar görmüş olsa bile kalan kısımları hala yağmur şiddetini kırmada oldukça etkili olabilir. Kuruyup dökülen ibreler bile ölü-örtü olarak yağışın şiddetini kesmede etkili olmaktadır (Şekil 7).



Şekil 7. Yangın sırasında sıcaktan kavrulan ibreler dökülerek alttaki kül tabakasını erozyona karşı korucu bir etki oluşturabilir

Bu ağaçlar yangını takip eden ilk yağışlı dönemden önce ve topraktaki hidrofobik yapı değişmeden kesilirse yağmur şiddetli bir şekilde yere inerek ve toprak yüzeyini sıvayıp yüzeysel akışa geçebilir. Ayrıca kesim sırasında toprak yüzeyi sıkışmaya maruz kalacağından infiltrasyon düşerek erozyon riski artabilir (Şekil 8). Odunun böceklenmeden ve değeri düşmeden sahadan çıkarılmasına yönelik bir politika izlenmektedir. Eğer bu kadar alanda tıraşlama kesimi yapılırsa sonbaharda ciddi erozyon tehlikesi ve erozyona bağlı zengin besin elementi içeren sediment yüklü su kaynakları sorunu ile karşı karşıya kalınabilir. Bu nedenle ilk yağışlı dönemlerden önce kesimi oldukça sınırlı tutmak gerekmektedir. İlk yağışlı dönemden sonra toprağı tutacak ve yağmurun şiddetini kıracak yer örtücü bitkilerin en azından bir kısmı sahaya gelene kadar kesimleri sadece düşük meyilli arazilerde sınırlandırmak gerekebilir.



Şekil 8. Yangın sonrası sahadan boşaltma kesimleri sırasında yamaç arazilerde erozyon riski artabilir

Şiddetli rüzgârlar yangının hızla yayılmasına fakat şiddetinin düşük olmasına neden olabilir. Bu durumda yangının önemli bir kısmı örtü yangını şeklinde gerçekleşmekte yangın yerdeki ölü-örtü ve diri örtüyü yok ederken ağaçların sadece alttaki kuru dallarını hızla yalayarak geçip oluşan yüksek sıcaklıkla ibreler kurumaktadır. Bu tür sahalarda ağaçların kambiyum dokusu zarar görmemiş ve dallarda tekrar patlayacak tomurcuklar bulunuyorsa gelecek vejetasyon döneminde bazı ağaçlar tekrar yeşerebilir (Şekil 9). Geniş alanlarda kesimler gelecek vejetasyon dönemine kadar 5-6 ay sürdüğünden tekrar yeşerme olasılığı olan bireylere fırsat verecek şekilde kesimlerin tepe çatısı tamamen yanmış genç bireylerden başlaması daha uygun olabilir.



Şekil 9. Yangın sırasında oluşan sıcaklıkla ibreler kurusa da kambiyum zarar görmemiş ve tomurcuklar tamamen ölmemişse ağaçların bir kısmı tekrar yeşerebilir.

Yanan sahalar içerisinde birçok alan düşük yoğunlukta ve şiddette yangına maruz kalabilir. Bu alanlarda yeşil kalan ağaçlar hem geçmiş meşcereden genetik malzeme taşımakta hem de yamaç boyunca erozyonu önlemeye yardımcı olmaktadır. Ayrıca düşük şiddette yanan lekeler sahaların tekrar bitkiler ve mikroorganizmalar tarafından kolonize edilmesi için kaynak oluşturmaktadır. Yangın sonrası tam alanda kesim yapmak bu kaynakların tahrip olmasına neden olacağından yanmamış küçük alanların veya bireylerin korunması önemlidir.

Yangın sonrası sahadaki odunu çıkarmak için çok yoğun orman yolları yapılmaktadır. Bu yolların bir kısmı daimi yol bir kısmı sürütme yollarıdır (Şekil 10). Bu yolların yapımı sırasında yamaç arazisi bozulduğundan kısmen toprak kayması ve erozyona neden olabilmektedir. Diğer yandan çıplak kalmış uzun bir yamaçta eğimin sürekliliğinin yol ağlarıyla kesilmesi erozyonu kısmen de olsa yavaşlatabilir. Yapılan gözlemlerde yamaçtan gelen çoğu malzemenin sürütme yollarına yığıldığı ve buralarda gençliklerin geldiği tespit edilmiştir (Şekil 10). Ancak yapılan yollar bu amaçla tesis edilmediği ve yine yolun kendisinin de yol güzergâhı boyunca farklı bir eğim oluşturduğundan yolların erozyonu önleme işlevi sınırlı kalmaktadır. Bu nedenle yamaç

arazilerde erozyonu önleyecek ve yamaçtan gelen besin içeriği yüksek malzemeleri biriktirip iyi bir tohum yatağına dönüşecek terasların yağışlardan önce tesis edilmesi başarı şansını arttırabilir.



Şekil 10. Yangın sahalarında sürütme ve daimi yollar ile yamaç boyunca yeşil kalan orman lekeleri erozyonu önlemede etkili olabilir

4. SONUÇ VE ÖNERİLER

Yangın politikamız sadece yangın sonrası tepki niteliğinde değil önleyici unsurlarda içermelidir. Bu bakımdan ormanların yangın sonrası toparlanma kapasitesi dışında yangına karşı dirençli hale getirilmesi gerekmektedir. Bunun için yanıcı maddenin azaltılması yoluna gidilmelidir. Özellikle çok sık olan gençlik sahalarında bakım yapıp hem ağaçların daha hızlı büyüyerek yer örtücülerle temasının bir an önce kesilmesi hem de ölü örtü miktarının azaltılması sağlanabilir. Ayrıca aralama meşcerenin yaprak yüzey alanını düşürerek su kullanımını azaltacaktır. Özellikle yol kenarlarında kontrollü yangınlarla 150-200 metrelik kısımda ölü-örtü ve diri örtü temizlenmelidir. Yangın emniyet şeritleri ve havai hatların altında yeteri kadar temizlik yapılmamaktadır. Bu alanlar her yıl kontrollü yangınlarla temiz tutulmalıdır. Sahil kenarlarında yerleşim yerleri makiliklerle iç içedir. Bu yangın da göstermiştir ki yerleşim yerlerinin yöneticilerinin şehri yangından koruma kapasiteleri bulunmamaktadır. Bu nedenle yerleşim yerlerinin ormanla olan sınırında 30-40 metrelik yangın koruma şeritleri oluşturulup buraların her yıl kontrollü yangınlarla temiz hale getirilmesi gerekmektedir.

Ayrıca doğaya bakış felsefemizi de değiştirerek orman ekosistemlerini odun üretimi hizmetine mıhladığımız gibi doğal kaynaklarımızı nitelikleri üzerinden değil metalaştırarak nicelikleri üzerinden değerlendirme alışkanlığımızdan vazgeçmemiz gerekmektedir.

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TÜRKİYE'DE TARIM VE ENERJİ TÜKETİMİNİN AGRO-EKOLOJİK EKONOMİK KRİTERLER İLE DEĞERLENDİRİLMESİ

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ÖZET
Türkiye'nin Birleşmiş Milletler (BM) Genel Kurulunda Paris Anlaşması'na taraf olacağını açıklamasının ardından anlaşma, 6 Ekim'de TBMM'de onaylandı. Anlaşmanın onaylanmasına ilişkin karar 7 Ekim'de Resmi Gazete'de yayımlanırken, Türkiye'nin Paris Anlaşması'na ilişkin onayı 11 Ekim'de BM Sekretaryası'na bildirildi. Türkiye'nin güncelleyeceği ulusal katkı beyanlarında 2053'te net sıfır emisyona ulaşma hedefine yönelik yol haritasının oluşturulması bekleniyor. Bu çalışma 2053 yılına gidilen yolda emisyon miktarları ve enerji paylarının projeksiyonlarından hareketle yorumlar yapmayı amaçlamıştır. TÜİK verilerinden hareketle zaman serileri (çizgisel, kuadratik, üssel ve S eğrileri) modellerine intibak ettirilerek gelecek senaryolara tahminlerde bulunulmuştur. 1970-2020 yılları arasındaki elektrik üretimi enerji payları olan 5 zaman serisi ve aynı yıllar arasındaki sektörlere göre enerji dağılımına 7 yıllık projeksiyonlarda bulunulmuştur. Elde edilen sonuçlar sektörlere göre emisyon miktarlarıyla karşılaştırılmıştır. 2050 yılında sıfır emisyon mottosu olan Paris İklim Antlaşması gereğince sonuçlar yorumlanmış ve önerilerde bulunulmuştur. Analiz sonuçlarına göre halihazırda yükselmekte olan emisyon miktarlarının yasal yükümlülükler getirilmediği takdirde artış içerisinde olacağı öngörülmüştür. Türkiye'nin enerji üretiminde yenilenebilir enerji kaynaklarından elde edilen enerjinin payı %16,8 (2020 yılı verisi) dır. Bu durum temiz ve sürdürülebilir enerji geleceğinin geçmiş yıllara göre daha iyi seviyede olduğunu göstermektedir. Tarımda kullanılan enerji miktarının %7 civarında olması düşük olarak nitelendirilse bile tarımın diğer sektörler ile olan ilişkisinden dolayı bu payın daha yüksek olduğu bilinmektedir. Sonuç ve öneriler kısmında bu olay kombine olarak düşünülmüş ve çevre üzerindeki antropojenik etkiler tartışılmıştır.

Anahtar Kelimeler: Agro-Ekolojik Ekonomik, Temiz Enerji, Sürdürülebilirlik.

EVALUATION OF AGRICULTURE AND ENERGY CONSUMPTION WITH AGRO-ECOLOGICAL ECONOMIC CRITERIA IN TURKEY

ABSTRACT

Turkey announced that would become a participent of the Paris Agreement at the United Nations (UN) General Assembly. Later that the agreement was approved by the Turkish Grand National Assembly on 6 October. While the decision regarding the ratification of the agreement was published in the Legal Gazette on 7 October, Turkey's approval of the Paris Agreement was reported to the UN Secretariat on 11 October. In the national contribution declarations that Turkey will update, it is expected that a roadmap will be created towards the target of achieving net zero emissions in 2053. This study aimed to make comments based on the projections of emission amounts and energy shares for electricity toward the road to 2053. Based on Turkish Statistical Institute data, time series (linear, quadratic, exponential growth and S curves) models were adapted to make projections for future scenarios. 7 years of energy distributions for sectors have been carried out in the 5 time series, which was the energy share for electricity production and enegy distributions for sectors from 1970 to 2020. The results were compared with the emission amounts according to the sectors. In accordance with the Paris Climate Agreement, which is the motto of zero emissions in 2050, the results were interpreted and suggestions were made. According to the analysis results, currently rising the emissions are expected to increase if legal obligations are not met from the goverment. The share of energy obtained from renewable energy's sources in Turkey's energy production is 16.8% (2020 data). This situation shows that the clean and sustainable energy's future is at a better level than in previous years. Even if the amount of energy used in agriculture is around 7%, it is known that this share is higher due to the relationship of agriculture with other sectors. In the conclusion and suggestions section, this event was considered as a combination and discussed antropogenic effects on the environment.

Keywords: Agro-Ecological Economic, Clean Energy, Sustainability.

1. GİRİŞ

Enerji insanoğlunun tarih boyunca artan bir ihtiyacı olmuştur. Enerji kaynaklarının kıt olması, yakın gelecekte bitecek olması ve çevresel kalitede yaşanan olumsuzluklardan dolayı ekonomiler, tüketicilere herhangi bir refah kaybı yaşatmadan üreticilere ise üretimin miktarında ve kalitesinde herhangi bir düşüş yaşatmadan enerji tüketim miktarının nasıl azaltılacağı ve nasıl tasarruf edilebileceği konusunu sürekli olarak gündemlerinde güncel tutmuşlardır. (Özbek ve Naimoğlu, 2021: 314). Sürdürülebilir kalkınma, "gelecek nesillerin ihtiyaçlarından ödün vermeden bugünün neslinin ihtiyaçlarını karşılamak" anlamına gelir. Bunun için doğal kaynakları rasyonel olarak kullanarak gelecek nesillere uygun ekolojik bir ortam sağlanmalıdır. Bu nedenle, sürdürülebilir kalkınma kavramı sürdürülebilir ekoloji ile uyumludur. Öte yandan, ekolojik ayak izi kavramı, insan ve doğa arasındaki ilişkiyi inceleyerek, doğal kaynaklar üzerindeki baskının büyüklüğünü ve bu baskıya neden olan faktörleri belirler. Ekolojik ayak izi arttıkça, doğal kaynakların tüketildiğini ve ekonomik faaliyetin sürdürülemeyeceğini gösterir (Kocakuşak 2020). Sürekli gelişen dünya da gelecekte yaşanacak bilimsel gelişmelerin yanı sıra ekolojik bozulmalar da anılmaya başlanacaktır. Özellikle çevre sorunları ile günümüzde de sonuçlarını görmeye başladığımız bu süreçte uluslararası gündemi meşgul eden konulardan birisi küresel ısınmaya bağlı olarak ortaya çıkan küresel iklim değişikliğidir (Güneş ve Karakaş, 2022). Özellikle sanayi ve teknolojinin gelişmesiyle artan fosil yakıt kullanımı ile son yıllarda üstünde durulan bir konu haline gelmiştir. Fosil yakıt kullanımı sonucu karbon salınımı ile gelinen noktada dünya sera gazı etkisi altındadır (Gümüş ve Buluş, 2020; Çelen, 2021). Bu durum beraberinde sadece Türkiye'nin değil Dünya'nın ilgilendiği küresel tedbirlerin alınmasını gerekli kılmaktadır. Alınacak tedbirler ve geliştirilecek politikalar konusunda ön plana çıkan konulardan birisi yeşil ekonomidir. Birleşmiş Milletler Çevre Programı (UN Environment Programme, UNEP) 2011 yılında yayınladığı raporda "İnsanlığın refahını ve sosyal eşitliği sağlayarak çevresel riskleri azaltmak ve ekolojik zenginlikleri önemli derecede geliştirmeye yönelik politikaları" yeşil ekonomi olarak tanımlamaktadır (Gürler ve ark., 2020). Yeşil ekonomi ile mevcut kaynakların etkin kullanımının yanı sıra kullanım sonrası ortaya çıkan atıkların özellikle ekolojik yapı üzerindeki negatif etkisi üzerinde durulmaktadır (Kuşat, 2013).

İklim değişikliğine karşı alınacak tedbirlere ilişkin sürecin başlangıcı Birleşmiş Milletler (BM) İklim Değişikliği Çerçeve Sözleşmesi ile başlamış Kyoto Protokolünün genişletilmesi ile günümüzde Paris İklim Anlaşması ile son halini almıştır (Kaya, 2020; ILO, 2022). Küresel iklim politikaları için atılan bu adımda küresel ısınmayı sanayi devrimi öncesine göre 2°C'nin oldukça altında tutan ve hatta 1.5°C ile sınırlamayı amaçlayan uzun vadeli bir hedef

belirlenmiştir (AB Türkiye Delegasyonu, 2022). Bu hedef insanlık ve diğer canlılar için geri dönülemez sonuçların doğmasını engellemek açısından önem teşkil etmektedir.

2016 yılında aralarında Türkiye'nin de bulunduğu 195 ülkenin onayıyla kabul edilen Parıs İklim Anlaşması iklim değişikliğine karşı küresel ölçekte verilen mücadelede dönüm noktası olmuştur. Anlaşma yapan ülkelerin belirleyeceği ulusal katkı beyanları ile belirlenen hedefe yönelik ilk adımların atılması, ilki 2023 yılında yapılması planlanan ve her beş yılda bir gerçekleştirilecek "küresel durum değerlendirme" zirveleri ile sürecin takip edilmesi planlanmaktadır. Türkiye'nin ise ulusal katkı beyanlarında 2053 yılı için net sıfır emisyona ulaşma noktasında yol haritası belirlemesi beklenmektedir (Dışişleri Bakanlığı, 2022). Bu hedef doğrultusunda Türkiye'nin net sıfır emisyon mottosuna ulaşma yolunda emisyon miktarları ve elektrik enerjisi üretim miktarlarına yönelik projeksiyonlarla çalışmada yorumlamalar yapılmıştır.

2. MATERYAL VE YÖNTEM

Bu çalışmada 1970-2020 yılları arasında elektrik enerji üretim payları ve 1990-2020 yıllarına ait sera gazı emisyon miktarlarına ait trend denklemleri aracılığıyla 11 zaman serisine 7 yıllık projeksiyon yapılmıştır. Ancak Türkiye 1985 yılı itibariyle doğal gazdan elektrik üretimine başlamıştır. Dolayısıyla analize dahil edilen elektrik üretimindeki doğal gazın payına ait zaman serisi 1985 yılından başlatılmıştır. Çalışmaya dahil edilen zaman serileri TÜİK verilerinden elde edilmiştir (TÜİK, 2022). Trend denklemleri oluşturulurken alternatif modeller denenmiştir. Veri setinin uygulandığı trend modelleri aşağıda verilmiştir.

Linear (Doğrusal) trend model	$Y_t = \beta_0 + \beta_1 t + e_t$
Exponential growth (Üssel) trend model	$Y_t = \beta_0 * \beta_1^t * e_t$
Quadratic (2. Derece) trend model	$Y_t = \beta_0 + \beta_1 t + \beta_2 t^2 + e_t$
S-Curve (S-Eğrisi) trend model	$Y_t = 10^a / (\beta_0 + \beta_1 \beta_2^t)$

Burada β_0 sabit terimi, β_j bir dönemden diğerine ortalama değişim, t zaman değeri ve e_t hata terimini göstermektedir.

Linear trend modeli doğrusal olduğu kabul edilen trendin gelecekte de devam edeceği varsayımı altında tahminde bulunur. Exponential (Üssel) büyüme eğilimi modeli, üstel büyümeyi veya bozulmayı açıklamaktadır. Quadratic (2. Derece) trend modeli, basit eğriliği açıklayabilen ikinci dereceden eğilim modelidir. S-Curve (S-Eğrisi) trend modelinde ise veriler, değişimin yönünün zamanla değiştiğini gösteren bir S şekline sahiptir.

Zaman serilerinin analizinde Minitab 21 paket programından yararlanılmıştır. Minitab, belirli zaman değerleri için tahmini hesaplamada trend denklemini kullanır. Tahmin kaynağından

önceki verileri trende uyması için kullanır. Seçilen modellerin uygunluğunun tespitinde MAPE (Ortalama mutlak yüzde hata), MAD (Ortalama mutlak sapma) ve MSD (Ortalama karesel sapma) kriterleri arasında en düşük çıkan değerler matematiksel model olarak tercih edilmiştir. Değerlerin hesaplanmasında aşağıdaki formüller kullanılmaktadır.

$$MAPE = \frac{\sum(y_t - \check{y}_t)/y_t}{n} * 10 \qquad (y_t \neq 0)$$

$$MAD = \frac{\sum_{t=1}^{n}|y_t - \check{y}_t|}{n}$$

$$MSD = \frac{\sum_{t=1}^{n}|y_t - \check{y}_t|^2}{n}$$

Burada y_t t zamandaki gerçek değerleri, $\check{y}_t$ uyarlanmış değeri ve n gözlem sayısını ifade etmektedir.

MAPE uyarlanmış zaman serisi değerlerinin doğruluğunu ölçer ve yüzde olarak ifade edilir. MAD değeri uyarlanmış zaman serisi değerlerinin doğruluğunu ölçer ve hata miktarını kavramsallaştırmaya yardımcı olan verilerle aynı birimlerde doğruluğu ifade eder. MSD ise modelden bağımsız olarak her zaman aynı payda, n kullanılarak hesaplanır. MSD, alışılmadık derecede büyük bir tahmin hatasının MAD'den daha hassas bir ölçüsüdür (Minitab, 2022). Üretilen denklemlerde en düşük MSD değerine sahip denklemler tahmin için kullanılmıştır.

3. ARAŞTIRMA BULGULARI

1990-2020 yılları arası Türkiye'nin sera gazı emisyonları 4 modele intibak ettirilmiş ve denklemler elde edilmiştir. Bu modellere ilişkin denklemler ve doğruluk ölçümleri tablo 1'de verilmiştir. MSD değeri en düşük kuadratik değerde bulunmuş ve grafiği şekil 1'de gösterilmiştir.

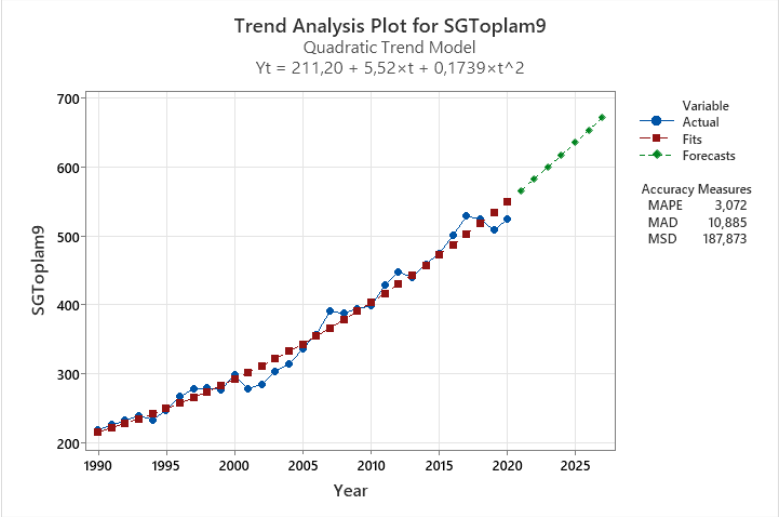
Tablo 1. Toplam sera gazı emisyonu için modellerin doğruluk ölçümleri

Toplam Sera Gazı Emisyonu	**Linear**	**Kuadratik**	**Büyüme Modeli**	**S-Eğrileri**
Trend Denklemleri	Yt = 180,59 + 11,084×t	Yt = 211,20 + 5,52×t + 0,1739×t^2	Yt = 208,166 × (1,03188^t)	Yt = (10^4) / (-70,6512 + 116,221×(0,990983^t))
MAPE	4,534	3,072	3,208	3,592
MAD	14,423	10,885	11,369	13,611
MSD	342,251	187,873	201,793	367,711

1990-2020 yılları arasında sürekli artış gösteren emisyon miktarlarının trend denklemlerinden hareketle 2027 yılında da artış eğiliminde olduğu öngörülmektedir. Yıllar itibariyle (2021-2027) öngörülen emisyon miktarları tablo 2'de verilmiştir.

Tablo 2. Toplam sera gazı emisyonu için tahminler (milyon ton CO_2 eşdeğeri)

Tahmin	2021	2022	2023	2024	2025	2026	2027
Toplam Sera Gazı Emisyonu	565,888	582,711	599,882	617,401	635,267	653,482	672,044



Şekil 1. Toplam seragazı emisyonu için tahmin grafiği

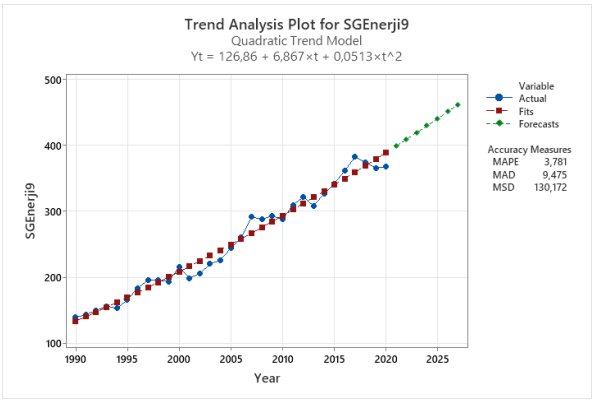
Şekil 1'de mavi olarak gösterilen gerçek değerler yıllar itibariyle artış göstermektedir. Ölçümü yapılan son yıl (2020) da 523,9 milyon ton CO_2 eşdeğeri hesaplanan emisyon miktarının 2027 yılında 672,0 milyon ton CO_2 eşdeğeri olması beklenmektedir.

Tablo 3. Sektörlerin seragazı emisyonları için modellerin doğruluk ölçümleri

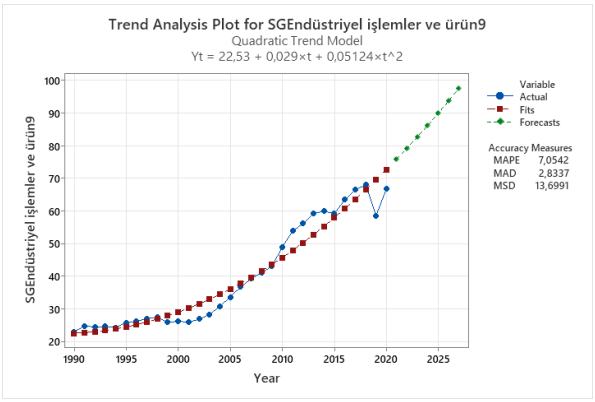
		Linear	Kuadratik	Büyüme Modeli	S-Eğrileri
Enerji	**Trend Denklemleri**	Yt = 117,83 + 8,509×t	Yt = 126,86 + 6,867×t + 0,0513×t^2	Yt = 138,452 × (1,03551^t)	Yt = (10^4) / (6,81945 + 66,5123×(0,959269^t))
	MAPE	4,281	3,781	4,037	3,725
	MAD	10,140	9,475	10,502	9,624
	MSD	143,616	130,172	192,705	153,171
Endüstriyel işlemler ve ürün	**Trend Denklemleri**	Yt = 13,51 + 1,669×t	Yt = 22,53 + 0,029×t + 0,05124×t^2	Yt = 19,2822 × (1,04210^t)	Yt = (10^3) / (65,6999 - 21,8716×(1,03096^t))
	MAPE	13,7616	7,0542	9,2982	10,417
	MAD	4,6478	2,8337	3,5421	5,286
	MSD	27,1024	13,6991	17,2462	101,908
Tarım	**Trend Denklemleri**	Yt = 37,45 + 0,698×t	Yt = 52,31 - 2,004×t + 0,08445×t^2	Yt = 38,9374 × (1,01303^t)	Hesaplanamayan model
	MAPE	11,2526	3,47823	10,6280	
	MAD	5,3615	1,60434	5,1599	
	MSD	40,4997	4,09780	37,7180	
Atık	**Trend Denklemleri**	Yt = 11,804 + 0,2080×t	Yt = 9,498 + 0,6273×t - 0,01310×t^2	Yt = 11,8559 × (1,01469^t)	Yt = (10^2) / (5,95275 + 7,82245×(0,781608^t))
	MAPE	5,99782	2,77073	6,47674	5,25301
	MAD	0,91296	0,40399	0,99640	0,72393
	MSD	1,08921	0,21279	1,33018	0,85389

Türkiye'de emisyon miktarlarının bileşeni olan (enerji, endüstriyel işlemler ve ürün, tarım ve atıklar) 31 yıllık 4 zaman serisine denenen trend denklemleri ve doğruluk ölçümleri tablo 3'de gösterilmiştir. 4 zaman serisi de MSD değeri en düşük olan kuadratik modelde denklemler oluşturulmuş ve öngörüler şekil 2'de toplu halde verilmiştir.

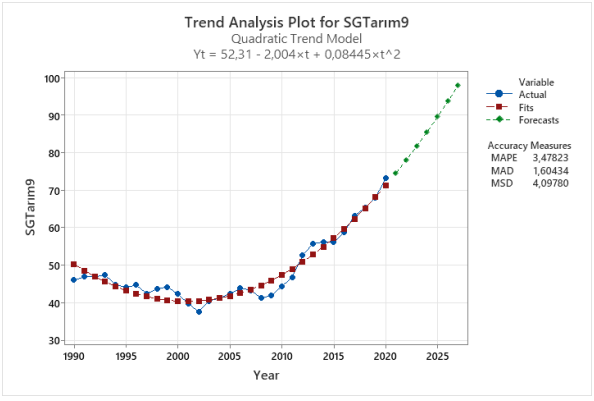
Enerji



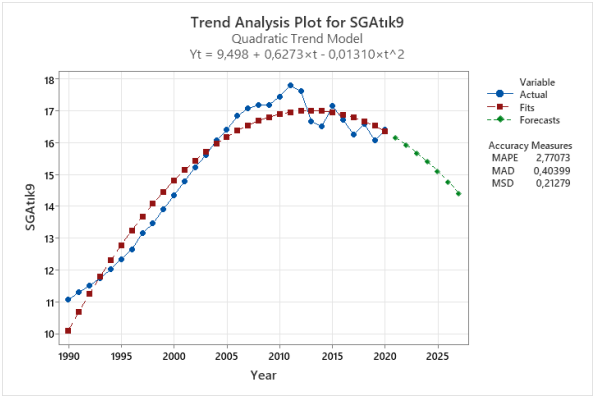
Endüstriyel işlemler ve ürün



Tarım



Atık



Şekil 2. Sektörlerin seragazı emisyonları için tahmin grafikleri

Şekil 2 incelendiğinde enerji, endüstriyel işlemler ve ürün, tarım emisyon miktarları artış eğilimindeyken, seragazı emisyonuna neden olan atıkların düşme eğiliminde olduğu öngörülmüştür. Grafikler ayrı ayrı incelendiğinde Şekil 1'i destekler nitelikte olduğu söylenebilir. Gelişmiş ve gelişmekte olan tüm ülkelerde olduğu gibi Türkiye'de de sera gazı emisyonunun en büyük payı enerji sektöründen kaynaklanan emisyon miktarlarıdır. Açıklanan son yıl için enerji sektörünün oluşturduğu sera gazı emisyonu %70'lik pay almaktadır. Şekil 2'de de görüldüğü üzere 2027 yılında da enerji sektöründen kaynaklanan emisyon miktarlarında artış öngörülmüştür. Endüstriyel işlemlerin en temel gereksinimi enerjidir. Enerji sektöründen kaynaklanan emisyon miktarlarının artış tahmini ile birlikte endüstriyel işlemler ve ürünlerden kaynaklanan emisyon miktarlarının paralel olarak artması da çalışmada yapılan öngörüleri doğrular niteliktedir. Dört sektörün 2021-2027 yılları için öngörülen emisyon miktarları tablo 4'te verilmiştir.

Tablo 4. Sektörlerin seragazı emisyonları için tahminleri (milyon ton CO_2 eşdeğeri)

Tahminler	2021	2022	2023	2024	2025	2026	2027
Enerji	399,149	409,352	419,657	430,065	440,576	451,189	461,905
Endüstriyel işlemler ve ürün	75,9281	79,2879	82,7502	86,3149	89,9822	93,752	97,6242
Tarım	74,6568	78,142	81,796	85,619	89,6108	93,7715	98,1012
Atık	16,1536	15,9292	15,6785	15,4016	15,0986	14,7693	14,4138

1970-2020 yılları arası Türkiye'nin elektrik enerjisi 4 modele intibak ettirilmiş ve denklemler elde edilmiştir. Bu modellere ilişkin denklemler ve doğruluk ölçümleri Tablo 5'te verilmiştir. MSD değeri en düşük kuadratik değerde bulunmuş ve grafiği Şekil 3'te gösterilmiştir.

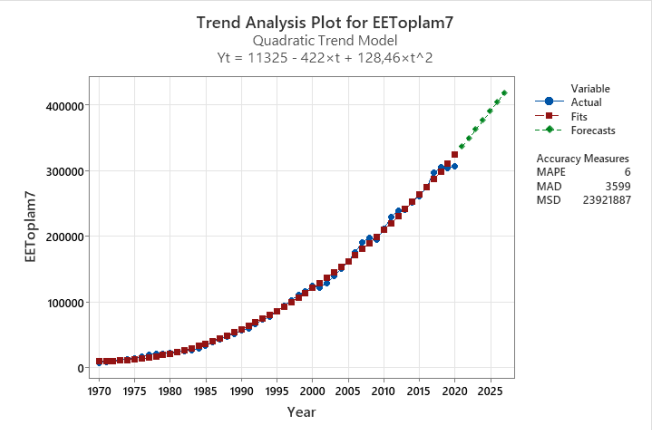
Tablo 5. Elektrik enerjisi üretim miktarı için modellerin doğruluk ölçümleri

Elektrik Enerjisi Üretim Miktarı	Linear	Kuadratik	Büyüme Modeli	S-Eğrileri
Trend Denklemleri	Yt = -47680 + 6258×t	Yt = 11325 - 422×t + 128,46×t^2	Yt = 11003,4 × (1,07486^t)	Yt = (10^6) / (2,49835 + 116,674×(0,907077^t))
MAPE	65	6	13	4
MAD	22406	3599	16493	3407
MSD	642937392	23921887	915163201	27178369

1970-2020 yılları arasında sürekli artış gösteren elektrik enerjisi üretim miktarları trend denklemlerinden hareketle 2027 yılında da artış eğiliminde olduğu öngörülmektedir. Yıllar itibariyle (2021-2027) öngörülen elektrik enerjisi üretim miktarları Tablo 6'da verilmiştir.

Tablo 6. Elektrik enerjisi üretim miktarı için tahminler (GWh)

Tahmin	2021	2022	2023	2024	2025	2026	2027
Elektrik Enerjisi Üretim Miktarı	336751	349818	363141	376722	390559	404653	419004



Şekil 3. Toplam elektrik enerjisi için tahmin grafiği

Şekil 3'te görüldüğü üzere Türkiye'de elektrik üretimi toplamında gerçek değerler yıllar itibariyle artış göstermektedir. Ölçümü yapılan son yıl (2020) da 306703 GWh hesaplanan elektrik enerjisi üretim miktarları 2027 yılında 419004 GWh olması beklenmektedir.

Tablo 7. Elektrik enerjisi üretim kaynakları için modellerin doğruluk ölçümleri

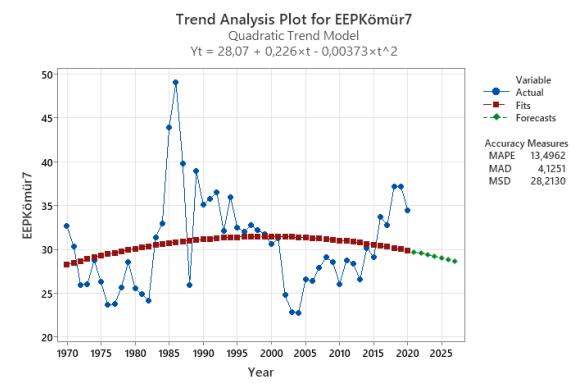
		Linear	Kuadratik	Büyüme Modeli	S-Eğrileri
Kömür	**Trend Denklemleri**	Yt = 29,79 + 0,0317×t	Yt = 28,07 + 0,226×t - 0,00373×t^2	Yt = 29,1712 × (1,00130^t)	Hesaplanamayan model
	MAPE	13,7781	13,4962	13,5133	
	MAD	4,2173	4,1251	4,1984	
	MSD	28,7360	28,2130	28,9421	
Sıvı Yakıtlar	**Trend Denklemleri**	Yt = 35,00 - 0,8350×t	Yt = 46,16 - 2,098×t + 0,02430×t^2	Yt = 83,757 × (0,90185^t)	Yt = (10^3) / (30,7272 + 0,583329×(1,20385^t))
	MAPE	490,750	141,026	54,8458	45,7088
	MAD	4,601	2,747	4,1583	3,8577
	MSD	38,574	16,431	72,7265	33,1421
Doğalgaz	**Trend Denklemleri**	Yt = 12,03 + 0,978×t	Yt = -9,48 + 4,375×t - 0,0918×t^2	Yt = 7,323 × (1,0641^t)	Hesaplanamayan model
	MAPE	220,154	98,8353	152,371	
	MAD	8,959	5,0153	12,620	
	MSD	114,334	35,9967	276,588	
Hidroelektrik	**Trend Denklemleri**	Yt = 43,78 - 0,4247×t	Yt = 35,54 + 0,508×t - 0,01794×t^2	Yt = 44,1928 × (0,98650^t)	Yt = (10^3) / (27,7333 + 0,0277728×(1,15490^t))
	MAPE	22,4695	21,6037	22,1058	23,1783
	MAD	6,7306	6,2458	6,9033	7,0421
	MSD	72,9766	60,9052	78,6646	73,7678
ve Yenilenebilir Enerji Atıklar	**Trend Denklemleri**	Yt = -1,748 + 0,1481×t	Yt = 4,397 - 0,5475×t + 0,01338×t^2	Hesaplanamayan model	Hesaplanamayan model
	MAPE	466,392	319,184		
	MAD	2,352	1,343		
	MSD	9,627	2,913		

Türkiye'de enerji kaynaklarına göre (Kömür, sıvı yakıtlar, doğal gaz, hidroelektrik, yenilebilir enerji ve atıklar) elektrik enerjisi üretim payları 51 yıllık 5 zaman serisine denenen trend denklemleri ve doğruluk ölçümleri Tablo 7'de gösterilmiştir. Zaman serileri için MSD değeri en düşük olan kuadratik modelde denklemler oluşturulmuş ve öngörüler Şekil 4'te toplu halde verilmiştir. Sıvı yakıtlar için oluşturulan grafik incelendiğinde S-eğrileri modelinin trend eğilimlerine daha yatkın olduğu belirlenmiştir. Bu durumdan hareketle MSD değeri daha yüksek olmasına rağmen S-eğrileri modeli ile öngörülerde bulunulmuş ve grafik çizilmiştir. 1970'li yıllarda sıvı yakıtların enerji üretimindeki payı %50'ler de olsada verisi olan 2020 yılında %0,11 e kadar gerilemiştir. Trend denklemlerinden hareketle oluşturulan öngörülerde

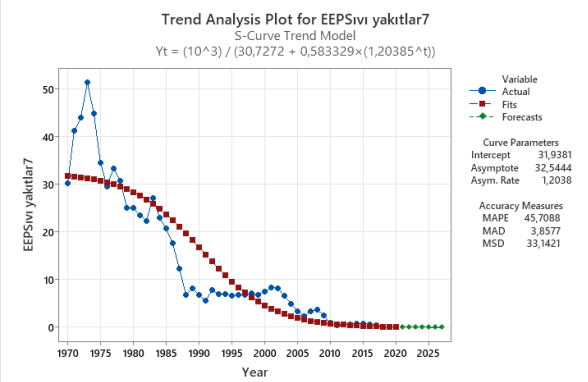
ise bu oranın %0,03 olması beklenmektedir. Sıvı yakıtlar için bu durum sonuçlar bölümünde detaylı olarak ele alınmıştır.

Artan enerji talebine rağmen enerji üretimindeki kömürün payı yıllar içinde dalgalanma göstersede ortalama olarak %30'lar civarında seyretmektedir. Analiz sonuçlarından da 2027 yılında bu durumun değişmeyeceği öngörülmektedir.

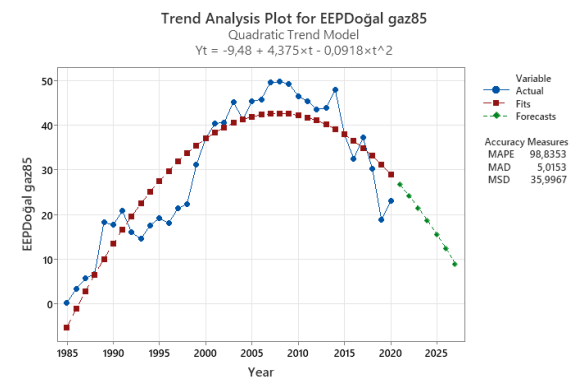
Kömür



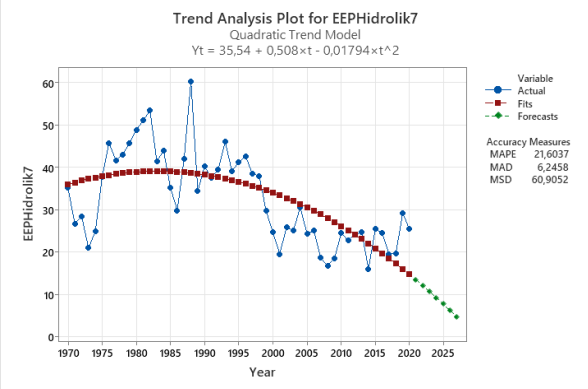
Sıvı yakıtlar



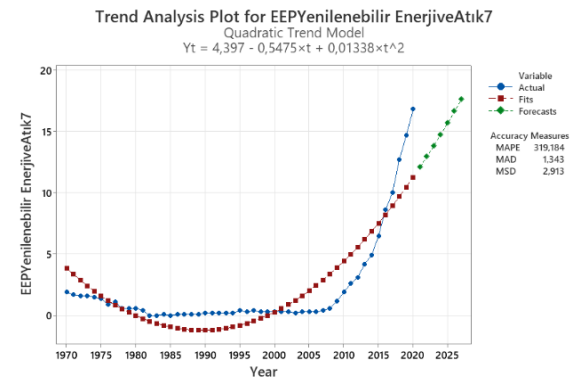
Doğal gaz



Hidroelektrik



Yenilenebilir Enerji ve Atıklar



Şekil 4. Eletrik enerjisi üretim kaynakları için tahmin grafikleri

Gelişmiş ülkeler nükleer enerji kullanmalarına rağmen enerji üretim girdisi olarak doğalgaz birincil üretim kaynağıdır. Türkiye'de ilk olarak enerji üretiminde 1985 yılında doğalgaz enerji kullanılmaya başlanmıştır. 2000li yıllarda bu kaynak %50'lere kadar çıkmış ve son 10 yılda enerji üretim payında yaklaşık %20lere varan bir düşüş görülmüştür. Emisyon salınım miktarı kömüre göre az olsada doğalgaz netice itibariyle bir fosil yakıttır. Fosil yakıtların yanma reaksiyonu sonucu F gazları, buhar, CO_2, CO, NO_2, PM_{10} emisyonları oluşturması temiz ve sürdürülebilir bir kaynak olmadığını göstermektedir.

1970li yıllarda ikincil enerji üretim kaynağı olan hidroelektrik santralleri analize dahil edilen yıllar içerisinde dalgalanma göstersede elektrik üretimindeki payı azalım eğilimindedir. Sıfır emisyon ile çalışmasına karşın hidroelektrik santrallerinin ekolojik dengeyi bozması ve maliyetinin yüksek olması nedeniyle enerji üretimindeki payı yıllar itibari ile azalma eğilimi göstermektedir.

Türkiye'de başlıca kullanılan yenilenebilir enerji kaynakları rüzgar, jeotermal, güneş ve biyokütledir. Şekil 4'te de görüleceği üzere yenilenebilir enerji kaynaklarının elektrik üretimindeki payı 2008 yılından itibaren artmaktadır. Yenilenebilir enerji kaynaklarının sıfır emisyon ile çalışması sürdürülebilirlik açısından oldukça önemlidir. Son yıllarda artarak artış eğiliminde olan grafikten hareketle bu çalışmadaki öngörülerde 2027 yılında kaynağın elektrik üretiminde payının artacağı yönündedir.

Tablo 8. Elektrik enerjisi üretim kaynaklarının payı için tahminler (%-Pay)

Tahminler	2021	2022	2023	2024	2025	2026	2027
Kömür	29,7198	29,5536	29,3799	29,1988	29,0102	28,8141	28,6106
Sıvı yakıtlar	0,110374	0,091737	0,07624	0,063355	0,052645	0,043742	0,036344
Doğal gaz	26,7117	24,2015	21,5076	18,6301	15,569	12,3243	8,896
Hidroelektrik	13,453	12,0775	10,6662	9,219	7,7359	6,2169	4,6621
Yenilenebilir Enerji ve Atıklar	12,0991	12,9562	13,8401	14,7508	15,6882	16,6524	17,6433

4. SONUÇ VE ÖNERİLER

Paris İklim Anlaşması gereğince 2050 yılında sıfır emisyon miktarı hedefi analiz sonuçlarına göre yorumlandığında önümüzdeki 7 yıl için Türkiye'deki toplam emisyon miktarının artarak artan ivme ile yükseleceği öngörülmektedir. 2027 yılında 672,044 milyon ton CO_2 eşdeğeri olması öngörülen sera gazı emisyon miktarının azalması için yasal yükümlülükler getirilme zorunluluğu düşünülmektedir. Emisyona neden olan dört sektörün herbiri ayrı değerlendirildiğinde birbileri arasındaki ilişki gözardı edilmemelidir. Tarım sektörü tek başına incelendiğinde emisyon içindeki payı düşük görülebilir. Ancak enerji ve endüstriyel işlemler

ve ürünler ile çok yakın ilişkisi bulunan sektörün payı topyekun olarak düşünüldüğünde emisyon miktarı daha yüksektir. Örneğin tarımda önemli bir girdi olan mazot enerji sektörü içerisinde değerlendirilirken tarıma dayalı sanayi ise endüstriyel işlemler ve ürünler içerisinde yer almaktadır. Dolayısıyla tarımın çevre üzerindeki baskısı grafikler detaylı incelendiğinde her geçen gün artmaktadır. Ayrıca ısıyı saklama kapasitesi bulunan sera gazlarının emisyon miktarındaki artış tarım üzerinde negatif etkiye neden olacaktır. Yeşil devrim ile birlikte ekstansif tarımdan intansif tarıma geçilmesi tarımın ekolojik ayak izini ve çevre üzerindeki baskısını arttırmıştır.

Tarım ve enerji, Paris İklim anlaşması göz önünde tutulduğunda agro ekolojik ekonomi perspektifden değerlendirildiğinde sürdürülebilirliğini kaybetmiştir. Bunun sebebi ise emisyon miktarlarının artışı sonucu oluşan küresel ısınma, beraberinde küresel ısınmanın oluşturacağı daha fazla emisyon miktarına bağlı kısır döngü, doğal koşullara bağlı üretimin gerçekleştirilememesine sebep olacaktır. Bu durumda son yıllarda yeşil ekonomi kavramı ön plana çıkmaktadır. Yenilenebilir enerji kaynaklarından elde edilen enerjinin 2020 yılında yaklaşık olarak %12 olan payı analiz sonuçlarında 2027 yılı için %17,64 olması beklenmektedir. Bu artış artan enerji arzı ile birlikte ileride alınabilecek tedbirler ile daha net ortaya çıkabilecektir. Diğer bir önemli konu ise Türkiye'de henüz nükleer enejinin kullanılmamasıdır. 2023 yılında ilk reaktörün devreye girmesi (Enerji Bakanlığı, 2022) ile birlikte fosil yakıtlarının enerji içerindeki payının azalması beklenmektedir. Ancak çevrecilerin nükleer enerji konusundaki görüşleri bölünmüş durumdadır. Bazıları nükleer enerjiyi desteklerken diğer bir grup ise çözülmemiş atık sorunlarını ve tehlikeli iklim değişikliğini durduracak kadar hızlı inşa edilemeyen bir teknoloji olarak görmektedir (Anonim, 2022a). Ancak bilinmektedir ki nükleer enerjinin emisyon miktarının düşük olması çevreci enerji kaynaklarına dahi alternatif kaynak olarak kılmaktadır (İşeri ve Özen, 2012). Bu durum ilerleyen dönemlerde nükleer enerjinin kullanımı ile birlikte enerji içerisinde alacağı payın hızla yükselmesini sağlayacaktır.

Türkiye'de fosil yakıtlardan elde edilen enerji toplam enerji üretiminin %57'sine denk gelmektedir. Bu durum daha önce söz edilen emisyon miktarı ve küresel ısınma arasındaki kısır döngünün en büyük sebepleri arasında sayılabilir. Yeşil ekonomi kavramı ile birlikte ortaya çıkacak daha çevreci yaklaşımların, toplam enerji üretimi içinde fosil yakıtların almış olduğu payı düşürücü yönde etkileyeceği düşünülmektedir.

BM'ler 2050 yılı için dünya nüfusunu 9.8 milyar olarak öngörmektedir (Anonim, 2022b). Bu senaryonun gerçekleşmesi durumunda enerji tüketinin en büyük sebebi olan nüfusun daha fazla enerjiye ihtiyaç duyması ile sadece Türkiye'nin değil Dünya geneli içinde sorun teşkil edecektir. Bu enerji ihtiyacının karşılanması için karbon tutma teknolojileri hızla uygulanabilir hale gelmedikçe artan emisyon miktarı sonucu oluşacak küresel ısınma içinde geri dönülmesi daha zor hale gelecektir. Bu bağlamda çevresel enerji kullanımının arttırılması ile sürdürülebilir kalkınmasının sağlanmasına yönelik politikalar küresel ölçekte benimsenmeli ve uygulamalarda yer bulmalıdır.

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TÜRKİYE'DE YEM BİTKİSİ DESTEKLEMELERİ İLE EKİM ALANI ARASINDAKİ NEDENSELLİK İLİŞKİSİ

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ÖZET

Bu araştırmada, Türkiye'de yem bitkileri kapsamında alan bazlı desteklerin yonca, fiğ, korunga ve silajlık mısır ürünleri üzerindeki etkisi incelenmiştir. 2000-2021 dönemini kapsayan çalışmada ürünlerin ekim alanı ve alan bazlı destekleme ödemeleri arasındaki ilişkiyi test etmek için Granger nedensellik testi kullanılmıştır. Granger nedensellik testi sonuçlarına göre, yonca, korunga ve silajlık mısır ürünlerinde üretim alanları ve alan bazlı destek miktarı arasında tek yönlü, fiğ ekim alanı ve alan bazlı destek miktarı arasında ise çift yönlü bir ilişki tespit edilmiştir. Yonca ve korungada ekim alanı alan bazlı verilen destek miktarı üzerinde bir etkiye sahipken silajlık mısırda destek miktarının ekim alanını etkilediği sonucuna varılmıştır. Türkiye'de yonca ve korunga önde gelen kaliteli kaba yemler arasında yer almaktadır. Bu nedenle ekim alanlarındaki artış doğrudan desteklemeler ile ilgili olmadığı ifade edilebilir. Ancak özellikle 2000 yılı sonrasında fiğ ve silajlık mısır ürünlerinin yem bitkileri üretimi içerisinde önemli bir pay almasının desteklemeler ile yakından ilgili olduğunu söylemek yanlış olmayacaktır. İstatistiksel veriler incelendiğinde korunga ve yoncada düzenli bir üretim dönemi söz konusu iken özellikle yem bitkilerinin destek kapsamına alınmasıyla birlikte yem bitkileri ürün çeşitliliğinde önemli bir artış gözlenmektedir. Silajlık mısır ve fiğ özelinde bakıldığında 2000 yılı öncesinde silajlık mısır üretimi yapılmıyor denecek kadar az iken fiğ ekili alanlarında 2000 yılı itibariyle ciddi bir artış gözlenmektedir. Bu durum ürüne göre farklı miktarlarda verilen alan bazlı desteklemelerin, yem bitkilerinde ürün çeşitliliğini arttırma yoluyla sürdürülebilirliği sağlamaya yönelik olduğunu göstermektedir.

Anahtar Kelimeler: Yem bitkileri, Kaba yem, Tarımsal destekler

THE CAUSALITY RELATIONSHIP BETWEEN FORAGE SUPPORTS AND CULTURE AREA IN TURKEY

ABSTRACT

In this study, the effect of field-based supplements on forage crops in Turkey on alfalfa, vetch, sainfoin and silage maize products was investigated. In the study including the period of 2000–2021, Granger Causality test was used to test the relationship between the cultivation area of crops and area-based support payments. According to the results of the Granger Causality test, while there was unidirectional relationship between the culture areas and the amount of field-based supplements for alfalfa, sainfoin and silage maize, bidirectional relation was found between the amount of field-based supplements and the culture for vetch. It was concluded that while the cultivation area in alfalfa and sainfoin affected the amount of support given on a field basis, the amount of support in silage maize affected the cultivation area. Alfalfa and sainfoin are among the leading quality forage in Turkey. For this reason, it can be stated that the increase in cultivation areas is not directly related to the supports. However, it would not be wrong to say that especially after 2000, the fact that vetch and silage corn products have a significant share in the production of forage crops is closely related to their supports. When statistical data are examined, while there is a regular production period in sainfoin and alfalfa, a significant increase is observed in forage crops product diversity, especially with the inclusion of forage crops in the scope of support. In terms of silage maize and vetch, there was hardly any silage maize production before 2000, but a significant increase is observed in the vetch-planted areas as of 2000. This situation shows that field-based supports given in different amounts according to the product ensures sustainability by increasing the product diversity in forage crops.

Keywords: Forage crops, Roughage, Agricultural supports

1. GİRİŞ

Türkiye'de 2000 yılı sonrası uygulanan hayvancılık destekleme politikalarındaki gelişmelerin etkisiyle büyükbaş hayvan varlığı artış eğilimine girmiş ve yerli ırkın yerini kültür ve melez ırklar almıştır. Küçükbaş hayvan varlığında ise önemli bir değişim olmamasına karşın çeşitli projeler kalite ve verimi arttırıcı bir etki göstermiştir. Hayvan varlığında nitel ve nicel olarak yaşanan olumlu gelişmelere paralel olarak kaliteli kaba yem ihtiyacı artmaktadır.

Hayvan sağlığı ve verimliliği açısından hayvan beslemede günlük rasyonların %60 oranında kaba yem içermesi gerektiği bilinmektedir. İşletmeler kaba yem teminini çayır-meralar ve yem bitkileri üretme ya da satın alma yoluyla sağlamaktadırlar. Zamansız ve yoğun otlatma ile düzenli bakım sağlanamaması Türkiye'de hayvancılık işletmelerinin çayır- mera alanlarından faydalanma düzeyini oldukça düşürmekte dolayısıyla en önemli maliyet unsuru olan yem giderleri üzerindeki baskıyı daha da arttırmaktadır. Bu baskıyı azaltmanın en temel yolu ise işletme bünyesinde yem bitkileri üretilmesinden geçmektedir (Yavuz ve Ceylan, 2005; Budak ve Budak, 2014).

İşletmelerde yem maliyetlerindeki artış ve ülkede hayvan varlığındaki artışa paralel olarak artan kaba yem ihtiyacı sonucunda yem bitkileri ekim alanlarının ve verimliliklerinin arttırılması gerekliliği gündemde önemli bir yer almıştır (Sayar ve ark., 2010; Temel ve Şahin, 2011; Yavuz ve ark., 2020). Bunun sonucunda hayvancılık sektörünün gelişimi ve sürdürülebilirliğinin sağlanması amacıyla Türkiye'de 2000 yılı itibariyle "*Hayvancılığın Desteklenmesi Hakkında Bakanlar Kurulu Kararı Uygulama Esasları Tebliği*" ile birlikte yem bitkisi üretimi destek kapsamına alınmıştır.

2000 yılı baz alındığında 2021 yılında yem bitkileri ekili alanında %587 oranında ciddi bir artış önemli gözlenmiştir. Bununla beraber ürün çeşitliliği açısından bakıldığında, 2000 yılı öncesi sınırlı sayıda yem bitkisinin üretimi yapılırken günümüzde yaklaşık otuz ürüne destek verildiği görülmektedir (Şahin ve Yılmaz, 2008; Aksu ve Dellal, 2016; Altıntaş ve ark., 2017). Nicel veriler dikkate alındığında yem bitkilerine yönelik desteklerin üretim, verim, kalite ve alternatif ürün çeşitliliğinin arttırmaya yönelik amacına ulaştığını ifade etmek yanlış olmasa yeterli ölçüde ortaya koyan bir unsur değildir. Çünkü aynı dönemde hayvancılık politikalarındaki iyileştirmelere bağlı hayvancılık sektöründeki gelişimin olduğu düşünüldüğünde yem bitkisi üretimindeki gelişmelerin sadece desteklemeler ile ilgili olamayacağı açıktır. Bu nedenle desteklemelerin doğrudan üretime etkisini detaylı olarak incelemek gerekmektedir. Bu çalışmada desteklemelerin üretime etkisini ortaya koymak amacıyla 2000-2021 döneminde yem bitkisi üretiminin yaklaşık %65'ini oluşturan yonca, fiğ, korunga ve silajlık mısır destekleme fiyatları ile ekili alanları arasındaki nedensellik ilişkisi incelenmiştir.

2. MATERYAL VE YÖNTEM

Yem bitkisi destekleri ile ekili alan arasındaki ilişkiyi değerlendirmeyi amaçlayan bu çalışmada 2000-2021 dönemini kapsayan 22 yıllık zaman serisi kullanılmıştır. Çalışmanın veri seti TÜİK'ten sağlanan yonca, fiğ, korunga ve silajlık mısır ekili alanları (ha) ve yonca, fiğ, korunga ve silajlık mısıra ait Tarım ve Orman Bakanlığından sağlanan alan bazlı destek miktarlarından (TL/da) oluşmaktadır. Değişkenlere ilişkin bilgiler tablo 1'de verilmiştir.

Tablo 1. Değişkenlere ilişkin tanımlayıcı istatistikler

Değişken	Tanım	Gözlem sayısı	Ortalama	Standart sapma	Min.	Max
FIGEA	Fiğ Ekili Alan (ha)	22	3977683	1204118	2200000	6391774
FIGRF	Fiğ Destekleme Reel Fiyatları (TL/da)	22	18.61	7.32	8.34	38.06
SMSREA	S.mısır Ekili Alan (ha)	22	3256771	1318632	1400000	5306706
SMSRRF	S.mısır Destekleme Reel Fiyatları (TL/da)	22	30.49	7.99	13.90	50.13
YNCEA	Yonca Ekili Alan (ha)	22	5252309	1594627	2490000	6923055
YNCRF	Yonca Destekleme Reel Fiyatları (TL/da)	22	18.27	4.24	10.72	24.74
KRNGEA	Korunga Ekili Alan (ha)	22	1528721	364547.7	990000	1963349
KRNGRF	Korunga Destekleme Reel Fiyatları (TL/da)	22	16.11	3.48	10.05	23.73

Türkiye'de yem bitkisi üretiminde ve desteklemelerinde yonca, silajlık mısır, korunga ve fiğ önemli bir paya sahip olduğundan bu ürünleri detaylı olarak incelemek desteklerin üretime etkisini daha belirgin bir şekilde ortaya koymaya yardımcı olacaktır. Bu amaçla çalışmada her bir ürünün ekim alanı ve destekleme reel fiyatları arasındaki ilişkiyi ortaya koymak amacıyla Granger Nedensellik Analizinden yararlanılmıştır.

Analize geçmeden önce, Granger Nedensellik analizinin ön koşulu olarak serilerin durağanlığının belirlenmesi gerekmektedir. Serilerin durağan olup olmadığının tespitinde yaygın olarak kullanılan Genişletilmiş Dickey-Fuller (ADF) birim kök testi kullanılmıştır (Dickey ve Fuller, 1979). ADF birim kök testi (1) nolu denklem ile gösterilebilir.

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + e_t \quad (1)$$

Denkleme göre hesaplanan t istatistik değerleri ADF değerleri ile karşılaştırılak serilerin durağan olup olmadığına karar verilir. Durağan bir yapıya sahip değilse, durağanlaştırmak için

serinin farkı alınır (Gujarati, 2003). Serilerin durağan yapıya dönüştürülmesi ve istatistiki olarak anlamlı bulunması ile Granger nedensellik testine geçilmektedir.

Araştırmada Granger nedensellik analizi her bir ürün için ayrı ayrı hesaplanmıştır. Analizde değişkenler arasındaki nedenselliğin yönü araştırılmaktadır. İki durağan zaman serisine ilişkin Granger nedensellik analizinde kullanılan modeller (2) ve (3) nolu denklemlerde ifade edilmiştir (Granger, 1969).

$$X_t = \sum_{j=1}^{m} a_j X_{t-j} + \sum_{j=1}^{m} b_j Y_{t-j} + e_t \qquad (2)$$

$$Y_t = \sum_{j=1}^{m} c_j X_{t-j} + \sum_{j=1}^{m} d_j Y_{t-j} + \mathrm{u}_t \qquad (3)$$

Sebep-sonuç ilişkisine dayalı analizde Y'nin mi X'i etkilediği, X'in mi Y'i etkilediği yoksa iki değişken arasında geri besleme mi olduğu ortaya konulmaktadır.

3. ARAŞTIRMA BULGULARI VE TARTIŞMA

Yem bitkileri ekili alan ve alan bazlı destekleme fiyatları arasındaki nedensellik ilişkisini ortaya koymak amacıyla çalışmada Granger nedensellik analizi uygulanmıştır. Bu analizin uygulanabilmesi için öncelikli olarak serilerin durağanlık dereceleri belirlenmiştir. Durağanlık derecelerini belirlemede Genişletilmiş Dickey-Fuller (ADF) birim kök testinden faydalanılmıştır. Tablo 2'de fiğ, silajlık mısır, yonca ve korungaya ilişkin ekili alan ile alan bazlı destek miktarı değişkenleri için uygulanan birim kök testi sonucunda değişkenlerin birinci derece farkı alındığında durağanlaştığı belirlenmiştir.

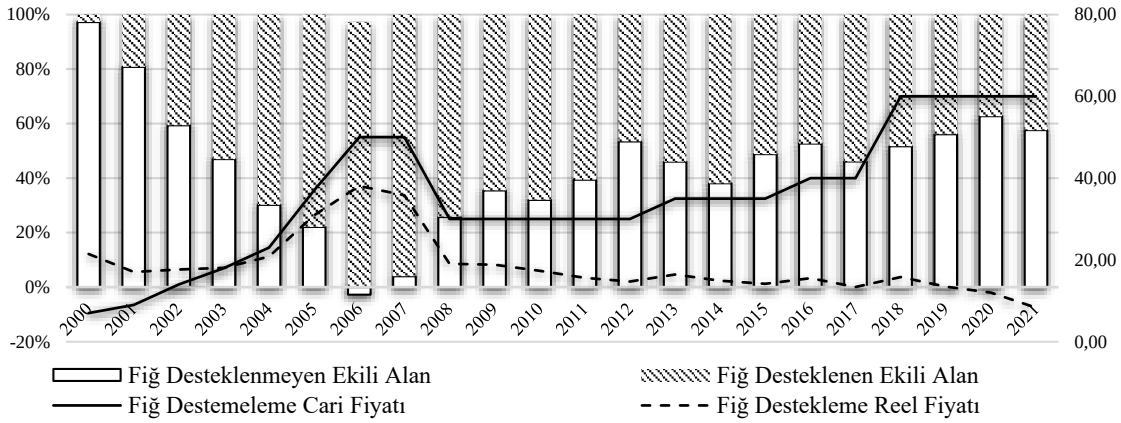
Tablo 2. Birim kök testi sonuçları

	ADF		
	C	C/T	N
FIGRF	-1.819[1]	-3.106[1]	-0.979[0]
FIGEA	-2.444[1]	-1.292[2]	0.044[2]
ΔFIGRF	-3.362[0]**	-3.394[0]*	-3.434[0]***
ΔFIGEA	-4.194[1]***	-4.571[1]***	-4.264[1]***
SMISIRRF	-1.255[0]	-3.074[2]	-0.845[0]
SMISIREA	0.254[0]	-5.367[2]***	3.807[0]
ΔSMISIRRF	-4.230[0]***	-4.482[0]**	-4.302[0]***
ΔSMISIREA	-3.971[2]***	-3.760[2]**	-2.201[0]**
YNCRF	-0.593[0]	-1.624[0]	-0.901[0]
YNCEA	-1.597[0]	-0.984[0]	1.671[0]
ΔYNCRF	-3.356[0]**	-3.530[0]*	-3.408[0]***
ΔYNCEA	-4.950[0]***	-5.608[1]***	-1.612[1]*
KRNGRF	-1.172[1]	-2.418[1]	-1.118[0]
KRNGEA	-1.038[0]	-1.153[0]	1.135[0]
ΔKRNGRF	-3.380[0]**	-3.430[0]*	-3.427[0]***
ΔKRNGEA	-4.694[0]***	-4.746[0]***	-4.308[0]***

[a] [ ] içerisindeki değerler akaike criteria ne göre gecikme uzunluklarını göstermektedir.
[b] *, **, *** istatiksel olarak sırasıyla %1, %5 ve %10 anlamlılığı ifade etmektedir.
[c] birim kök sınamasında C: sabit, C/T: sabit ve trend, N: sabitsiz ve trendsiz model kullanılmıştır.

3.1. Fiğ Ekili Alan ve Destekleme Miktarı Arasındaki Nedensellik İlişkisi

2000-2021 döneminde fiğ ekiliş alanında dalgalanmalar söz konusudur. Son beş yıllık süreçte ise fiğ ekili alanın toplam yem bitkileri ekili alana oranı giderek azalmaktadır. Pek çok yem bitkisinde olduğu gibi fiğ ekimi 2006-2007 döneminde önemli bir artış göstermiştir (Şekil 1). Bunun nedeni daha öncede bahsedildiği gibi Çiftçi Kayıt Sistemi (ÇKS) ve destekleme fiyatlarındaki artış ile ilgilidir. 2007 yılında ekili alan 639177.4 ha olup toplam yem bitkileri ekili alanın %36.8'ini oluşturmakta ve desteklenen fiğ ekili alanın maksimum olduğu yıldır. 22 yıllık süreçte fiğ ekili alandaki değişimler büyük ölçüde üreticilerin destekleme reel fiyatlarını dikkate alması ile ilgili olduğu söylenebilir. Üreticiler maliyetleri baz alarak ürün ekiminde bulunduğu düşünüldüğünde ve diğer ürünler baz alındığında fiğ üretiminin maliyet bakımından daha yüksek olması dikkate alındığında üreticilerin destekleme fiyatlarına karşı daha duyarlı olduğunu söylemek yanlış olmayacaktır. Öte yandan 2014 yılı öncesiyle karşılaştırıldığında 2014 yılı itibariyle fiğ çeşitlerinin yaygınlaşmasıyla birlikte ekim alanlarında önemli değişimlerin olmadığı ifade edilebilir.



Şekil 1. Fiğ Ekili Alan ve Alan Bazlı Destekleme Fiyatı
Kaynak: Anonim, 2022a, Anonim, 2022b.

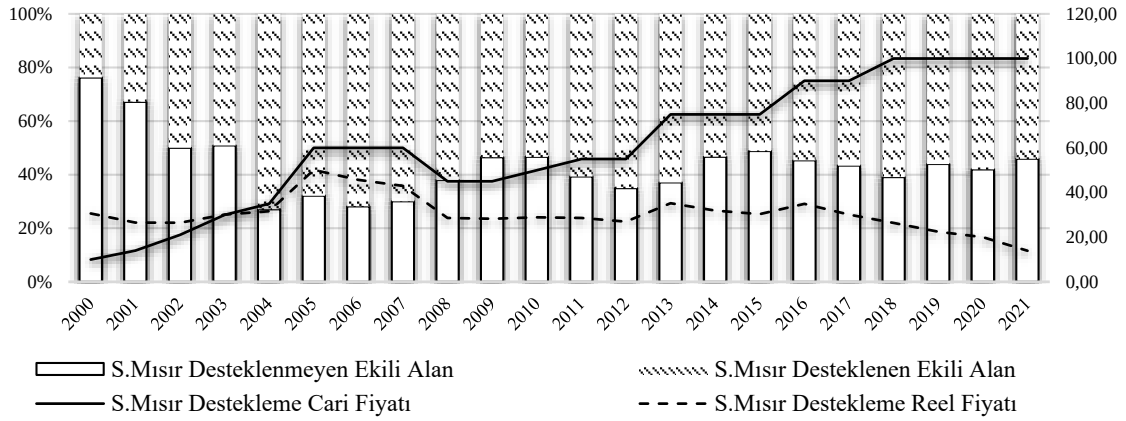
Tablo 3'te ise fiğ ekili alan ve fiğ destekleme reel fiyatlarına ilişkin Granger nedensellik analizi sonuçları yer almaktadır. Buna göre fiğ ekili alan ile fiğ destekleme reel fiyatı arasında çift yönlü nedensellik ilişkisi tespit edilmiştir. Bu durum fiğ ekili alanın destekleme miktarından etkilendiği ve aynı zamanda destekleme miktarlarının ekili alan miktarını etkilediği sonucunu göstermektedir.

Tablo 3. Fiğ ekili alan ve destek miktarı arasındaki nedensellik ilişkisi

H_0 Hipotezi	F-istatistiği	Probablity	SONUÇ
FIGEA nedeni değildir FIGRF'nin	2.943	0.086	FIGEA ↔ FIGRF
FIGRF nedeni değildir FIGEA'nın	4.082	0.040	

3.2. Silajlık Mısır Ekili Alan ve Destekleme Miktarı Arasındaki Nedensellik İlişkisi

Türkiye'de silajlık mısır birinci ve ikinci ürün olarak ekilmekte ve yem bitkileri ekili alan içerisinde yaklaşık %20 oranında pay almaktadır. 2000 yılında silajlık mısır toplam yem bitkisi ekili alanın (155400 ha) %23.8'ini oluşturmaktadır. Şekil 2'ye bakıldığında yıllar itibariyle silajlık mısırda desteklenen ekili alan önemli ölçüde artış göstermiş ve desteklenmeyen ekili alan ile karşılaştırıldığında daha yüksek pay almıştır.



Şekil 2. Silajlık Mısır Ekili Alan ve Alan Bazlı Destekleme Fiyatı
Kaynak: Anonim, 2022a, Anonim, 2022b.

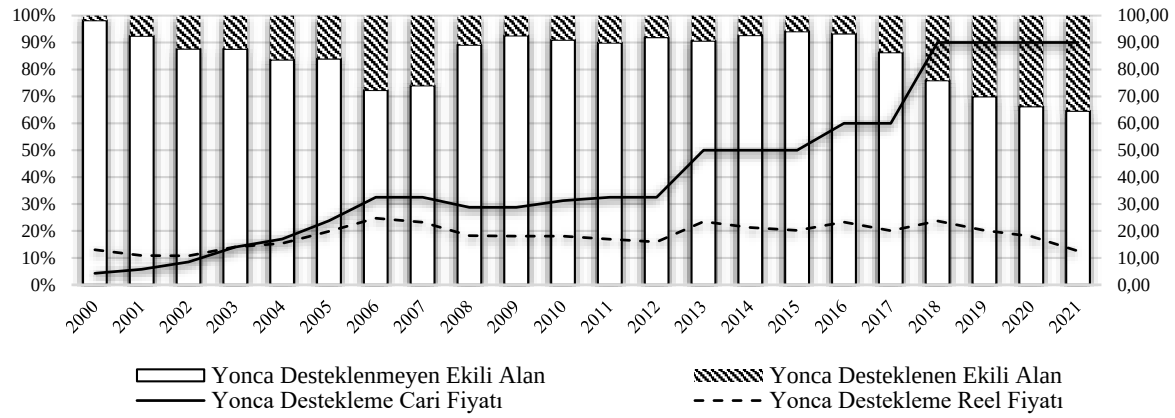
2010 yılına kadar silajlık mısıra ilişkin destekleme cari ve reel fiyatları paralel hareket etmekte sonrasında ise destekleme cari fiyatı ile destekleme reel fiyatı arasındaki makas belirgin bir şekilde düzenli olarak artmıştır. Destekleme cari fiyatlarının yüksek olduğu dönemlerde desteklemelerden yararlanma düzeyinin arttığı düşük olduğu dönemlerde ise azaldığı sonucuna varılmıştır. Tablo 4'te yer alan silajlık mısır ekili alan ve silajlık mısır destekleme reel fiyatlarına ilişkin Granger nedensellik analizi sonuçları yer almaktadır. Silajlık mısır destekleme reel fiyatından silajlık mısır ekili alana doğru tek yönlü nedensellik ilişkisi tespit edilmiştir. Bu sonuçlar şekil 2 de yapılan yorumların doğruluğunu destekler nitelikte olup üreticilerin silajlık mısır ekiminde bulunmalarında destekleme miktarlarının etkili olduğu ortaya koymaktadır.

Tablo 4. Silajlık mısır ekili alan ve destek miktarı arasındaki nedensellik ilişkisi

H_0 Hipotezi	F-istatistiği	Probablity	SONUÇ
SMSREA neden değildir SMSRRF'nin	0.989	0.334	SMSREA←SMSRRF
SMSRRF neden değildir SMSREA'nin	6.4393	0.021	

3.3. Yonca Ekili Alan ve Destekleme Miktarı Arasındaki Nedensellik İlişkisi

Türkiye'de yem bitkisi denildiğinde üreticilerin ilk aklına gelen ürünün yonca olması verim ve kalite ile ilgili olmakla beraber üreticinin yetiştiricilikte yeterli tecrübeye sahip olmasıyla da yakından ilişkilidir. Yem bitkilerine ilişkin istatiksel veriler dikkate alındığında en fazla üretimi yapılan yem bitkisinin yonca olduğu bilinmektedir. Önceki yıllarda olduğu gibi 2000-2021 döneminde de yonca en fazla ekimi yapılan yem bitkisi konumundadır.



Şekil 3. Yonca Ekili Alan ve Alan Bazlı Destekleme Fiyatı
Kaynak: Anonim, 2022a, Anonim, 2022b.

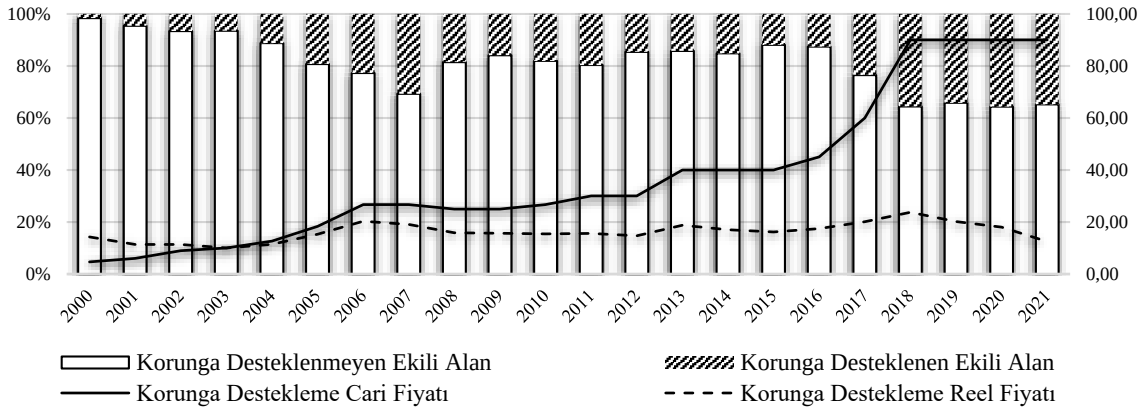
2000 yılı itibariyle başlayan yem bitkisi desteklemeleri dikkate alındığında diğer ürünlere kıyasla yonca ekili alan ile destekleme fiyatları arasındaki ilişki oldukça zayıftır (Şekil 3). Bu durum yoncanın hayvan beslemede temel ürün olarak kabul edilmesiyle yakından ilgilidir. Tablo 5'de yer alan ekim alanı ve destekleme fiyatları arasındaki nedensellik ilişkisinde benzer sonuç ile karşılaşılmıştır. Analiz sonucuna göre yonca ekim alanından yonca reel fiyatlarına doğru tek yönlü nedensellik ilişkisi istatiksel olarak ortaya konulmuştur. Açık bir şekilde yoncanın ekimde en çok tercih edilen ürün olması destekleme fiyatlarını belirleyici etkide bulunduğu görülmektedir.

Tablo 5. Yonca ekili alan ve destek miktarı arasındaki nedensellik ilişkisi

H_0 Hipotezi	F-istatistiği	Probablity	SONUÇ
YNCEA nedeni değildir YNCRF'nin	4.828	0.025	YNCEA→YNCRF
YNCRF nedeni değildir YNCEA'nın	1.963	0.177	

3.4. Korunga Ekili Alan ve Destekleme Miktarı Arasındaki Nedensellik İlişkisi

Şekil 4 dikkatli incelendiğinde ülkede korunga ekili alanındaki değişim yıllar itibariyle yonca ile paralellik göstermektedir. Yonca sulanabilir arazilerde verim ve kalite bakımından ön sırada yer alan bir ürün olmasına karşın kurak arazilerde üretimi ekonomik değildir. Kuraklığın hakim ve hayvancılığın yaygın olduğu bölgelerde kalite ve verim açısından korunga yoncanın ikamesi niteliğinde bir üründür. Özellikle Türkiye'nin doğu bölgelerinde yaygın olarak üretiminin yapıldığı bilinmektedir. Dolayısıyla iki ürün arasındaki bu ilişki dikkate alındığında destelemelerin korunga ekim alanı üzerindeki etkisi yoncadan elde edilen sonuçlar ile benzerlik göstermesi beklenen bir sonuçtur. Tablo 6'da yer alan Granger nedensellik sonuçları da istatiksel olarak korunga ile destekleme fiyatları arasında belirlenen ilişkiyi ispatlar niteliktedir.



Şekil 4. Korunga Ekili Alan ve Alan Bazlı Destekleme Fiyatı
Kaynak: Anonim, 2022a, Anonim, 2022b.

Tablo 6. Korunga ekili alan ve destek miktarı arasındaki nedensellik ilişkisi

H_0 Hipotezi	F-istatistiği	Probablity	SONUÇ
KRNGEA nedeni değildir KRNGRF'nin	4.458	0.032	KRNGEA→KRNGRF
KRNGRF nedeni değildir KRNGEA'nın	0.262	0.773	

4. SONUÇ VE ÖNERİLER

Türkiye'de büyükbaş ve küçükbaş hayvan sayılarındaki artış eğilimi dikkate alındığında, kaba yeme olan ihtiyacın gelecek yıllarda da artacağı öngörülmektedir. Son yıllarda yem bitkileri desteklemelerine ilişkin yapılan düzenlemelerin, hayvancılıkta kaba yem ihtiyacının giderilmesine önemli katkı sağladığı ancak yem bitkisi üretiminin istenilen seviyeye ulaşmadığı ve kaba yem açığının artış gösterdiği ifade edilebilir. Yem bitkilerinin destek kapsamına alınmasıyla birlikte ekili alanda önemli artışlar gözlenmesine karşın alternatif yem bitkilerinin ekimi %34.8 ile sınırlı kalmış ve özellikle fiğ ve silajlık mısır dikkate alındığında üretimin destekleme fiyatlarındaki dalgalanmalara paralellik gösterdiği dikkat çekmektedir. 2000-2021 döneminde desteklemelerin üretim alanına etkisini Granger nedensellik analizi ile değerlendiren bu çalışma sonucunda fiğ ve silajlık mısır destekleme fiyatlarının ekili alanı etkileyebileceği, yonca ve korungada ise ekim alanlarının destekleme fiyatları üzerinde etkili olabileceği sonucuna varılmıştır. Fiğ ve silajlık mısır yem bitkilerinin üretiminde sürdürülebilirliğin sağlanması uygulamada fiyat politikalarındaki istikrarlılıkla yakından ilişkilidir. Diğer yandan desteklemeler yem bitkisi ürün çeşitliliğinde artışa katkı sağlamış olsa da gelecek yıllarda yaşanacak talep artışı ve iklim değişikliğinin yaratacağı olumsuz etkiler düşünüldüğünde, alternatif ürünlerin yaygınlaşmasına yönelik geliştirilecek politikalara ihtiyaç duyulmaktadır. Alan bazlı destekleme fiyatları dikkate alındığında, son üç yılda destekleme cari

fiyatlarında herhangi bir değişim olmamış reel fiyatlarda ise önemli bir azalış söz konusu olmuştur. Destekleme birim fiyatlarının üretim döneminden önce üreticileri yönlendirecek ölçüde her yıl güncellenerek arttırılmasının, nadas yılı ve ekim nöbetinde yem bitkisi ekimine teşvik edici destek kalemlerinin geliştirilmesinin yem bitkisi üretimini ve çeşitliliğini arttırmada etkili olabileceği düşünülmektedir.

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GRAFİTİN GENLEŞEBİLİR POLİSTİREN KÖPÜĞÜN YANMAZLIK ÖZELLİĞİ ÜZERİNE ETKİSİNİN UL94 TESTİ İLE İNCELENMESİ

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ÖZET
Bu çalışmanın amacı, alev geciktirici özellik gösteren nanografitin genleşmiş polistiren (EPS) köpüğün yanmazlık özelliği üzerine etkisi hakkında UL94 (UL94 HB ve UL94 V) testi ile bilgi vermektir. Bu nedenle ilk olarak genleşmiş grafitin hem alev geciktirici hem de yanmazlık özelliğinin grafite göre daha gelişmiş olması nedeni ile G, EG'ye dönüştürülmüş ve sonra stiren monomerine eklenerek EG/EPS nanokompozit köpüğü üretilmiştir. Elde edilen bu köpüklere ASTM D635-98 standardına göre yatay yakma testi (UL94 HB), ve ASTM D3801-96 standardına göre dikey yanmazlık testi (UL94V) uygulanmıştır. Böylece, köpüklerin tutuşma süresi, damlama özelliği ve UL94V testi ile yanmazlık sınıfı (V0,V1,V2) hakkında bilgi edinilmiştir.

Anahtar Kelimeler: Grafit, Genleşmiş polistiren, Yanmazlık, UL94 testi, Polimerizasyon

1.GİRİŞ

Ateşin bulunmasından bu yana, yangınlar insanoğlunun hayatının bir parçası olmuştur. Ateşler çeşitli nedenlerle zaman zaman insanlığın kontrolünden çıkarak yangınlara neden olmuş bu yangınlarda insanoğlu maddi ve manevi büyük kayıplar yaşamıştır [1]. Ateşin bulunmasından bu yana meydana gelen büyük ve küçük ölçekli yüzlerce yangında binlerce kişi hayatını kaybetmiş, binlerde bina yanarak yok olmuş ve binlerce dönüm orman içinde yaşayan canlılarla birlikte yanarak kül olmuştur. Hatta bazı yangınlar insanlığa verdiği büyük hasar nedeni ile tarihin kara sayfalarına geçmiştir. Bunlardan; 1871 tarihinde Chicago'da 2 gün süren büyük bir yangın olmuştur. Yangında 300 kişi hayatını kaybetmiş, 100 bin kişi evsiz kalmış, 17 binden fazla yapı yıkılmış ve yaklaşık 200 milyon dolarlık hasar meydana gelmiştir. Bu yangın tarihe büyük Chicago yangını olarak geçmiştir [2]. 1966 yılında Londra'da çıkan yangın, hem Londra'da hem de çevresinde ağır hasarlar bırakmıştır. Yangında yaklaşık 436 dönüm orman, 89 bölge kilisesi ve 13.200 ev yerle bir olmuştur. Bu yangın tarihe büyük Londra yangını olarak geçmiştir [3]. 1871 yılında çıkan Peshtigo yangını, ABD'nin Wisconsin bölgesinde çıkmıştır. Büyük Chicago Yangını ile aynı anda başlayan bu yangın uzun süre kontrol altına alınamamış ve yangında 2.400 m^2'lik alan yanmış 1.500-2.500 kişi hayatını kaybetmiştir. Bu nedenle Peshtigo yangını tarihin en ölümcül yangınlarından biri olarak kabul edilmiştir [4]. 2019 yılının haziran ayında başlayan Avustralya orman yangınları 240 gün sürmüştür. Yangın, yaklaşık 8 milyon hektarlık alanı kapsamış 2500'den fazla bina kullanılmaz hale gelmiş, 28 kişi ve 1,1 milyardan fazla hayvan yaşamını yitirmiştir [5]. 1910'da Büyük Yangın (şeytanın süperge ateşi), Batı Montana, Doğu Washington ve Güneydoğu Britanya Kolombiya'sında olmuştur. Büyük yangında 3 milyon dönüm arazi kül olmuş 87 kişi hayatını kaybetmiştir. 1939'da Kara Cuma Yangını, Avustralya' nın Victoria kentinde,71 kişi ölmüştür. 1950 Chinchaga Yangını, Kanada'nın Britanya Kolombiyasında, 245 km orman yok olmuştur. 2003 Sibirya Tayga yangını, 47 milyon dönümlük orman yanarak kül olmuştur [6].

Bugün sanayileşmenin hızla ilerlemesi, nüfus artışı, çarpık kentleşme, çeşitli kazalar, kişisel hatalar ve kentsel dönüşüm gibi nedenlerle yangınlar olmaya devam etmektedir. Özellikle son zamanlarda kentsel dönüşümle birlikte yangınların çıkma olasılığı daha da artmıştır. Çünkü kentsel dönüşümle yüksek binaların sayısının artması ve bu binaların inşaatı sırasında gerekli yangın önlemlerinin yeterince alınmaması nedeni ile bu binalarda çıkacak herhangi bir yangında yaşanabilecek can ve mal kaybı oranı oldukça yüksektir. Bunu önlemek için binalarının yalıtımında kullanılan yalıtım malzemelerine yanmazlık özelliği kazandırılmasına karar verilmiştir.

Bugün yalıtım amacı ile hem ekonomik olması hem de üstün özelliklere sahip olması nedeni ile dünyada ve ülkemizde en çok tercih edilen yalıtım malzemesi EPS'dir [7,8]. EPS köpükler, ısı yalıtımının yanı sıra yapı ve ulaşım gibi birçok alanda yaygın olarak kullanılmaktadır. Ancak EPS köpükleri kolay alevlenir ve hızla yanar ve yanma sırasında büyük miktarda siyah duman üretir. Yüksek yanıcılığı ve yanma sırasında şiddetli eriyik damlaması, uygulama alanını büyük ölçüde sınırlandırmaktadır [9-12]. Bu yüzden, EPS'nin, yanmazlık özelliğini geliştirmek zorunlu hale gelmiştir. Bunun için PS matrise kil, perlit gibi çeşitli inorganik nanopartiküller takviye ederek yangına dayanıklı EPS nanokompozit köpükler üretilmiştir. EPS'nin hem ısı izolasyonu hem de yanmazlık özelliğini geliştirmek için en çok tercih edilen inorganik nanopartiküllerden biri de grafittir [8].

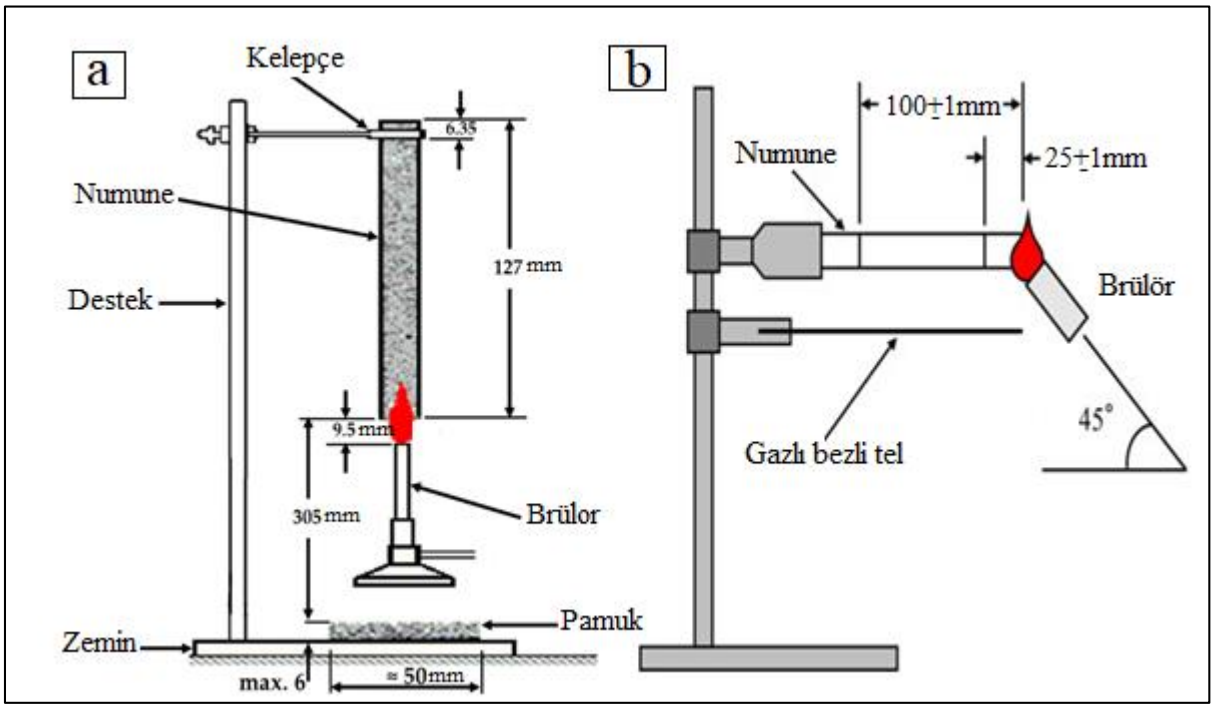
Grafit, tek katmanlı grafen tabakalarının üst üste dizilmesiyle oluşan bir karbon allotropudur. Her bir grafen tabakası zayıf van der Waals bağları ile her bir grafen tabakasındaki karbon atomları da kuvvetli kovalent bağlarla birbirine bağlanmıştır. PS matrise eklenen grafit, tabakaları biribirinden ayrılarak polimer matris içinde dağılır. Ayrılan grafit tabakaları ile polimer matris arasında oluşan sinerjik etki nedeniyle saf EPS köpüğe göre izolasyon kabiliyeti artmış, termal kararlılığı, alev geciktiriciliği ve yanmazlık özelliği vb özellikleri gelişmiş yüksek performanslı polimer köpükler elde edilir [8,13-15].

Bugüne kadar yapılan çalışmalarda; Zhao ve arkadaşları (2022), EPS köpüğün yanmazlık özelliğini geliştirmek için polisiloksan ve EG ekleyerek kaplama yöntemiyle EPS köpük hazırlamışlardır. Elde edilen EPS kompozit köpüğün LOI değeri %18'den %36'ya yükselmiş, UL-94V testinde V-0 yanmazlık sınıfına girmiştir [16]. Chen ve arkadaşları (2014), EPS'nin alev geciktirici ve yanmazlık özelliğini geliştirmek için nitrojen-fosforlu alev geciktirici EG ile kombine edilerek PS'ye eklenmiştir. Elde edilen EPS köpüğe LOI, UL94-V dikey alev testi testleri, yapılmıştır. Elde edilen EPS köpüğün LOI değeri %189'den %33,9'a yükselmiş, V0 yanmazlık sınıfına girmiştir. Buna dayanarak EPS köpüğün alev geciktirici özelliğinin dolayısıyla yanmazlık özelliğinin geliştiği tespit edilmiştir [17].

2. GRAFİT EKLENMİŞ EPS KÖPÜKLERİN UL94 ANALİZİ

Polimer köpüklerin yanmazlık özelliğini araştırmak için sınırlayıcı oksijen indeksi (LOI), yanmazlık sınıfını belirlemek için UL-94V testi ve koni kalorimetri testi, duman salınımı testi vb. testler uygulanır. Bunlardan UL-94 testi ürünlerin alevlere maruz kaldıkları zaman nasıl performans göstereceklerini bilmek, ürünün güvenilirliğini belirlemek ve dolayısıyla tüketici güvenini oluşturmak için yapılır. UL-94 testi yapılmış ürün, güvenilir ürün demektir.

UL94 testi UL-9V (dikey) ve UL-94 HB (yatay) yanmazlık testi olmak üzere ikiye ayrılır. Elde edilen G/EPS ısı yalıtım köpüklerine ASTM D635-98 standardına göre UL94 HB testi ve ASTM D3801-96 standardına göre UL94V testi uygulanır. Böylece, köpüklerin tutuşma süresi, damlama özelliği ve UL94V testi ile yanmazlık sınıfı (V0,V1,V2) belirlenir. Yatay ve dikey yanmazlık testleri Şekil 1'de gösterilen düzeneğe göre hava akımı olmayan oda, laboratuvar ortamında veya özel kabin içinde yapılır.



Şekil 1.UL-94 Test düzeneği:a)UL-94V dikey yanmazlık test, b)UL-94HB yatay yanmazlık test düzeneği

UL-94 dikey yanmazlık testi yapılırken; Numune, test düzeneğinde en fazla 10 s aleve maruz kalır. Bu süre içinde yanmaz, dolayısıyla damlacık oluşmaz ise malzemenin yanmazlık sınıfı V0'dır. Numune, test düzeneğinde en fazla 30 s aleve maruz kalır, bu süre içinde yanar fakat damlacık oluşur fakat düzenek altına yerleştirilen pamuğu tutuşturmaz ise yanmazlık sınıfı V1'dir. Numune, test düzeneğinde en fazla 30 s aleve maruz kalır, bu süre içinde malzeme yanar ve yanma ürünü olan damlacıklar oluşur ve oluşan damlacıklar düzenek altına yerleştirilen pamuğu tutuşturur ise yanmazlık sınıfı V2'dir [18].

Ağırlıkça %3G ilave edilmiş G/EPS nanokompozit köpüklerin yanmazlık sınıfını karakterize etmek için yapılan bir çalışmada ilk olarak G, EG'nin alev geciktirici özelliğinin G'ye göre daha yüksek olması, ayrıca EG'nin polimer matriste G'ye göre daha homojen olarak dağılması nedeni ile EG'ye dönüştürülmüştür. Daha sonra elde edilen %3EG/EPS nanokompozit köpüğe UL-94 dikey yanmazlık testi uygulanmış ve test sonuçları Tablo 1'de özetlenmiştir .

Tablo 1.UL-94 yanmazlık test sonuçları

Numuneler	İlk alev çarpmasından sonraki alev sonrası süre, t_1 (s)	İkinci alev çarpmasından sonraki alev sonrası süre, t_2 (s)	Damlama	Tutuşma	Yanmazlık sınıfı
Saf EPS	12	--	evet	evet	NR
EPS/%3G	0.8	1.1	evet	hayır	V1
EPS/%3EG	1.3	1.6	evet	hayır	V0

Saf EPS köpüğü, yanıcı olduğu için test sırasında tamamen yanmış bu yüzden derecelendirilmemiş (NR) olarak sınıflandırılmıştır. Test sırasında, yangın çarpmalarından sonra tüm kontrol numuneleri yanmaya devam etmiştir. Tablodaki değerler ateşlemeden sonra 4-5 s içinde PS köpüklerde yangının hızla parladığını göstermektedir. Ateşle siyah duman yayan damlalar pamuklu bezi tutuşturdu. Buna karşılık, %3EG/EPS'deki EG, köpük tutuştuktan hemen sonra genişler. Grafitin genleşmesi eriyik damlalarını engellemese de eriyik damlalarının 2-4 s içinde kendi kendine söndüğünü ve pamuğun tutuşmadığını ve böylece numunenin V0 derecesini karşılamasını sağladığını göstermektedir. [19]. %3G ilave edilmiş EPS nanokompozit köpüğün tutuşmasından sonra 30 s'den daha kısa sürede tutuşmuş damlayarak yanmıştır. Zemine düşen damlalar 12-14 s içinde kendi kendine sönmüştür. Bu nedenle V1 yanmazlık sınıfına dahil edilmiştir.

3.SONUÇ

Saf EPS köpüğün test sırasında tamamen yanması nedeni ile yanmazlık sınıfı belirlenememiştir. Grafitin hem alev geciktirici hem de yanmazlık özelliğine sahip olması nedeni ile ilave edildiği EPS köpüğün yanmazlığı saf EPS'ye göre daha gelişir ve ilave edilen %'de G oranı arttıkça G/EPS köpüğün yanmazlık sınıfı da yükselir.

Genleşmiş grafitin ise hem alev geciktirici hem de yanmazlık özelliği grafite göre daha gelişmiştir. Çünkü EG, PS matris içinde daha homojen dağılır ve şişme özelliğine sahiptir. Bu nedenle EG/EPS köpüğün yanmazlık özelliği G/EPS köpüğe göre daha fazla geliştirmiştir. O yüzden EPS köpüğün yanmazlık özelliğini geliştirmek için G yerine EG kullanılması tavsiye edilir.

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HALLOYSİT NANOTÜP ile POLİSTİREN MATRİSİN YÜZEYLERİ ARASINDAKİ SİNERJİK ETKİNİN ARTIRILMASI

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ÖZET
Bu çalışmanın amacı, halloysit nanotüp (HNT) ile polistiren (PS) matris arasındaki sinerjit etkinin arttırılması hakkında bilgi vermektir. Sinerjik etkinin artması için kimyasal yapıları farklı olan apolar ve hidrofobik yapıdaki PS matrisle, polar ve hidrofilik yapıdaki HNT kilinin kimyasal yapılarının benzer olması gerekir. Bu nedenle HNT kiline stiren-maleik-anhidrit (SMA), (3-aminopropil)trietoksisilan (APTES) vb kimyasallarla yüzey modifikasyonu uygulanır. Böylece polar ve hidrofilik yapıdaki HNT kilinin apolar ve hidrofobik yapıdaki organokile dönüşmesi ve HNT'nin PS matrisle kimyasal yapısının benzer hale gelmesi sağlanır. Yüzey modifikasyonu ile HNT'nin PS matriste homojen bir şekilde dağılması ve böylece modifiye HNT ve PS matrisin yüzeyleri arasındaki etkileşimin artması ile aradaki sinerjik etkinin artması sağlanır. Bu durum HNT/PS nanokompozitlerin mekanik, termal kararlılık, yanmazlık vb. özelliklerinde iyileşme olmasını sağlar.

Anahtar Kelimeler: HNT, Modifikasyon, Organo kil, Sinerjik etki, SMA

1.GİRİŞ

Polimer nanokompozitler, çeşitli polimerler ile polimerlere ilave edilen nano boyutlu inorganik veya organik dolgu maddeleri ile yapılan yeni bir malzeme sınıfıdır. Polimer nanokompozitler, mekanik özellikler, mukavemet, termal kararlılık ve yanmazlık gibi özellikler bakımından geleneksel polimer kompozitlere göre daha üstün özelliklere sahiptir [1].

Geçtiğimiz on yıl boyunca polimerlere, cam elyafları, karbon elyafları, talk, kalsiyum karbonat, karbon siyahı, perlit, grafit, grafe, karbon nanotüp gibi bazı organik ve inorganik takviye malzemeleri başarılı bir şekilde takviye edilmiştir. Bu sayede nanokompozitlerin mekanik, termal, yanmazlık vb. özelliklerinin gelişmesi sağlanmıştır [1].

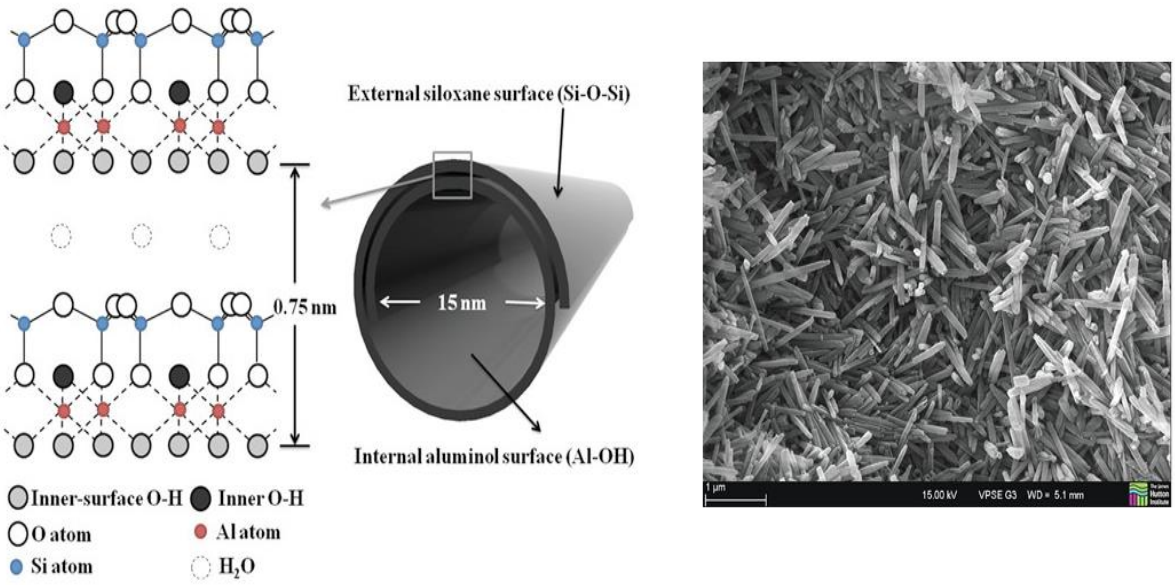
Polimerlerin özelliklerini geliştirmek için tercih edilen inorganik takviye malzemelerinden biri de kildir. Sepiyolit, montmorillenit, bentonit, kaolinit ve HNT en çok tercih edilen kil grubudur. Ağırlıkça %1-5 gibi çok düşük oranlarda eklendiğinde dahi pul pul dökülmüş kil tabakalarının en boy oranı ve bunların geniş yüzey alanı nedeni ile fiziksel özelliklerde ileri düzeyde gelişme görülmüştür [2]. Bunlardan HNT son zamanlarda kimyasal yapısının karbon nanotüpe benzemesi nedeni ile dikkatleri üzerine çekmiştir. Halloysit, doğada bol miktarda bulunan kaolinit tipi bir alüminosilikat ($Al_2Si_2O_5(OH)_4 \cdot nH_2O$) kildir. Nano ölçekli boyutta (50-100 nm çapında) içi boş çok katmanlı boru şeklinde bir yapıya sahip olması bakımından benzersizdir. Dış yüzeyde 1:1 silika tabakası ve iç duvarda alümina bulunması halloysit nanotüpleri geometrik olarak çok duvarlı karbon nanotüplere benzer kılar. HNT'nin dış yüzeyi siloksan bağlarıyla (Si-O-Si) oluşan tetrahedral silikat tabakasından, iç yüzeyi ise alüminol (Al-OH) gruplarından oluşan oktahedral alümina tabakasından meydana gelir. HNT'nin nanotüp kenarlarında bulunan silanol (Si-OH) ve alüminol grupları, yüzeye kazandırdıkları polarlık sayesinde nanokilin polar polimerik matrislerde etkili bir şekilde dağılmasına olanak sağlar. Sahip olduğu hidroksil grupları sayesinde yüzey modifikasyonuna oldukça müsait olan HNT, PS, poliolefin gibi apolar polimer matrislere ilave edilmeden önce modifiye edilir ve sonra polimer matrise eklenir. Montmorillonit gibi diğer katmanlı silikatların aksine, halloysit polimer zincirlerinin araya girmesiyle pul pul dökülemez ve bu nedenle morfolojisi polimer matrislerinde bozulmadan kalır. İlave edildiği polimerlerin daha yüksek mekanik mukavemet (modül, darbe özellikleri, vb.), daha yüksek bozunma sıcaklığı ve iyileştirilmiş alev geciktirme gibi özelliklerinin gelişmesini sağlar. Bu gelişmiş özellikler ise, polimerin otomotiv endüstrisinden biyomedikal cihazlara kadar geniş bir ürün yelpazesinin üretiminde kullanılmasını sağlar [3-5].

Bu güne kadar yapılan çalışmalarda; Zhao ve arkadaşı (2008), HNT'nin PS içinde homojen dağılımını sağlamak için HNT yüzeyini γ-metakriloksipropil trimetoksisilan (MPS) ile modifiye etmiştir. Modifiye edilen HNT, stiren ile karıştırarak in-situ polimerizasyon yöntemiyle PS/HNT nanokompoziti hazırlamışlardır. PS nanokompozitlerin saf PS ye göre termal dayanımlarında artış gözlenmiştir [6]. Guo ve arkadaşları (2009), HNT'nin PA6 içinde homojen dağılımını sağlamak için HNT yüzeyini MPS ile modifiye etmişlerdir. Modifiye edilen HNT, PA6 matriste karıştırarak eriyik karıştırma yöntemiyle PA6 nanokompoziti hazırlanmıştır. Analiz sonuçlarından modifikasyon sayesinde nanokilin PA6 matriste daha homojen bir dağılım gösterdiği belirlenmiş ve ayrıca modifiye HNT eklenen PA6 nanokompozitlerinin saf PA6'ya göre mekanik özelliklerinde ve termal kararlılıklarında artış gözlemlenmiştir [7]. Du ve arkadaşları (2006), HNT'nin yüzeyini APTES ile modifiye etmişlerdir. Elde edilen organokili PP matrise ekleyerek eriyik karıştırma yöntemiyle nanokompozit hazırlamışlardır. Mikroskobik analiz sonuçları, modifiye edilen HNT'nin PP matriste homojen dağıldığını, bu nedenle PP/HNT nanokompozitlerin termal kararlılığının saf PP'ye göre arttğı gözlemlenmiştir [8]. Ning ve arkadaşları (2007), HNT yüzeyini kuaterner amonyum tuzu (metil-tallow-bis-2-hidroksietil amonyum klorür) ile modifiye etmişlerdir. Modifiye edilmiş HNT'yi izotaktik PP matrise ekleyip karıştırarak eriyik karıştırma yöntemiyle PP/HNT nanokompozitler hazırlamışlardır. Mikroskobik analiz sonuçlarından modifikasyonun nanokilin izotaktik PP'de dağılımını arttırdığı ancak nanokompozitlerin mekanik özelliklerinde kayda değer bir gelişme olmadığı gözlemlenmiştir [9]. Pasbakhsh ve arkadaşları (2010), HNT yüzeyini MPS ile modifiye etmişlerdir. Modifiye edilmiş HNT, etilen propilen dien monomer (EPDM) ile karıştırlmıştır. Farklı oranlarda modifiye ve saf HNT içeren EPDM nanokompozitlerin mikroskobik analiz sonuçları incelendiğinde modifiye HNT'nin EPDM matriste çok daha homojen bir dağılım gösterdiği, mekanik özellikleri incelendiğinde ise modifiye HNT içeren HNT/EPDM nanokompozitlerin çekme dayanımları ve çekme modüllerinde saf HNT içeren nanokompozitlere göre artış olduğu gözlemlenmiştir [10].

2.HNT KİLİNE UYGULANANA YÜZEY MODİFİKASYON İŞLEMLERİ

Bir dolgu maddesinin bir polimerin mekanik özellikleri üzerindeki güçlendirme etkileri partiküllerin boyutu, şekli ve en-boy oranı, polimer matrisindeki dağılım derecesi ve dolgu partikülleri ile polimer matris arasındaki arayüzey etkileşimi gibi bir dizi faktöre bağlıdır. HNT doğada hidrofiliktir ve bu nedenle genellikle onları hidrofobik polimerle uyumlu hale getirmek için yüzey modifikasyonu gerektirir, bu da polimer matrisinde kil parçacıklarının topaklaşmasını önler (Şekil 1). Bu amaçla, kil yüzeyi genellikle organik işlem yoluyla

değiştirilir, bu sayede polimerlerle daha etkili bir şekilde etkileşime girebilir ve böylece mekanik özellikleri iyileştirir [11].



Şekil 1.HNT kilinin kimyasal yapısı

İnorganik yapıdaki halloysit (HNT) nanokilinin PS matrisle uyumlu hale gelmesi ve polimer içinde homojen olarak dağılması için stiren-maleik anhidrit kopolimeri (SMA) ile yüzey modifikasyonu yapılarak organokile dönüştürülmüştür. Modifikasyonun başarılı olduğundan emin olmak için FTIR spekturumu alınmıştır. Nano HNT'nin yüzey modifikasyonu için üç farklı kimyasal reaksiyon yöntemi kullanılmıştır. İlk yöntemde nanokil yüzeyleri (3-aminopropil) trietoksisilan (APTES) ile fonksiyonlandırılmış; yüzeydeki serbest –NH2 grupları üzerinden SMA'ların nanokil yüzeyine bağlanması amaçlanmıştır. İkinci yöntemde nanokiller, doğrudan APTES ve SMA ile birlikte reaksiyona sokularak modifiye edilmiştir. Son yöntemde ise nanokiller doğrudan SMA ile modifiye edilmiştir [3].

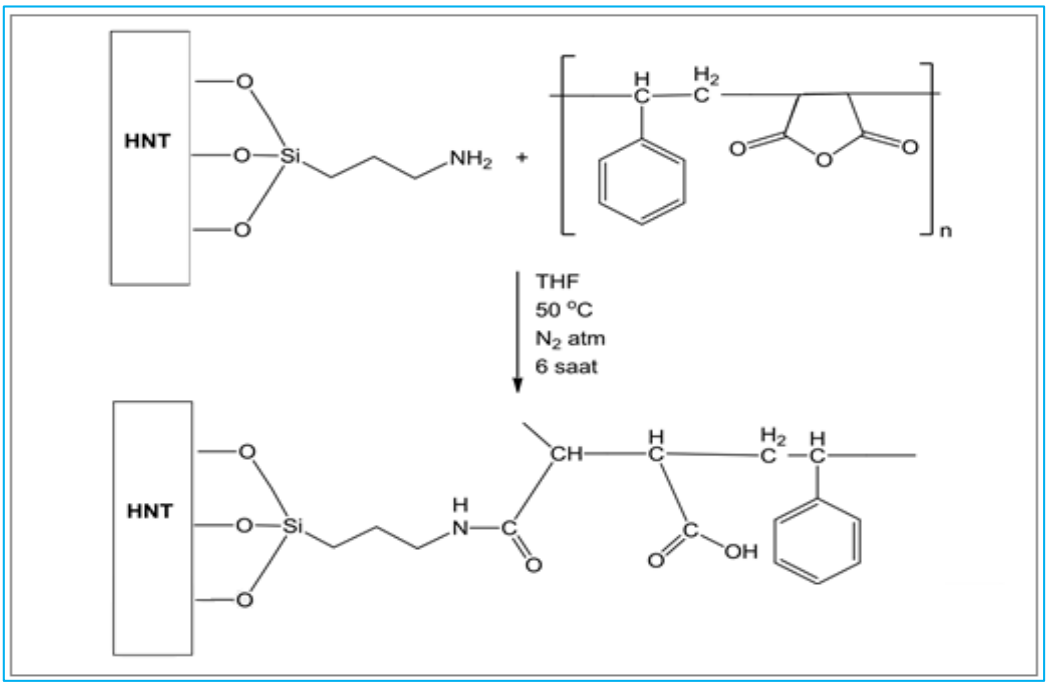
2.1. Halloysit Nanotüpünün Yüzey Modifikasyonu

2.1.1.Halloysit nanotüp yüzeyinin (3-aminopropil)trietoksisilan (APTES) ile yüzey modifikasyonu

Bu yöntemde, 3g HNT ile 3 mL APTES (ağırlıkça 1:1) karıştırılmasıyla elde edilen çözelti, 25 mL mutlak etanol içinde 400 rpm hızında, N_2 atmosferinde ve oda sıcaklığında 24 saat karıştırılır. 24 saatin sonunda santrifüj ile (10000 rpm hızda 10 dk süre) çökelti ayrılır ve üç kez daha mutlak etanolle yıkanır. Daha sonra petri kabına boşaltılır ve 60°C etüvde bir gece bekletilerek kurutulur. Elde edilen organokil stiren monomerine eklenir [12].

2.1.2. (3-Aminopropil) trietoksisilan ile fonksiyonlandırılan halloysit nanotübün stiren-maleik anhidrit kopolimeri ile yüzey modifikasyonu

Yağ banyosu içine yerleştirilmiş üç boyunlu reaksiyon balonuna 2 g SMA kopolimeri, 50 mL THF çözeltisinde 50 °C sıcaklıkta karıştırılarak çözünür. Bu çözeltiye 1 g APTES ile modifiye edilmiş HNT katılır. HNT: SMA oranı ağırlıkça 1:2 alınmıştır. Reaksiyon balonuna takılan N_2 atmosferinde 6 saat boyunca 50 °C sıcaklıkta reaksiyona devam edilir. 6 saatin sonunda santrifüj (10000 rpm, 10 dk) yapılarak ayrılan çökelti, üç kez daha THF ile yıkanır. Böylece reaksiyona girmemiş SMA aşırısı çökeltiden uzaklaştırılır. Petri kabına alınan çökelti 60 °C etüvde bir gece bekletilerek kurutulur (Şekil 2) [3]. Hazır hale gelen modifiye HNT stirene eklenir.

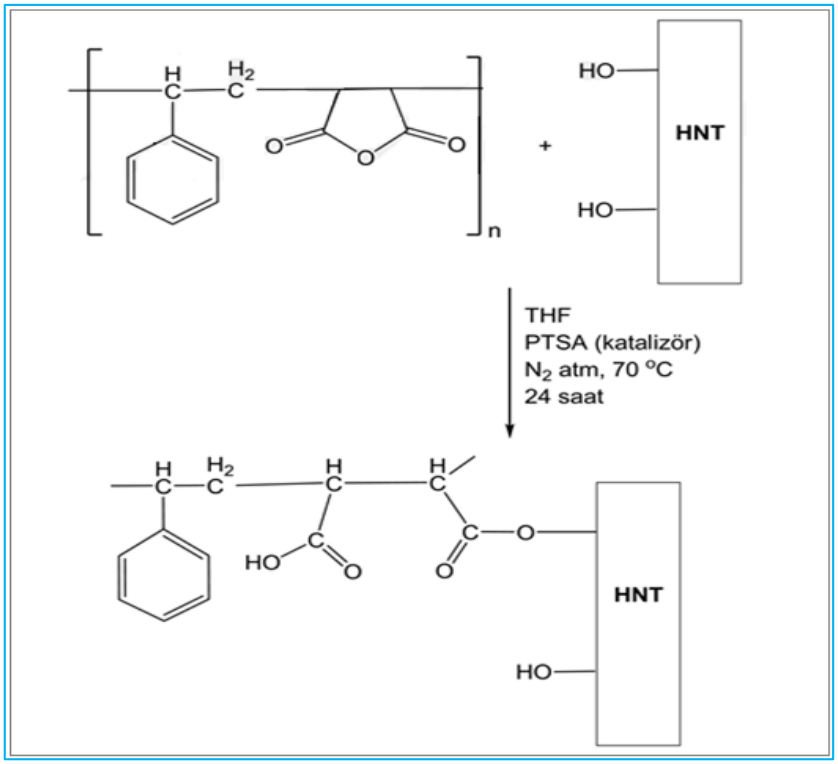


Şekil 2. APTES ile fonksiyonlandırılan HNT'nin SMA ile modifikasyonu [3]

2.1.3.Halloysit nanotüp yüzeyinin doğrudan stiren-maleik-anhidrit kopolimeri (SMA) ile yüzey modifikasyonu

Modifikasyon için 5 g SMA kopolimeri 50 mL THF içinde reflüks edilerek çözünür. Daha sonra çözeltiye 5 g HNT (HNT: SMA oranı ağırlıkça 1:1) katılır. Reaksiyon N_2 atmosferinde gerçekleştirilir. Reaksiyona, reaktanların toplam ağırlığının %4'ü kadar *p*-toluen sülfonik asit (PTSA) katalizör olarak katılır ve 24 saat boyunca reaksiyona devam edilir. Süre sonunda santrifüj (10000 rpm, 10 dak süre) yoluyla ayrılan çökelti, reaksiyona girmemiş SMA'nın

uzaklaştırılması için üç kez daha THF ile yıkanır. Petri kabına alınan çökelti 60°C etüvde bir gece bekletilerek kurutulur [3]. HNT yüzeyindeki hidroksil gruplarıyla SMA kopolimerindeki anhidrit grubu arasındaki ester bağı oluşumu Şekil 3'te verilmiştir.



Şekil 3. HNT yüzeyinin doğrudan SMA ile modifikasyonunun kimyasal yapısı [3]

3.SONUÇ

HNT'nin yüzey modifikasyonu için kullanılan kimyasallar sadece SMA, APTES ile sınırlı değildir. Yüzey modifikasyonu için kullanılan bütün kimyasallar HNT'nin polimer matriste homojen olarak dağılmasını sağlamış ve böylece HNT ile PS matris arasındaki sinerjik etkileşimin artmasına neden olmuştur. Bu da, HNT takviyeli PS nanokompozitlerin mekanik, termal ve yanmazlık vb.özelliklerin daha fazla gelişmesine neden olmuştur.

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(COVID-19 PANDEMİ KRİZİ SONRASI TARIMSAL GİRDİLERİN DURUMU: MINERAL VE ORGANIK GÜBRE ÖRNEĞI)

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ÖZET

Gübre, sürekli bir şekilde tarımsal girdiler arasında popülerliğini korumaktadır. Sürdürülebilir tarım ve toprak yönetiminde doğru gübrelemenin önemi giderek artıyor. Mineral gübreler, bitkilerin büyümesini sürdürmek için toprağa eklenen tamamen veya kısmen sentetik kökenli herhangi bir inorganik malzeme olarak tanımlanır. Öte yandan, organik gübreler, bitki büyümesi için gerekli besinleri içeren doğal organizmaların kalıntılarından veya yan ürünlerinden türetilen maddelerdir. Ayrıca organik gübreler tarımsal ve evsel atıklardan elde edilebildiği için çevre dostu ve ekonomiktir. Mineral gübrelerde NPK oranı ortalama %20-60 arasında iken, organik gübrelerde oran ortalama %10-15 arasındadır. Mineral gübreler (örneğin, amonyum sülfat, amonyum fosfat, süper fosfat, amonyum nitrat, üre, amonyum klorür ve benzerleri), ürün için gerekli olan ve her zaman anında tedarik için hazır olan üç temel besin maddesi (N, P, K) bakımından eşit derecede zengindir. Mineral gübreler (örneğin, amonyum sülfat, amonyum fosfat, süper fosfat, amonyum nitrat, üre, amonyum klorür ve benzerleri), ürünler için gerekli olan üç temel besin (N, P, K) bakımından eşit derecede zengindir ve gereksinim duyulduğunda talep edilirse bitkilere besin tedariği durumunda her zaman hazırdır. Ancak organik gübreler (örneğin solucan gübresi, guano, kompost, yeşil gübre, inek gübresi, pamuk tohumu küspesi, kan unu, kanatlı gübresi, kanalizasyon çamuru, yarasa gübresi ve benzerleri) toprağa doğal besinler ekler, toprağın organik maddesini arttırır, toprağı iyileştirir. Toprağın yapısal düzeyini ve kalitesini, su tutma kapasitesini iyileştirir, toprakta kabuklanma sorunlarını azaltır, rüzgar ve sudan kaynaklanan erozyonu azaltır, besin maddelerinin yavaş ve tutarlı salınımını azaltır. Dezavantajları olarak, birçok mineral gübrenin yüksek asit içeriği vardır. Mineral gübreler sentetik malzemeden üretilmektedir. Organik gübrelerin yavaş salınım

kabiliyeti olmasına rağmen, organik gübrelerdeki besin dağılımı eşit değildir. Organik gübreler, canlılardan elde edilen malzemelerden yapılır. Mineral gübreler, kilo başına daha fazla besin içerdiğinden daha ucuzdur. Ancak pandemiden sonra mineral gübrelerin fiyatı çok arttı. Özellikle doğal kaynakların tükenmesi, işçilik ve enerji maliyetlerinin aşırı artması mineral gübrelerin üretim maliyetlerini artırmış ve bu da fiyatları olumsuz etkilemiştir. Organik gübre pound başına daha ucuz olabilir, ancak aynı düzeyde besin için daha fazlasına ihtiyaç duyulduğu için hepsinden daha pahalıdır. Genel bir karşılaştırma yapıldığında 2022 yılı için organik gübre fiyatının mineral gübrelerden daha yüksek olmadığı anlaşılmaktadır. Covid-19 Pandemi Krizi sonrasında tarımsal üretim sistemindeki dengeler de değişmeye başladı.

Anahtar Kelimeler: Organik gübre, mineral gübre, solucan gübresi, atık, fiyat, covid-19 pandemi krizi.

STATUS OF AGRICULTURAL INPUTS AFTER THE COVID-19 PANDEMIC CRISIS: THE CASE OF MINERAL AND ORGANIC FERTILIZERS. A REVIEW

ABSTRACT

Fertilizer undoubtedly maintains its popularity among agricultural inputs. The importance of correct fertilization in sustainable agriculture and soil management is increasing. Mineral fertilizers are defined as any inorganic material of wholly or partially synthetic origin that is added to soil to sustain plant growth. On the other hand, organic fertilizers are substances that are derived from the remains or byproducts of natural organisms which contain the essential nutrients for plant growth. In addition, organic fertilizers are environmentally friendly and economical as they can be obtained from agricultural and domestic wastes. While the ratio of NPK in mineral fertilizers is between 20-60% on average, the ratio in organic fertilizers is between 10-15% on average. Mineral fertilizers (e.g., ammonium sulfate, ammonium phosphate, super phosphate, ammonium nitrate, urea, ammonium chloride and the like) are rich equally in three essential nutrients (N, P, K) that are needed for crops and always ready for immediate supply of nutrients to plants if situation demands. However, organic fertilizers (e.g., vermicompost, guano, compost, green manure, cow manure, cottonseed meal, blood meal, poultry manure, sewage sludge, bat dung and the like) add natural nutrients to soil, increases soil organic matter, improves soil structure level and quality, improves water holding capacity, reduces soil crusting problems, reduces erosion from wind and water, slow and consistent release of nutrients. As disadvantages several mineral fertilizers have high acid content. Mineral fertilizers are manufactured from synthetic material. However organic fertilizers have slow-release capability, distribution of nutrients in organic fertilizers is not equal. Organic fertilizers are made from materials derived from living things. Mineral fertilizers turn out to be cheaper because they pack more nutrients per kg of weight. But after the pandemic, the price of mineral fertilizers increased a lot. Especially the depletion of natural resources, excessive increases in emptia, labor and energy costs increased the production costs of mineral fertilizers and this had a negative impact on prices. Organic fertilizer may be cheaper per pound but works out to be more expensive over all because more of it is needed for the same level of nutrients. When a general comparison is made, it is understood that the price of organic fertilizers for 2022 is not higher than mineral fertilizers. After the Covid-19 Pandemic Crisis, the balances in the agricultural production system also tended to change.

Keywords: Organic fertilizer, mineral fertilizer, vermicompost, waste, price, covid-19 pandemic crisis.

INTRODUCTION

Increasing world population has resulted in higher consumption of goods and services that has driven a substantial increase of organic wastes originating from households, industry and agriculture (Hoornweg et al., 2013). In the past, farmers used organic waste from cities to amend soils but with the development of the chemical and food industry in the twentieth century, this waste was no longer of interest (Barles 2014). With growth and development of the communities, the amount of urban solid waste increases, which is nowadays considered one of the serious problems for humans' life; because increasing use of mineral fertilizers and pesticides in agricultural ecosystems have created numerous and important problems such as food chain disruption, destruction of soil resources, and resistance of pest to pesticides. Organic fertilizer production and application and the use of biological control methods aid in solving many agricultural problems (Najar and Khan, 2013). Fertilizers are used to improve soil fertility but intensive inorganic fertilizer usage in agriculture causes so many health problems and unrecoverable environmental pollution. Thus, to reduce and eliminate the adverse effects of mineral fertilizers on human health and environment, now-a-days a new agricultural practice have been developed called as organic agriculture, sustainable agriculture or ecological agriculture (Aksoy, 2001; Chowdhury, 2004). The industrial revolution followed by green revolution caused an increase in yield per unit area in crop production, but they also increased the use of synthetic fertilizers in agriculture. Intensive mineral fertilizer usage in agriculture causes so many health problems and unrecoverable environmental pollution. To reduce and eliminate the adverse effects of mineral fertilizers on human health and environment, new agricultural practices have been developed that all so-called organic agriculture. The organic fertilizers include peat, animal wastes, plant waste from agriculture, and treated sewage sludge whereas inorganic fertilizers include chemicals like ammonium nitrate, potassium chloride, urea, NPK etc. (Sharma and Chetani, 2017).

Although agriculture at the global level has become more efficient, in recent years, competition for natural resources has intensified owing to consumption patterns driven mainly by population growth, changing dietary patterns, industrial development, urbanization, covid-19 pandemic crisis and climate change. Finally, pressure on natural resources will be driven not only by changes in demand, but by changes in climate. Unconscious use of agricultural inputs, land degradation (example of reduction of organic matter, especially in agricultural soils), decrease in agricultural land, growing population, deforestation and water scarcities are among the most visible manifestations of this unsustainable competition. These and similar problems should be solved urgently, and the number of academic studies on these issues should be increased. When

it comes to agriculture, it is very important for the producers to use their agricultural inputs correctly, both economically and environmentally.

As the world accelerates towards its urban future, the rate of waste generation is faster than the rate of development. Waste is strictly linked to urbanization and economic development. The inadequate management of waste disposal has degraded the quality of the natural resources on regional, state, country basis and even globally. However, with good planning and knowledge, animal and agricultural wastes can be converted into organic fertilizer. Vermicomposting is the preferred form of composting as it results in the formation of organic fertilizer called "vermicompost" due to the presence of rich plant nutrients and growth promoting factors in it. Unless measures are taken, solid wastes will continue to be a problem for the world and will remain on the agenda as another cause of food hunger. Worldwide, approximately 1.3 billion metric tons of solid waste is being generated now-a-days. This amount is nearly twice of that were being generated a decade before. It is estimated that solid waste generation will be doubled by 2025 (Hoornweg and Bhada-Tata, 2012). Composting and vermicomposting are examples of the reuse of organic waste. An alternative method to stopping the increase in mineral fertilizer prices can be to increase composting and vermicomposting production and applications. However, this may be more possible with education and encouragement.

After the pandemic crisis, the most activity in the organic fertilizer sector is in "vermicompost production", and there are many academic studies on this subject (Aslam et al., 2021; Aslam et al., 2020; Bellitürk, 2018; Bellitürk, 2018a; Bellitürk, 2016; Bellitürk et al., 2015). Vermicompost, an organic fertilizer rich in NPK, micronutrients and beneficial soil microbes (nitrogen fixing and phosphate solubilizing bacteria and actinomycetes), is a sustainable alternative to chemical fertilizers, which is an excellent growth promoter and protector for crop plants (Sinha et al., 2011; Chauhan and Singh, 2015).

Today, the cost of production has increased many folds in the classical agricultural production system. Use of organic fertilizers like vermicompost could be an effective solution to the problem where it could substitute the chemical inputs (e.g., mineral fertilizers) in crop productivity and reduce the economic cost and on the other hand may also lead to organic produce which fetches higher price in the global market. The increase in living standards around the world has created a growing demand for such organic produce, or cultivation using only natural pesticides and organic fertilizers, which are perceived to be healthier for consumers and environment friendly. Traditional methods in agricultural production must be replaced by modern and rational-environmental methods. In this study, mineral and organic fertilizers were compared, taking into account the current excessive input cost increases. Apart from this, it has

been tried to mention the excessive price increases in fertilizer inputs in agriculture after the pandemic crisis. Finally, there is an increasing global concern for adverse effects of inorganic fertilizer and pesticides applied to agricultural soils.

Fertilizer prices often change according to the foreign exchange and energy prices that change from day to day. For these reasons, an evaluation of fertilizer prices was not made in this study. It was emphasized that only fertilizers are among the agricultural inputs that increased the most. Energy prices are increasing frequently, which creates the most negative situation as the increase in mineral fertilizer prices. As a solution to this problem, organic fertilizers to be obtained from wastes come to mind first. In this study, some important evaluations were made by considering the differences between organic and mineral fertilizers. Aim of this paper reviews the current sate of knowledge of organic fertilizer and mineral fertilizer in summary, then comparison of them after covid-19 pandemic crisis.

IMPORTANCE OF FERTILIZERS

Fertilizer is one of the most important inputs in sustainable agriculture. But whether it is mineral or organic fertilizers, they differ from each other in terms of their effects. Mineral fertilizers are produced synthetically from inorganic materials. Since they are prepared from inorganic materials artificially, they may have some harmful acids, which stunt the growth of microorganisms found in the soil helpful for plant growth naturally. They're rich in the three essential nutrients needed for plant growth. Some examples of mineral fertilizers are ammonium sulphate, ammonium phosphate, ammonium nitrate, urea, ammonium chloride and the like. Organic fertilizers are substances that are derived from the remains or by products of organisms. Organic fertilizers depend upon the microorganisms found in soil to break them down and release the essential nutrients. Organic nutrients are rich in phosphorous, nitrogen, and potassium, but in unequal proportions. Examples of organic fertilizers are cottonseed meal, blood meal, fish waste compost, and cow-cattle manure and sewage sludge. There are two types of organic fertilizers: Frst is the synthetic type which is organic compound produced artificially (e.g., urea, a common organic fertilizer); the other type is natural organic fertilizers because 100% of the ingredients used to create a typical natural organic fertilizer come from nature (e.g., fish extract, seaweed and manure, guano, and compost-vermicompost materials).

Fertilizers are used to provide nutrients to the plants for their good growth. Soil nutrients' deficiency is the prevalent problem among home-garden owners. One of the distinct advantages of mineral fertilizers over organic fertilizers is that mineral fertilizers are rich equally in all three essential nutrients: nitrogen (N), phosphorous (P), and potassium (K). On the other hand,

organic fertilizers may be rich in one of the three nutrients, or may have low levels of all the three nutrients.

Organic manuring is becoming an increasingly significant part of environmentally healthy, long-term farming. Plant nutrients are replenished in agricultural soils primarily through inorganic, organic, and biofertilizers (Havlin and Heiniger., 2020). Most cultivated soils in the world have less than 1.5% organic matter, although a good agricultural soil should have at least 2% organic matter. The use of organic manure in conjunction with chemical fertilizers can significantly boost rice output and soil productivity (Kakar et al., 2020). Organic matter level in many agricultural areas in Türkiye has decreased to around 1%. Nowadays, many experts are doing research on the use of organic fertilizers (Bellitürk, 2016; Bellitürk, 2018; Bellitürk, K. and Soytürk, 2020; Mumcuoğlu and Bellitürk, 2021).

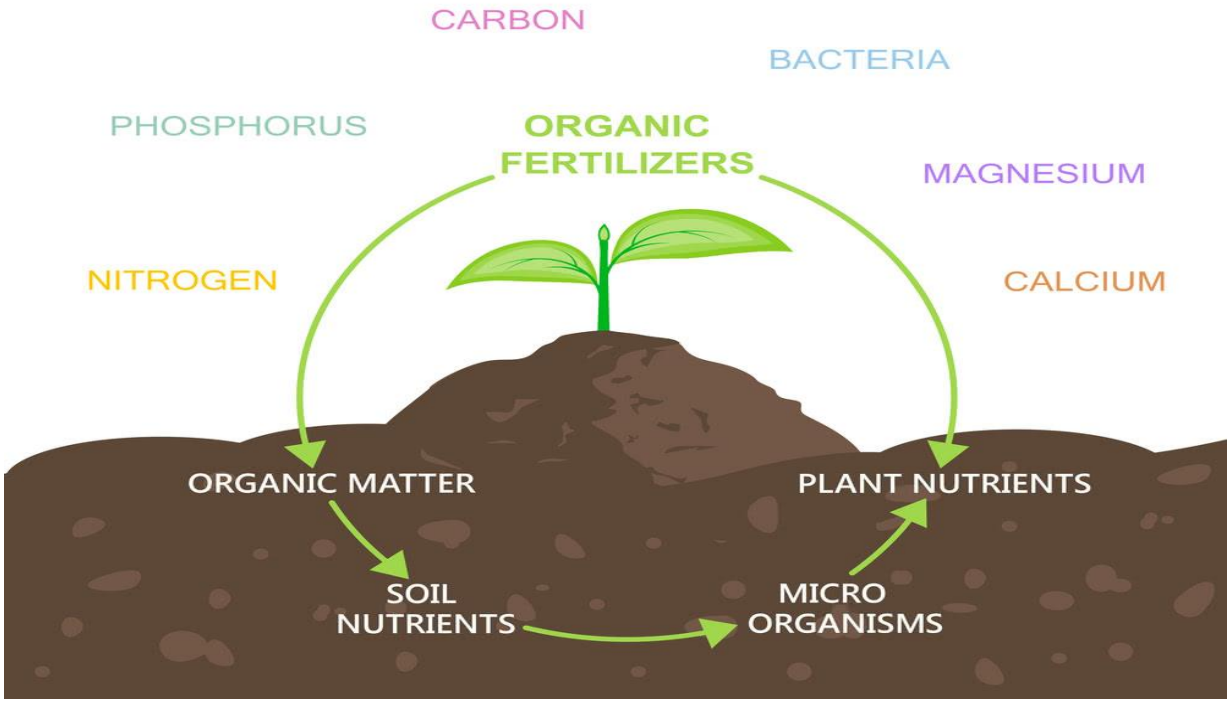


Figure 1. Organic fertilization and its components (https://www.ammanfarms.com/organic-fertilizer).

Before the pandemic crisis (before the covid 19 crisis in the world); organic fertilizers are generally much more expensive than chemical fertilizers, mostly because chemical fertilizers have more concentrated levels of nutrients per weight of product than organic fertilizers do. One needs several pounds of organic fertilizer to provide the same soil nutrient levels that a single pound of mineral fertilizer provides, and the higher cost of organic fertilizer is one of the biggest reasons that organic produce is more expensive than non-organic. (The other big reason

being lower organic yields, on average.) Although it is possible to make a lot of one's own organic fertilizer as well, once the labor, time, and other resources are accounted for, homemade organic fertilizer is usually more expensive than store-bought mineral fertilizer too. But after the pandemic crisis, the situation changed. The importance of natural resources used in the production of mineral fertilizers was realized. Mineral fertilizer producers made price increases, citing energy costs as a reason. These price increases were 3-5 times higher for some mineral fertilizers (for example, urea). Labor and transportation costs also increased day by day, and thus the prices of mineral fertilizers put the purchasing power of the farmers into a difficult situation. Some mineral fertilizer manufacturers have added organo mineral fertilizers to their product range. However, this did not prevent price increases. In this situation, farmers began to look for alternative ways. They began to resort to the production of organic fertilizers. Today, it is observed that there is an increase in organic fertilizer production day by day. It is seen that compost and vermicompost are the most common organic fertilizers. Vermicompost, which was more expensive than mineral fertilizer a few years ago, can now be sold cheaper than mineral fertilizers. The biggest reason for this is the increase in support and incentives for the evaluation of organic wastes and the awareness of organic fertilizers in producers.

Vermicompost expression is a word which is used for the final product (humus-like material) of composting procedure of organic waste materials by soil worms. There are lots of organic food sources for worms which may leads to vermicompost production: various animal faeces (sheep, cow, horse, rabbit and etc.), the waste of forest productions, kitchen waste materials, the waste of pruning and harvesting of grass, fruit and vegetable gardens, waste papers, and other organic sourced materials. In other words, these organic wastes can be digested in worm's digestive systems via lots of microorganisms and reformed to odorless material which is so rich in organic content which the material is named: "vermicompost" (Belliturk, 2016; 2018 and 2018a). There are two phases involved in vermicomposting process (Fig. 1): (a) In active phase, earthworm digestion process modifies physical and microbial characteristics of waste materials and (b) In maturation phase, earthworm left the matured portion of the compost and move to the fresh undigested layers. Fig. 2 shows the processes involved in GAPs and CAPs with a basic mechanism of organic degradation and cast production (Samal et al., 2019). Earthworms used to obtain vermicompost are epigeic species and feed on rot. Most of the species enriched the humus profile with amorphous organic matter finely incorporated within a mineral matrix. Besides different food selection, a network of burrows was produced as a consequence of the different burrowing behaviour of each earthworm species (Bernier, 1998). Coming back to Darwin, there is renewed interest in the feeding activities of earthworms and their

roles in earth surface processes of importance in archaeological sites, including the transport of soil, stones and seeds, and the production of calcium carbonate granules which may have preserved palaeo-environmental information (Canti, 2003).

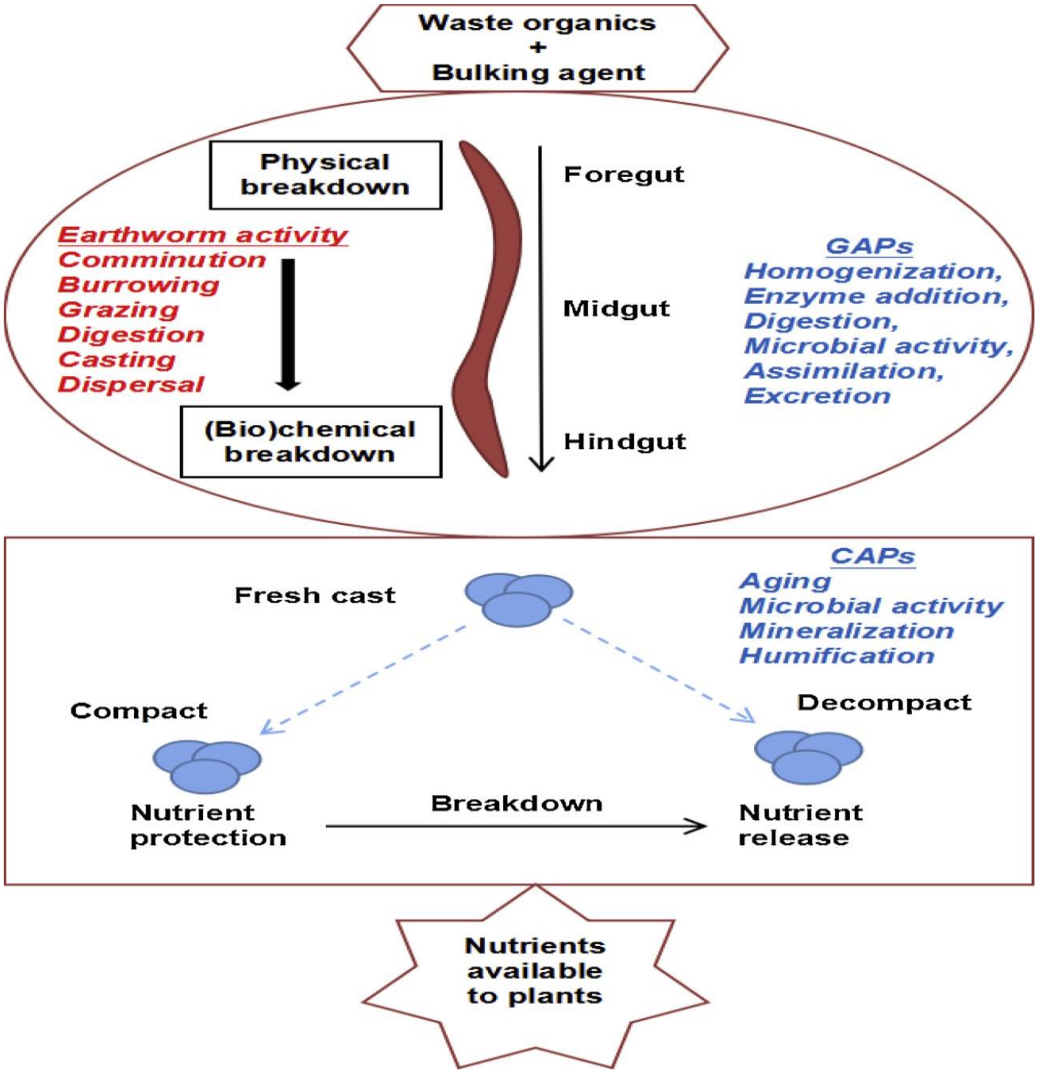


Figure 1. Processes involved organics degradation by earthworm and cast production (Samal et al., 2019).

For agriculture and aquaculture to respond to future challenges, innovation will not only need to improve the efficiency with which inputs are turned into outputs, but also conserve scarce natural resources and reduce waste (OECD, 2011; Troell et al., 2014). The reduction of wastes is placed at the top of waste management hierarchies because the best means of waste management is to reduce waste by not creating it in first place. The reduction of wastes can also be achieved through the reuse of products. The reduction and reuse of wastes saves natural resources, reduces generation of wastes and reduces the costs associated with waste disposal (USEPA, 2010). Vermicomposting convert waste to wealth in a safe and healthy way, because

it is done by biopotential of earthworm. Vermicompst is a good organic fertilizer that decreases environmental pollution. It contains plant growth hormones, enzymes, microbial population, and free of small animals and harmful pathogens such as “salmonella”. Application of such a microbiologically active organic substrate may have important effects on the microbial properties of the media (Alidadi et al., 2014). While there are many systems for the production of vermicompost, one of the best methods is a flow through system. One of the best examples of this is produced by the Riverm Company operating in Türkiye. The company's production is in Tekirdag province (Fig. 2). This system is well suited to indoor facilities. In indoor space the concrete surface is constructed in the pit to prevent predators gaining access to the earthworm population. The flow through system eliminates the need to separate worms from the casting before packaging, because the worms are already moved forward to the new feed pile.



Figure 2. Picture of vermicomposting flow through system of cattle manure in Tekirdağ, Türkiye.

Today vermicompost is an important component of organic farming systems, because it is easy to prepare, has excellent properties, cheap and is harmless to plants and also environmentally friendly. Vermicompost improves the physical, chemical and biological properties of the soil as well contributes to organic enrichment (Ansari and Jaikishun, 2011; Chauhan and Singh, 2013; Bellitürk, 2016; Bellitürk, 2018, Aslam et al., 2020; Aslam et al., 2021). The differences between organic fertilizers and mineral fertilizers are shown in Fig. 3 below. The most important issue in Fig. 2 is that mineral fertilizers are only for plants, but organic fertilizers provide multi-faceted benefits, including for plants.

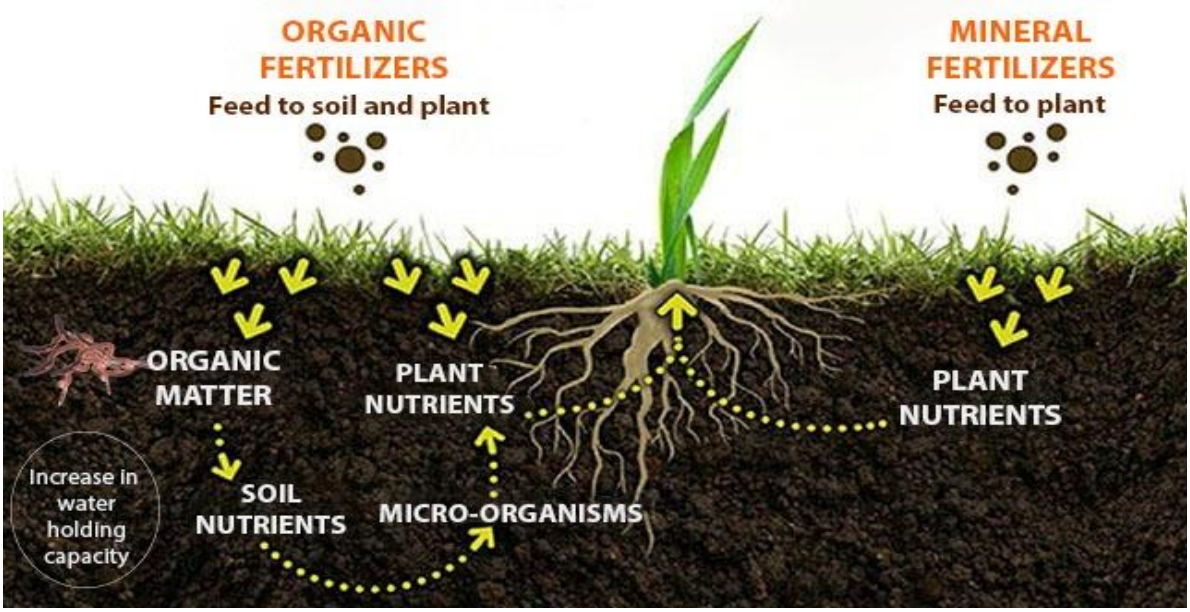


Figure 3. Important differences between mineral and organic fertilizers.

Plants can take up only nutrients that are in solution, dissolved in soil water, regardless of whether they come from organic or mineral fertilizer sources. Nutrients in mineral fertilizers are usually immediately available to plants. Organic fertilizer nutrients are not all as quickly available; they release some of their nutrients more slowly, over the course of weeks or months. Nutrients from either organic or mineral fertilizer can be lost and run off to surface or ground water if plants do not use them. Most naturally occurring soil nutrients are tied up in insoluble forms. They become available to plants only after they are converted to soluble forms, through weathering or biological decomposition (Anonymous, 2022). The price of fertilizers seems to increase continuously. However, agricultural production also has to be continued. So, it doesn't seem right to complain about mineral fertilizer price increases. What needs to be done is to search for alternative fertilizer sources. In this regard, composting and vermicomposting is a very convenient way especially in Türkiye conditions. The government needs to find more attractive methods to encourage producers to use this fertilizer. Training activities, incentives, public service announcements and other supports should be increased for the production and use of organic fertilizers, which also allow the evaluation of wastes, for agriculture-landscape purposes. It would never make sense to stop agricultural production by citing fertilizer price increases. The needs of the growing population are also increasing. Due to the increasing population, the wastes are also increasing. Therefore, more academic and scientific studies should be carried out on the production of organic fertilizers in waste management and the results should be applicable.

CONCLUSION

Mineral fertilizers are partially or completely synthetic in origin. Plants get many of their nutrients from the soil. The quantity of nutrients decreases if plants absorb them. Urea, NPK, ammonium nitrate, super phosphate are chemical nutrients that make the soil sustain plant growth. Organic farming farmers use bio-fertilizers, instead of using mineral fertilizers and synthetic pyrethroids, to get higher yielding. To maintain soil productivity organic farming came into existence and farmers use natural manures and natural pest-controlling methonds and also, they are practicing crop rotation and mixed crop systems. This review suggests that the use of organic fertilizers and amendments are eco-friendly, cheap and has got an upper edge as compared to mineral fertilizers which causes environment pollution and also might get accumulated in the soil leading to human health hazards. As a result of preceding discussion, the difference between mineral fertilizers and organic fertilizers are mineral fertilizer is any inorganic material of wholly or partially synthetic origin that is added to soil to promote plant growth. Organic fertilizers are substances derived from organisms' remains or byproducts. Indeed, organic fertilizer had a greater effect on soil, plant growth, and yield than compost, probably due to other parameters such as microbiology, mineralization potential. While mineral fertilizers are beneficial only to plants, organic fertilizers are beneficial to the soil, plant and environment. The available literature proves that organic fertilizer technology (e.g., vermicomposting, composting) is one of the most sustainable methods to manage various organic-rich solid and liquid waste. Today, the recycling of organic wastes is given extreme importance in the World and in Türkiye. State supports and incentives have given a new impetus to waste management in Türkiye. This situation, besides preventing the price increases of agricultural inputs, also provides benefits for the recycling of wastes that can turn into organic fertilizers and protecting the environment. Increasing the awareness of farmers in Türkiye, giving more importance to organic fertilizers after the pandemic crisis, protecting the environment and increasing the quality and quantity of agricultural products are among the future targets.

CONFLICTS OF INTEREST

There is no conflict of interest.

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TARLA BİTKİLERİ YETİŞTİRİCİLİĞİNDE VERMİKOMPOST KULLANIMININ ÖNEMİ

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ÖZET
İklim değişikliği, küresel ısınma, ormansızlaşma, su ve toprak varlıklarının deformasyonu gibi çevreyi ve tarımsal üretimi baskılayan daha birçok konuda bilimsel çalışmaların sayısı artmaktadır. Çünkü geri dönüşü ve kazanımı mümkün olmayan sorunlar tüm insanlığı tehdit eder duruma gelmiştir. Tarımsal üretimin sosyo ekolojik sistemlerle entegrasyonu iklim değişikliği kırılganlık indekslerine göre planlanması zorunluluk haline gelmiştir. Tarımsal üretimde maliyetlerin düşürülerek kimyasal ve yakıt kullanımını azaltıcı toprağın kalitesini ve yapısal özelliklerini koruyucu ve iyileştirici ve aynı zamanda üreticilerin çevresel ve kaynak verimliliği konusundaki farkındalıklarını artırıcı imkan ve uygulamaların yaygınlaştırılması gerekmektedir. Tarımsal üretimde gıda güvenliğini ön planda tutarak artan dünya nüfusu için daha fazla gıda üretimine ihtiyaç olacağı öngörülmektedir. Dünyada çevresel sorunlarla birlikte ön görülen gıda krizinin 2050 ve 2070 yıllarında daha da kronik bir sorun olabileceği düşünülmektedir. Gıda açlığının çözümünde bitkisel üretim ve tarla bitkileri "stratejik" bir yere sahiptir. Çünkü insanların beslenme, giyinme, barınma ve tedavi gibi temel ihtiyaçlarını büyük düzeyde karşılayan en önemli ürünler tarla bitkileridir. Dünya'da bu amaçlarla tarımı yapılan ve yüksek öneme sahip 20 kültür bitkisi de tarla bitkisidir. Yapılan bitkisel üretimlerde çevre ve tarım dostu uygulamalar ekosistem hizmetlerinin sürdürülebilirliği açısından önemlidir. Son yıllarda Türkiye'de ve Dünya'da kullanımı hızla yaygınlaşan vermikompost gübresi tarla bitkileri üretiminde sık kullanılan doğa dostu bir gübredir. Bu çalışma ile tarla bitkileri yetiştiriciliğinde vermikompost kullanımının kazanımları ve önemi araştırılmıştır. Konuyla ilgili birçok bilimsel araştırma sonuçlarına göre, vermikompost gübresi uygulanan bazı tarla bitkilerinde tüm bitkisel kalite parametrelerinde olumlu sonuçlar elde edilmiştir. Özellikle verimde birim alandan elde edilen ürün miktarlarında başarılı sonuçlara ulaşılmıştır.

Anahtar Kelimeler: İklim değişikliği, Tarla bitkisi, Toprak kalitesi, Vermikompost, Tarımsal üretim

THE IMPORTANCE OF USING VERMICOMPOST IN FIELD CROPS CULTIVATION

ABSTRACT

The number of scientific studies is increasing on many issues that suppress the environment and agricultural production, such as climate change, global warming, deforestation, deformation of water and soil assets. Because the irreversible and future-proof problems have become a threat to all humanity. Integration of agricultural production with socio-ecological systems has become a necessity to be planned according to climate change vulnerability indexes. Opportunities and practices that reduce the use of chemicals and fuel in agricultural production, protect and improve the quality of the soil and its structural properties, and increase the awareness of producers on environmental and resource efficiency, should be expanded. It is predicted that more food production will be needed for the increasing world population by keeping food safety in the forefront in agricultural production. It is thought that the food crisis, which is foreseen together with environmental problems in the world, may become a more chronic problem in 2050 and 2070. Crop production and field crops have a "strategic" place in the solution of food hunger. Because field crops are the most important products that meet the basic needs of people such as nutrition, clothing, shelter and treatment at a great level. 20 cultivars of high importance, cultivated for these purposes in the world, are also field crops. Environment and agriculture-friendly practices in plant productions are important for the sustainability of ecosystem services. Vermicompost fertilizer, which has become widespread in Turkey and the world in recent years, is a nature-friendly fertilizer that is frequently used in the production of field crops. In this study, the benefits and importance of the use of vermicompost in the cultivation of field crops were investigated. According to the results of many scientific researches on the subject, positive results were obtained in all plant quality parameters of some field crops applied with vermicompost fertilizer. Particularly, successful results were achieved in the amount of product obtained from unit area in yield.

Keywords: Climate change, Field crop, Soil quality, Vermicompost, Agricultural production

1.INTRODUCTION

The concept of sustainability in agricultural production is one of the most frequently discussed issues during and after the covid 19 pandemic. Conservation of natural assets on the basis of sustainability is possible with correct and rational use. Various negative ecological results in developed and developing countries have revealed the necessity of new alternative production strategies, techniques and technologies with a correct and determined management in agricultural production today. New alternative methods of agricultural production must be productive and cost-effective, suitable for future needs and constraints, and above all ecological and sustainable.

For the continuation of agricultural activities, it is necessary to protect and increase the quality of all components, especially soil and water assets. Since soil is one of the most important components of agricultural production, maintaining quality parameters and reaching optimum conditions are very important in terms of food security and food hunger. In a process where climate change is frequently discussed, it has become a necessity to take some measures in order not to adversely affect the soils, especially in arid and semi-arid regions. The most effective and long-term method that will benefit from these measures is agriculture and environmentally friendly approaches. Especially in agricultural production, the frequent cycle of plant and animal production has led to an increase in vermicompost production.

Vermicompost fertilizer is an important component that increases soil quality in terms of economic and local resources use (Kırpık et al., 2017). Vermicompost is an agriculture-friendly organic fertilizer because it is not released quickly, that is, it has a feature that increases the level of agricultural production and reduces the loss of nutrients, and physical, chemical, biological and microbiological improvements are observed in the soil used. Some of the contributions they provide to the soil can be counted as having a soil conditioner feature, containing enough useful plant nutrients, controlling some pesticides and plant diseases, increasing the product yield by increasing the soil quality, being an environmentally friendly and economical fertilizer when used in the long term (Bellitürk, 2016) .

Vermicompost fertilizer, whose usage area has increased rapidly in agricultural production with the contributions it has made to the soil and the environment in the last period, has also gained momentum in agricultural practices related to field agriculture. In the studies on the use of vermicompost in the cultivation of field crops, it has been observed that vermicompost improves the drought tolerance, makes the storage plant nutrients available in the soil, increases the plant biomass production, and increases the enzyme activities and the use for photosynthesis in some oil plants (Bowden et al., 2010). It has been determined that some legumes, which use

vermicompost in their cultivation and fix nitrogen to the soil, have a healing effect on the soil (Jatt and Ahlawat, 2006). In this study, the potential for use of vermicompost fertilizer in the cultivation of field crops, its contribution to the plant and the soil, the difficulties and conveniences of growing field crops were examined.

2. WHY USE VERMICOMPOST FERTILIZER?

In today's farming scenario, the main concern of researchers and farmers is to sustainably increase crop productivity to maintain soil fertility and protect the environment. Therefore, vermicompost application has great potential to promote plant growth and especially grain yield, which is an important quality parameter in field crops, while maintaining the soil environment (Ahmad et al., 2022). Vermicompost is a material produced by the digestion of organic material by earthworms, which has more positive effects on plant growth, soil improvement, plant health and the environment than normal compost (Fritz et al., 2012; Belliturk et al., 2013; Belliturk et al., 2015). Vermicomposting is also defined as the conversion of organic wastes into bio-fertilizers by earthworms, and this technology is widely used in organic solid waste governance systems (Manyuchi et al., 2013). Earthworms are living things that provide important services to both natural and agricultural ecosystems.

Earthworms contribute significantly to soil fertility through plant nutrient mineralization (Bellitürk, 2016). In many scientific studies in which vermicompost application has been made, various results have been obtained indicating that there are various advantages, earliness and yield increases (Açıkbaş and Bellitürk, 2016; Görres et al., 2015; Bellitürk et al., 2016; Bellitürk et al., 2017). 97% of the plant nutrients in vermicompost, especially N, P and K, can be taken directly by the plant. Accordingly, Barley (1961) reported that in vermicompost, the amount of usable nitrogen in the rich top soil is 5 times, the amount of potassium 7 times, and the amount of calcium 3 times more. Organic matter is the main component of soils (Bellitürk et al., 2019). The organic matter content of vermicompost applied soils increases the mineralization in the soil and contributes to the usefulness of plant nutrients. Worms significantly affect the structural dimension of the soil, the productivity level and plant production. It can positively improve the balance of the soil through feeding and gallery opening activities. It can increase the penetration of water into the soil, accelerate the mixing of organic matter, lime and fertilizers applied to the surface with the soil, and increase the level of porosity. In addition, it has been proven by both laboratory and field conditions that they support plant root development, significantly reduce the rate of root diseases, increase meadow and crop yield and grain quality. In many countries, it has been determined that inoculation of earthworms in soils increases meadow yield by 10%

to 75%, growth of cereal crops by 39%, seed yield by 35%, and nitrogen content of seed by 12%. In addition, in greenhouse studies, it was determined that they significantly affected plant yield, as well as increased wheat and alfalfa quality. For example, Aporrectodea caliginosa was found to increase cereal and alfalfa plant biomass by 39% and 21%, respectively. It was also determined that this species increased the seed yield by 35% and the seed nitrogen content by 14%. It is also known that earthworms play an important role in the nitrogen cycle in the soil (Mısırlıoğlu, 2011; Tomati and Gali, 1995).

The nutritional value of composts is lower than vermicompost. This is due to the higher rate of mineralization and humification caused by worm activity (Joshi et al., 2015). It also has a lot of porosity, drainage, aeration and water storage capacity (Manivannan et al., 2009; Kılbacak et al., 2021). Vermicompost increases the activity of microorganisms such as bacteria, fungi and actinomycetes, making it ideal for plant growth (Ferreras et al., 2006). Vermicompost contains nutrients found in the plant such as nitrates, exchangeable potassium, soluble phosphorus, magnesium and calcium (Padamanabhan, 2021). Elements that affect plant growth produced by plant hormones and other microorganisms are also found in vermicompost (Joshi et al., 2015). It has been found that inorganic wastes processed by worms produce auxin and cytokinin (Vuković et al., 2021) (Figure 1).



Figure 1. Schematic summary of the vermicomposting process and its beneficial effects on soil health and crop productivity (Adapted from Chatterjee et al., 2021; Pierre-Louis et al., 2021)

Since vermicompost is rich in substances necessary for plant growth such as plant hormones and humic acid, Ravindran and Mnkeni (2016) reported that vermicompost can be used as a soil conditioner to improve plant growth, yield and yield quality. Intake of plant macronutrients such as N, P, K and Mg in vermicompost affects chlorophyll biosynthesis and thus increases photosynthesis (Al Jaouni et al., 2019).

Table 1. Chemical analysis results of some vermicompost's with different characteristics (Bellitürk et al., 2020).

Chemical content	Vermicompost				
	Produced from Cattle Manure (Arancon ve Edwards, 2011)	Produced from Food+ Garden Waste (Lange, 2005)	Produced from Ground Paper Waste (Bellitürk ve ark., 2015)	Produced from Olive Pruning Waste (Bellitürk ve ark., 2014)	Hazelnut Outer Shell (%50)+ Cattle Manure (%50) Produced from Wastes (Soytürk, 2020).
N, %	1,90	1,81	1,11	1,86	0,76
P, %	4,70	1,01	0,14	0,23	0,083
K, %	1,40	1,04	0,32	1,74	0,40
Ca, ppm	23,25	0,27	25,82	41500,00	4855,28
Fe, ppm	3454,00	1440,00	-	15451,91	290,78
Mg, ppm	5802,00	2100,00	0,33	5400,00	1108,54
Mn, ppm	160,00	346,00	131,50	585,73	46,39
Zn, ppm	516,00	387,20	48,80	69,75	24,37
Organic Matter %	-	30,30	39,00	47,86	37,23

The inclusion of micro and macronutrients as well as humic acids (Arancon et al., 2005) in vermicompost fertilizer promotes plant growth (Atiyeh et al., 2002; Fernandez-Luqueno et al., 2010). With the use of vermicompost (Manivannan et al., 2009), it has found an increase in nutrient uptake rates as well as symbiotic microbial association in plants. Vermicompost also contains more humic acid and biologically active compounds such as plant growth regulators, according to Fernando and Arunakumara (2021). Mainly, the other contribution of vermicompost application in agriculture is to promote plant growth and inhibit root pathogens/reduce soil-borne plant diseases with plant nutrients, depending on the organic matter content (Perner et al., 2006).

3. THE USE OF VERMICOMPOST IN THE CULTIVATION OF FIELD CROPS

Field crops have an important place in crop production. Because the most important products that meet the basic needs of people such as nutrition, clothing, shelter and treatment are field crops. The 20 most important cultivated crops (wheat, barley, corn, paddy, sorghum, potato, batat, cassava, sugarcane, sugar beet, soybean, rapeseed, peanut, sunflower, rice) cultivated for these purposes in the world and accepted as "strategic" cotton, beans, peas, chickpeas, lentils and alfalfa) are field crops. Approximately 23.5 million ha of the total agricultural area (78.3

million ha) in Turkey is cultivated agricultural land, and field crops are grown in 68% (16 million ha) of this amount (Baydar, 2022). According to the data obtained, it is necessary to increase the quality and quantity of field crops cultivation, which has come to a strategic position after the pandemic process in Turkey and in the world. An increase has been observed in the amount of yield obtained from the unit area with the environment and agriculture-friendly practices used during its cultivation. It has been determined that vermicompost fertilizer application plays a very important role in regulating drought tolerance, especially in wheat (*Triticum aestivum* L.) according to future drought scenarios (Ahmad et al., 2022). Curtis and Classsen (2005) determined that vermicompost increased the availability of plant nutrients in the soil and plant biomass production. Working on corn and soybean plants, Bowden et al. (2010) found that the use of vermicompost increased enzyme activity and photosynthesis level. Jatt and Ahlawat (2006), who applied vermicompost to chickpea (*Cicer arietinum* L.), reported that vermicompost improved the physical, chemical and biological properties of the soil. Mycin et al. (2010) determined that the shoot length of peanut (*Arachis hypogaea* L.) improved with vermicompost application. Ayyobi and Peyvast (2014) investigated the effects of farm manure (cow), vermicompost manure and municipal solid waste compost on mint (*Mentha piperita* L.) in Torbat-e-Jam and Rasht regions of Iran. According to the results of the research, the highest values in parameters such as plant growth, side branch, plant fresh and dry weight, fresh and dry yield, leaf area index, oil and oil yield per plant, chlorophyll a, b were obtained in vermicompost applications. Vermicompost significantly increased the N and P content in the grains of buckwheat (*Fagopyrum esculentum* M.). No significant differences was observed for the K, Ca and Mg content of the grains from any tested vermicompost application doses but remarkable increases in the Fe, Cu, Zn and Mn contents were observed (Özyazıcı ve Turan, 2021) (Figure 2).



Figure 2. Effect of Vermicompost Application on Mineral Nutrient Composition of Grains of Buckwheat (*Fagopyrum esculentum* M.) (Özyazıcı ve Turan, 2021)

Hosseinzadeh and Ahmadpour (2018), who applied vermicompost fertilizer on lentils (*Lens culinaris Medik*.) and investigated the growth conditions, nutrient uptake and photosynthetic pigments in moisture deficiency, Vermicompost is porous, has high water storage, has hormone-like substances, and also has a high level of macronutrients. They reported that it can play an effective role in plant growth and in reducing the harmful effects of various environmental stresses on plants because it contains micronutrients and micronutrients. In addition, the application of vermicompost in the soil, especially at the levels of 15% and 25% by weight, significantly increased all the properties studied under stress-free conditions. Under temperate and severe stress conditions, 25% by weight applied vermicompost caused a significant increase in plant height (+10% +21%), pod number (+44% +65%), root dry weight (+63%+). Increases in nutrients were also observed. Kum et al. (2018) determined in their research that the amount of vermicompost fertilizer applied depends on its quality, nutrient content and the type of plant to be planted. Depending on the age, 10-12 t/ha vermicompost fertilizer can be applied for vegetables, 5-6 t/ha for field crops and 8-10 kg per fruit tree. However, it has been suggested that 100–150 g of vermicompost fertilizer per pot can be used in pots.

4. CONCLUSION

Human and environmentally friendly production systems should be supported in order to establish the natural resources that are decreasing in ecosystem services and the lost natural balance as a result of wrong and unconscious practices. In this respect, in addition to reducing the use of synthetic chemical drugs and fertilizers, applications such as organic and green fertilization, appropriate crop rotations, soil-water protection, increasing plant resistance, biological control, stubble burning and soil improvement will not only increase the amount of production but also increase the product quality. contributes to safety and sustainable agriculture. Organic vermicompost, which is defined as vermicompost, is an organic fertilizer whose usability in organic agriculture is accepted all over the world, besides it has many advantages such as a good soil improvement agent and even reducing the use of pesticides when used in the long term. Considering this aspect, the increase in the cost of chemical fertilizers and pesticides, which are used extensively in field crops, revealed that organic fertilizers, especially vermicompost, are an important alternative. In this way, the number of users will increase in parallel with the increase in the number of users.

With vermicompost applications in the cultivation of field crops, the soil structure and water holding capacity will be preserved, especially in drought periods, and it will be ensured that the products pass through these periods with less damage. Likewise, protecting the natural services that agriculture benefits from (removal of water needs, biological control, pollination, etc.) is considered as the most effective method in adapting to the climatic changes that will occur. The main goal of agricultural activities in climate-friendly agricultural practices is to increase the quality / yield of the product, while not disturbing the structure of the soil. For this reason, it has become a necessity to use applications that protect and increase the quality of the soil as well as applications that will meet the nutritional needs of the grown products. In terms of agricultural area in Turkey, the areas where the most agricultural production is made and the field crops grown have an important strategic position. Chemical fertilizers used in these areas are useful in the soil for a short time, they are washed, they can damage water resources and cause economic losses. In order to compensate for these losses, farmers should turn to more agriculture-friendly practices and the state should support the producer economically. Studies have shown that vermicompost supports plant root development in field crops, significantly reduces the rate of root diseases, increases meadow and crop yield and grain quality, both in laboratory and field conditions. It has also been determined by various institutions and organizations that it will directly affect issues such as water resources, soil degradation, product pattern, crop yield, food prices and social change in agricultural production models made with scientific research.

CONFLICTS OF INTEREST

There is no conflict of interest.

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KARABUĞDAY (*Fagopyrum esculentum* Moench.)'DA FARKLI EKİM ZAMANI VE HASAT DÖNEMLERİNİN SİLAJ KALİTESİ ÜZERİNE ETKİLERİ

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ÖZET

Bu araştırma, 2018 ve 2019 yıllarında Bursa ekolojik koşullarında farklı ekim zamanı (15 Nisan, 1 Mayıs, 15 Mayıs ve 1 Haziran) ve hasat dönemlerinin (çiçeklenme, süt olum ve hamur olum) karabuğdayda silaj kalitesi üzerine etkilerini belirlemek amacıyla yürütülmüştür. Denemeler tesadüf blokları bölünmüş parseller düzenlemesine göre 3 tekrarlamalı olarak Bursa Uludağ Üniversitesi Ziraat Fakültesi Tarımsal Uygulama ve Araştırma Merkezi deneme alanlarında, Tarla Bitkileri Bölümü ile Toprak Bilimi ve Bitki Besleme Bölümü Laboratuarları'nda yapılmıştır. Çalışmada kuru madde oranı, pH, ham protein, ADF, NDF, P, K, Ca, Mg, Na, Fe, Cu, Zn ve Mn içerikleri gibi özellikler incelenmiştir. İki yıllık ortalama verilere göre; en yüksek kuru madde oranı 15 Nisan, en yüksek ham protein oranı ise 15 Mayıs ve 1 Haziran tarihlerinde yapılan ekimlerden elde edilen bitkilerle yapılan silajlarda tespit edilmiştir. Ekim zamanı geciktikçe silajlarda pH artış eğilimi göstermiştir. Ekim zamanlarının K, Na, Fe, Cu ve Zn içerikleri üzerine etkileri de önemli bulunmuştur. Hasat dönemleri bakımından en yüksek kuru madde oranı hamur olum döneminde, en yüksek ham protein ve en düşük ADF ile NDF içerikleri ise çiçeklenme döneminde hasat edilen bitkilerden yapılan silajlarda tespit edilmiştir. Hasat dönemlerinin silajların P, K, Mg ve Na içerikleri üzerine etkileri de önemli bulunmuştur. Sonuç olarak; incelenen tüm özellikler açısından karabuğdayın 15 Nisan tarihinde ekilmesi ve çiçeklenme döneminde hasat edilerek silaj yapılması önerilebilir. Ancak silaj kalitesinin iyileştirilmesi açısından soldurma ve katkı maddesi ilave edilmesine yönelik çalışmaların da yapılması önerilmektedir.

Anahtar Kelimeler: Karabuğday, ekim zamanı, hasat dönemi, silaj, makro ve mikro besin elementleri.

THE EFFECTS OF SOWING TIME AND HARVEST STAGES ON SILAGE QUALITY IN BUCKWHEAT (*Fagopyrum esculentum* Moench.)

ABSTRACT

This study was carried out to determine the effect of different sowing times (15 April, 1 May, 15 May and 1 June) and harvest stages (flowering, milky and dough) on the silage quality of buckwheat. Field experiments were conducted in 2018 and 2019 in Bursa Uludag University Agriculture Faculty Agricultural Application and Research Center experiment areas and laboratories of Department of Field Crops and Department of Soil Science and Plant Nutrition. The experiment arranged a randomized complete block design with split plot arrangement having three replications. Several parameters such as dry matter rate, pH, crude protein, ADF, NDF, P, K, Ca, Mg, Na, Fe, Cu, Zn and Mn contents have been examined in the experiment. According to the two-year average results; the highest dry matter content was determined on April 15, and the highest crude protein content was determined in silages made with plants obtained from sowing on May 15 and June 1. As the sowing time was delayed, the pH of the silages tended to increase. The effects of sowing time on K, Na, Fe, Cu and Zn contents were also found to be significant. In terms of harvest stages, the highest dry matter content was determined in the dough stage, the highest crude protein and the lowest ADF and NDF contents were determined in the silages made from the plants harvested during the flowering stage. The effects of harvest stages on the P, K, Mg and Na contents of silages were also found to be significant. As a result; in terms of all the properties examined, it can be suggested that buckwheat should be planted on April 15 and harvested during flowering and silage should be made. However, it is recommended that studies on withering and adding additives should also be carried out in terms of improving silage quality.

Keywords: Buckwheat, sowing time, harvest stage, silage, macro and micro nutrients

1.GİRİŞ

Karabuğday, Polygonaceae familyasından Fagopyrum cinsine dahil çift çenekli tek yıllık ve yabancı döllenen bir sıcak iklim bitkisidir (Guo ve ark., 2007; Dizlek ve ark., 2009; Kan, 2011; Björkman, 2010; Kara ve Yüksel, 2014). Asya kökenli bir bitki olan karabuğdayın en önemli özelliği hızlı büyümesidir (Tsuneo, 2004; Yavuz ve ark, 2016). Karabuğday, tanesinde glüten bulunmamasından dolayı esasen çölyak hastalığının tedavisine kullanılmaktadır. Ayrıca, yeşil ve kuru ot olarak sığır beslenmesinde ve taneleri kümes hayvanlarının beslenmesinde yer almaktadır (Wijngaard ve Arendt, 2006). Yeşil ve kuru ot verimi bakımından buğday, arpa, tritikale, çavdar ve korunga ile rekabet edebilir. Genel olarak karabuğday silajının kuru madde oranı mısır, sorgum ve ayçiçeği silajına yakın, tritikaleden ise düşüktür. Protein oranı ayçiçeğinden düşük olmasına rağmen, mısır, sorgum ve tritikaleden yüksektir. ADF ve NDF değeri ise ayçiçeği silajına yakın, mısır, sorgum ve tritikaleden düşüktür (Kara ve Yüksel, 2014). Karabuğday bitkisinin genel olarak tohum için hasat zamanı yaklaşık olarak ekimden itibaren 80-90 gün sonradır. Ancak, kaba yem üretimi için bu süre daha kısadır. Genellikle tohumların çıkışı ekimden yaklaşık 3-5 gün sonra gerçekleşir ve bunu takiben 4-6 hafta arasında çiçeklenme başlar (Verhallen ve Hayes, 2001).

Karabuğdayın ot ve silaj kalitesine yönelik ülkemizde sınırlı sayıda çalışma bulunmaktadır. Örneğin; Keleş ve ark. (2012) karabuğday bitkisinin kolay silolanabilen önemli bir alternatif kaba yem olduğunu ve süt olum döneminde silolanabileceğini bildirmişlerdir. Araştırıcılar süt olum döneminde hasat edilen karabuğdaydan yapılan silajlarda pH'nın 4.70 ve kuru madde oranının % 19.3, ham protein oranının % 15.4, ADF içeriğinin (% 30.3) ve NDF içeriğinin ise % 34.7 olduğunu bildirmişlerdir. Kara (2014) karabuğdayın yeşil ve kuru ot veriminin biçim zamanlarına göre değişmekle birlikte yeşil ot veriminin 1452-2760 kg/da ve kuru ot veriminin ise 465-854 kg/da arasında olduğunu bildirmiştir. Güllap ve ark. (2021), karabuğdayda en yüksek ham protein oranı (%15.07) ile en düşük ADF ve NDF oranlarının (sırasıyla % 22.50 ve % 41.73) çiçeklenme başlangıcında yapılan hasatlardan elde edildiğini bildirmişlerdir.

Bu çalışma farklı ekim zamanı ve hasat dönemlerinin karabuğday silajının bazı kalite özellikleri üzerine etkilerini incelemek amacıyla yürütülmüştür.

2. MATERYAL ve METOD

Araştırma 2018 ve 2019 yılllarında Bursa ekolojik koşullarında Bursa Uludağ Üniversitesi Ziraat Fakültesi Tarımsal Uygulama ve Araştırma Merkezi deneme alanlarında, Tarla Bitkileri Bölümü ile Toprak Bilimi ve Bitki Besleme Bölümü Laboratuarları'nda tesadüf blokları bölünmüş parseller düzenlemesine göre üç tekrarlamalı olarak yürütülmüştür. Araştırmada,

bitki materyali olarak Bahri Dağdaş Uluslararası Tarımsal Araştırma Enstitüsü tarafından geliştirilen Güneş çeşidi kullanılmıştır. Araştırmada ana parsellere ekim zamanı, alt parsellere ise hasat dönemleri yerleştirilmiştir. Denemede dört farklı ekim zamanı (15Nisan, 1 Mayıs, 15 Mayıs ve 1 Haziran) ile üç farklı hasat dönemi (çiçeklenme, süt olum ve hamur olum) ele alınmıştır. Araştırmada ekimle birlikte 6 kg N/da ve 6 kg P_20_5/da gübre uygulanmıştır. Denemede sıra arası mesafe 25 cm'dir. Her parsel 6 sıradan olup parsel boyu 5 m olarak ayarlanmıştır. Denemede al parsel büyüklüğü 7.5 m^2'dir. Denemede damla sulama sistemi kullanılarak sulamalar yapılmıştır. Yetiştirme dönemi boyunca yabancı otlara karşı elle mekanik mücadele yapılmıştır.

Denemede her bir hasat döneminde alınan bitki örnekleri 1.5-2 cm büyüklükte parçalanmış ve torbalara doldurularak etiketlenip çok kısa bır süre içerisinde laboratuvara götürülmüştür. Laboratuvara getirilen örnekler 1 litrelik anaerobik kavanozlara (Weck) bir pres ile sıkıştırılarak doldurulmuştur. Silaj kavanozları karanlık bir odaya yerleştirilerek 60 gün fermantasyona tabi tutulmuştur. Bu dönem sonunda, açılan kavanozların her birinden 150 g örnek alınmış ve 70 °C'de 48 saat kurutularak kuru madde oranları (KMO) belirlenmiştir. Ayrıca açılan silajlardan örnekler alınarak pH değerleri ölçülmüştür (Budaklı Çarpıcı ve ark., 2017). Kuru madde oranını belirlemek amacıyla kullanılan örnekler öğütülmüş ve bu örneklerde ham protein (HP), asit deterjanda çözünmeyen lif (ADF), nötr deterjanda çözünmeyen lif (NDF), fosfor (P), potasyum (K), kalsiyum (Ca), magnezyum (Mg), sodyum (Na), demir (Fe), bakır (Cu), çinko (Zn) ve mangan (Mn) içeriklerini belirlemek amacıyla analizler yapılmıştır (AOAC, 1997; Van Soest et al., 1991; Kacar, 2014).

Araştırma sonucunda ölçüm ve analizlerden elde edilen veriler JUMP paket programı yardımıyla tesadüf blokları deneme desenine uygun olarak varyans analizine tabi tutulmuştur. Hesaplamalarda paket programı kullanılmıştır. Önemlilik testlerinde % 1 ve % 5, farklı grupların belirlenmesinde ise % 5 olasılık düzeyi kullanılmış ve farklı grupların belirlenmesinde Asgari Önemli Fark testinden yararlanılmıştır.

3. BULGULAR ve TARTIŞMA

İki yıllık ortalama verilere ilişkin varyans analiz sonuçlarına göre; ekim zamanlarının karabuğday silajının kuru madde oranı, pH, ham protein, NDF, K, Na, Fe, Cu ve Zn içerikleri üzerine etkileri istatistiki anlamda önemli çıkmıştır. Hasat dönemlerinin ise karabuğday silajının kuru madde oranı, pH, ham protein, ADF, NDF, Mg ve Na içerikleri üzerine etkisi % 1, P ve K üzerine etkisi ise % 5 olasılık düzeyinde önemli olmuştur. Ekim zamanı x hasat dönemi interaksiyonunun karabuğday silajının kuru madde oranı pH, ham protein ve Fe içeriği

üzerine etkisi % 1, NDF, P, Mg ve Cu içerikleri üzerine etkisi ise % 5 olasılık düzeyinde önemli olmuştur (Çizelge 1).

Çizelge 1. Ekim zamanı ve hasat dönemlerinin karabuğday silajının bazı kalite özelliklerine ilişkin varyans analiz sonuçları (Kareler ortalaması)

Varyasyon Kaynağı	SD	KM	pH	HP	ADF	NDF	P	K	Ca	Mg	Na	Fe	Cu	Zn	Mn
Yıl (Y)	**1**	*	öd	**	öd	**	öd	öd	öd	öd	*	öd	öd	öd	**
EZ	**3**	**	**	**	*	*	öd	*	öd	öd	*	**	**	*	öd
Y X EZ	**3**	**	**	**	*	**	*	öd	öd	öd	öd	**	*	öd	*
HD	**2**	**	**	**	**	**	*	*	öd	**	**	öd	öd	öd	öd
Y x HD	**2**	*	**	öd	öd	öd	öd	öd	öd	öd	öd	öd	öd	öd	öd
EZ X HD	**6**	**	**	**	öd	*	*	öd	öd	*	öd	**	*	öd	öd
Y X EZ X HD	**6**	**	**	*	öd	öd	öd	*	öd	öd	**	öd	öd	öd	öd

*,**: Sırasıyla % 5 ve % 1 olasılık düzeyinde önemlidir.
öd: Önemli değil. EZ: Ekim zamanı, HD: Hasat dönemi

Ekim zamanı bakımından en yüksek kuru madde oranı % 16.96 ile 15 Nisan, en düşük ise 15 Mayıs ve 1 Haziran tarihlerinde yapılan ekimlerden elde edilmiştir. Araştırmada ekim zamanının gecikmesine bağlı olarak silajlarda pH artış eğilimi göstermiş ve en yüksek en pH değeri 1 Haziran tarihinde ekilen bitkilerden yapılan silajlarda tespit edilmiştir. Karabuğday silajlarında en yüksek ham protein oranı % 16.85 ile 1 Haziran ekiminden en düşük (% 14.48) ise 15 Nisan tarihinde yapılan ekimlerde ortaya çıkmıştır. Araştırmada en düşük ADF içeriği 15 Nisan, 15 Mayıs ve 1 Haziran, en düşük NDF içerikleri ise 15 Mayıs ve 1 Haziran tarihlerinde ekilen bitkilerden yapılan silajlarda tespit edilmiştir (Çizelge 2).

Çizelge 2. Farklı ekim zamanı ve hasat dönemlerinin karabuğday silajının KMO, pH, HP, ADF ve NDF içeriklerine etkisi (iki yıllık ortalama veriler)

Ekim zamanı	KMO (%)	pH	HP (%)	ADF (%)	NDF (%)
15 Nisan	16.96 a	4.83 b	14.48 c	32.26 b	43.82 ab
1 Mayıs	14.22 c	4.92 b	15.72 b	35.52 a	45.24 a
15 Mayıs	16.10 b	4.96 b	16.33 ab	30.86 b	42.27 b
1 Haziran	16.16 b	5.37 a	16.85 a	32.28 b	42.61 b
Hasat Dönemi					
Çiçeklenme	12.46 c	4.92 c	18.39 a	27.20 b	37.41 b
Süt olum	16.64 b	5.02 b	14.93 b	36.71 a	47.44 a
Hamur olum	18.47 a	5.12 a	14.21 c	34.28 a	45.61 a

Aynı sütunda yer alan ve aynı harfi taşıyan değerler arasında 0,05 olasılık düzeyinde fark yoktur.

Karabuğday silajının kuru madde oranı üzerine ekim zamanlarının etkisi % 1 olasılık düzeyinde çok önemli olmuş ve en yüksek kuru madde oranı % 18.47 ile hamur olum döneminde yapılan biçimlerden yapılan silajlarda belirlenmiştir. Silajın pH değerleri hasat döneminin gecikmesine

bağlı olarak artmış ve bunun sonucunda da hamur olum döneminde biçilerek yapılan silajlarda pH 5.12 olurken, çiçeklenme döneminde 4.92 olmuştur. Araştırmamızda süt olum döneminde hasat edilen bitkilere ait silajlarda tespit edilen pH değeri (5.02) Keleş ve ark. (2012) tarafından bildirilen pH değerinden (4.70) yüksek olmuştur. Bu durum muhtemelen çeşit ve ekolojik koşullardaki farklılıklardan kaynaklanabileceği gibi özellikle kuru madde oranındaki farklılıklardan da kaynaklanmış olabilir. En yüksek ham protein oranı (%18.39) ve en düşük ADF ve NDF (sırasıyla % 27.20 ve % 37.41) çiçeklenme döneminde hasat edilen bitkilerden yapılan silajlarda tespit edilmiştir (Çizelge 2). Campbell (1997), kuru madde oranı % 36.6 olan karabuğdayda protein içeriğinin % 4.6 olduğunu bildirmiştir. Er (2018), hamur olum döneminde hasat edilen karabuğdaydan yapılan silajlarda kuru madde oranı, pH, ham protein oranı, ADF ve NDF içeriklerinin sırasıyla % 17.6, 5.0, % 11.7, % 3.7 ve % 45.5 olduğunu rapor etmiştir.

Çizelge 3. Ekim zamanı x hasat dönemi interaksiyonunun karabuğday silajının KMO, pH, HP, ADF ve NDF içeriklerine etkisi (iki yıllık ortalama veriler)

Ekim Zamanı	Hasat Dönemi		
	Çiçeklenme	Süt olum	Hamur olum
Kuru madde oranı (%)			
15 Nisan	12.44 fg	18.27 b	20.15 a
1 Mayıs	11.33 g	14.58 e	16.75 cd
15 Mayıs	13.54 ef	15.94 d	18.81 b
1 Haziran	12.54 f	17.75 bc	18.17 b
pH			
15 Nisan	4.73 gh	4.69 gh	5.08 de
1 Mayıs	5.20 c-e	4.82 fg	4.74 gh
15 Mayıs	4.62 h	4.96 ef	5.31 bc
1 Haziran	5.14 c-e	5.61 a	5.40 b
Ham protein (%)			
15 Nisan	18.44 ab	13.04 de	11.95 e
1 Mayıs	18.25 b	15.22 c	13.69 d
15 Mayıs	17.38 b	16.12 c	15.51 c
1 Haziran	19.49 a	15.35 c	15.71 c
NDF (%)			
15 Nisan	34.93 e	48.72 ab	47.83 ab
1 Mayıs	41.48 cd	49.67 a	44.58 bc
15 Mayıs	38.13 de	44.20 bc	44.47 bc
1 Haziran	35.10 e	47.19 ab	45.55 a-c

Ekim zamanı x hasat dönemi interaksiyonuna ait önemli çıkan ortalamalarda aynı harfi taşıyan değerler arasında 0.05 olasılık düzeyinde fark yoktur.

Ekim zamanı x hasat dönemi interaksiyonu bakımından en yüksek kuru madde oranı % 20.15 ile 15 Nisan tarihinde ekilen ve hamur olum döneminde biçilen bitkilerden yapılan silajlarda tespit edilmiştir. İkili interaksiyonun silajın pH değeri üzerine etkisi incelendiğinde, 1 Mayıs

ekimi hariç diğer ekim zamanlarında hasat döneminin gecikmesiyle silajların pH değerleri artış göstermiştir. Denemede en düşük pH değeri 4.62 ile 15 Mayıs tarihinde ekilen ve çiçeklenme döneminde biçilen bitkilerle yapılan silajlardan elde edilmiştir (Çizelge 3). Araştırmada en yüksek ham protein oranı % 19.49 ile 1 Haziran tarihinde ekilen ve çiçeklenme döneminde hasat edilen bitkilerden yapılan silajlarda belirlenmiştir. Bunu % 18.44 ile 15 Nisan tarihine ekilen ve çiçeklenme döneminde hasat edilen bitkilerden yapılan silajlar izlemiştir. NDF bakımından değerler incelendiğinde; en düşük NDF içerikleri (% 34.93 ve % 35.10) 15 Nisan ve 1 Haziran ekimlerinin çiçeklenme döneminde hasat edilen bitkilerden yapılan silajlarda belirlenmiştir (Çizelge 3).

Karabuğday silajının K, Na ve Zn içerikleri üzerine ekim zamanlarının etkisi % 5, Fe ve Cu içerikleri üzerine etkisi ise % 1 düzeyinde önemli olmuştur. Denemede en yüksek K ve Na içerikleri 1 Mayıs ve 15 Mayıs tarihlerinde yapılan ekimlerde ortaya çıkmıştır. Fe ve Zn içerikleri incelendiğinde ise en yüksek değerlerin1 Haziran tarihlerinde yapılan ekimlerden elde edildiği görülmüştür. Silajların Cu içerikleri incelendiğinde 15 Nisan tarihleri hariç diğer ekim zamanları arasında istatistiki anlamda bir farklılık ortaya çıkmamış ve bunun sonucunda da 1 Mayıs, 15 Mayıs ve 1 Haziran ekimleri en yüksek içeriğe sahip olmuşlardır (Çizelge 4).

Çizelge 4. Ekim zamanlarının karabuğday silajının K, Na, Fe, Cu ve Zn içeriklerine etkisi (iki yıllık ortalama veriler)

Ekim zamanı	K (mg/kg)	Na (mg/kg)	Fe (ppm)	Cu (ppm)	Zn (ppm)
15 Nisan	3.27 b	0.19 ab	215.24 b	6.53 b	23.37 b
1 Mayıs	3.61 a	0.20 a	207.14 b	7.85 a	23.12 b
15 Mayıs	3.63 a	0.21 a	239.79 b	8.58 a	23.37 ab
1 Haziran	3.31 b	0.19 b	282.96 a	8.11 a	26.36 a

Aynı sütunda yer alan ve aynı harfi taşıyan değerler arasında 0,05 olasılık düzeyinde fark yoktur.

Çizelge 5. Hasat Dönemlerinin karabuğday silajının P, K, Mg ve Zn içeriklerine etkisi (iki yıllık ortalama veriler)

Hasat Dönemi	P (mg/kg)	K (mg/kg)	Mg (mg/kg)	Na (mg/kg)
Çiçeklenme	0.30 a	3.67 a	0.87 a	0.21 a
Süt olum	0.28 ab	3.41 b	0.78 b	0.19 b
Hamur olum	0.26 b	3.28 b	0.72 b	0.19 b

Aynı sütunda yer alan ve aynı harfi taşıyan değerler arasında 0,05 olasılık düzeyinde fark yoktur.

Hasat dönemlerinin karabuğday silajının P, K, Mg ve Na içerikleri üzerine etkisi önemli olmuş ve genel olarak hasat döneminin gecikmesiyle P, K, Mg ve Na içerikleri azalmıştır. Araştırmada en yüksek P, K, Mg ve Na içerikleri çiçeklenme döneminde hasat edilerek silaj yapılan uygulamadan elde edilmiştir (Çizelge 5). Kara (2014), karabuğdayda hasat dönemlerine bağlı

olarak bitkinin mineral madde içeğiinde önemli değişimlerin olduğunu ve en yüksek N, P, K, Ca, Mg, Fe, Cu, Mn ve B içeriklerinin çiçeklenme başlangıcından 20 gün sonra hasat edilen bitkilerde tespit edildiğini bildirmiştir.

Ekim zamanı x hasat dönemi interaksiyonunun karabuğday silajının P, Mg ve Cu içerikleri üzerine etkisi % 5, Fe içeriği üzerine etkisi ise % 1 olasılık düzeyinde önemli olmuştur (Çizelge 1). En yüksek P içeriği 0.36 mg/kg ile 1 Haziran tarihinden ekilen ve çiçeklenme döneminde hasat edilen bitkilerden yapılan silajlarda tespit edilmiştir. En yüksek Mg içerikleri 1 Mayıs ve 15 Nisan tarihlerinde ekilen ve çiçeklenme döneminde hasat edilen bitkilerden yapılan silajlarda, en yüksek Fe içeriği (317.87 ppm) 1 Haziran tarihinde ekilen ve hamur olum döneminde hasat edilerek silaj yapılan uygulamada, en yüksek Cu içeriği (9.48 ppm) ise 15 Mayıs taraihinde ekilen ve hamur olum döneminde hasat edilerek silaj yapılan uygulamadan elde edilmiştir (Çizelge 6).

Çizelge 6. Ekim zamanı x hasat dönemi interaksiyonunun karabuğday silajının P, Mg, Fe ve Cu içeriklerine etkisi (iki yıllık ortalama veriler)

Ekim zamanı	Hasat dönemi		
	Çiçeklenme	Süt olum	Hamur olum
P (mg/kg)			
15 Nisan	0.29 bc	0.25 cd	0.23 d
1 Mayıs	0.32 ab	0.28 b-d	0.26 b-d
15 Mayıs	0.25 cd	0.29 bc	0.30 bc
1 Haziran	0.36 a	0.30 bc	0.27 b-d
Mg (mg/kg)			
15 Nisan	0.91 a	0.71 bc	0.63 d
1 Mayıs	0.92 a	0.78 a-c	0.73 b-d
15 Mayıs	0.80 a-c	0.82 a-c	0.87 ab
1 Haziran	0.86 ab	0.81 a-c	0.63 d
Fe (ppm)			
15 Nisan	293.61 ab	186.86 cd	165.26 d
1 Mayıs	181.27 cd	232.52 b-d	207.64 cd
15 Mayıs	206.86 cd	217.97 cd	294.54 ab
1 Haziran	294.94 ab	236.07 bc	317.87 a
Cu (ppm)			
15 Nisan	7.70 b	6.17 c	5.73 c
1 Mayıs	8.25 b	7.54 b	7.76 b
15 Mayıs	7.70 b	8.57 ab	9.48 a
1 Haziran	8.40 ab	7.80 b	8.13 b

Ekim zamanı x hasat dönemi interaksiyonuna ait önemli çıkan ortalamalarda aynı harfi taşıyan değerler arasında 0.05 olasılık düzeyinde fark yoktur.

4. SONUÇ

Sonuç olarak; incelenen tüm özellikler açısından karabuğdayın 15 Nisan tarihinde ekilmesi ve çiçeklenme döneminde hasat edilerek silaj yapılması önerilebilir. Ancak silaj kalitesinin iyileştirilmesi açısından soldurma ve katkı maddesi ilave edilmesine yönelik çalışmaların da yapılması önerilmektedir.

5. TEŞEKKÜR BİLGİ NOTU

Bu çalışma, Bursa Uludağ Üniversitesi Bilimsel Araştırma Projeleri Birimi (OUAP(Z)-2018-6) tarafından desteklenmiştir. Çalışmanın yürütülmesinde maddi destek sağlayan Bursa Uludağ Üniversitesi Bilimsel Araştırma Projeleri Birimi'ne teşekkür ederiz.

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EXPRESSİNG GENES OF PEANUT (*ARACHİS HYPOGAEA* L.): A REVİEW

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ABSTRACT
Peanut is an important crop cultivated throughout the world for food and oil production. Peanut plant growth and yield are strongly influenced by abiotic stresses. Transcription factors (TFs) bind specific DNA sequences to control transcription and regulate responses under different abiotic stress conditions. Although peanut is a relatively drought-tolerant crop, its productivity and quality is adversely affected by drought stress. The identification of novel genes, the analysis of gene expression patterns in response to dehydration stress, and the evaluation of their potential functions in stress adaptation will provide the basis for effective engineering strategies to improve crop drought tolerance. Only a few studies on the reference genes have been done with peanut to date. Molecular studies conducted in the last decade to improve peanut tolerance to abiotic factros are reviewed here below.

Keywords: Genes, expression, peanut, groundnut, *Arachis hypogaea* L., biotechnology

1. INTRODUCTİON

Peanut (*Arachis hypogaea* L.) is a major crop grown on a big scale all over the world for food and oil production (Xiao et al., 2021). Peanut is one of the world's most important economic oilseeds and an exportable agricultural commodity. It is primarily grown in Asia, Africa, and North and South America's tropical and subtropical climates. Peanut seeds are a good source of carbs and proteins for both humans and animals. Peanut butter is used in food preparations and as an ingredient in confectionary. Peanut oil is a prominent vegetable oil. Cattle feed is made from by-products such as peanut cake and meal (Singh et al., 2014). Abiotic stressors such as drought, salt, and cold have a significant impact on peanut plant growth and yield. Plants adapt to these environments by undergoing a variety of biochemical and physiological changes (Chen et al., 2014).

2. Transcription factors

Transcription factors (TFs) bind specific DNA sequences to control transcription and regulate responses under different conditions, including biotic and abiotic stress (Yamaguchi-Shinozaki and Shinozaki, 2006). Quantitative real-time reverse transcription PCR (qRT-PCR), a sensitive technique for quantifying gene expression, depends on the stability of the reference gene(s) used for data normalization. Only a few studies on the reference genes have been done with peanut to date. 14 potential reference genes in peanut were evaluated for their expression stability by Chi et al., (2012). Expression stability was assessed by qRT-PCR across 32 biological samples, including various tissue types, seed developmental stages, salt and cold treatments. The results showed that the best-ranked references genes differed across the samples. UKN1, UKN2, TUA5 and ACT11 were the most stable across all the tested samples. A combination of ACT11, TUA5, UKN2, PEPKR1 and TIP41 would be appropriate as a reference panel for normalizing gene expression data across the various tissues tested, whereas the combination of TUA5 and UKN1 was the most suitable for seed developmental stages.

Because of its strong specificity and high accuracy, real-time quantitative PCR (RT-qPCR) has been a widely used method to study the expression of genes responsive to stress. It is crucial to have a suitable set of reference genes to normalize target gene expression in peanut under different conditions using RT-qPCR. In their study, 11 candidate reference genes were selected and examined under abiotic stresses (drought, salt, heavy metal, and low temperature) and hormone (SA and ABA) conditions as well as across different organ types by He et al., (2017). ELF1B and YLS8 were the most stable reference genes under PEG-simulated drought treatment. For high-salt treatment using NaCl, YLS8 and GAPDH were the most stable genes. Under CdCl2 treatment, UBI1 and YLS8 were suitable as stable reference genes. UBI1, ADH3,

and ACTIN11 were sufficient for gene expression normalization in low-temperature experiment. All the 11 candidate reference genes showed relatively high stability under hormone treatments.

3. Abiotic factors

Salinity is a major environmental stress that affects agricultural productivity worldwide. One approach to improving salt tolerance in crops is through high expression of the Arabidopsis gene AtNHX1, which encodes a vacuolar sodium/proton antiporter that sequesters excess sodium ion into the large intracellular vacuole. Sequestering cytosolic sodium into the vacuoles of plant cells leads to a low level of sodium in cytosol, which minimizes the sodium toxicity and injury to important enzymes in cytosol. In the meantime, the accumulation of sodium in vacuoles restores the correct osmolarity to the intracellular milieu, which favors water uptake by plant root cells and improves water retention in tissues under soils that are high in salt. To improve the yield and quality of peanut under high salt conditions, AtNHX1 was introduced into peanut plants through Agrobacterium-mediated transformation by Banjara et al., (2012). The AtNHX1-expressing peanut plants displayed increased tolerance of salt at levels up to 150 mM NaCl. When compared to wild-type plants, AtNHX1-expressing peanut plants suffered less damage, produced more biomass, contained more chlorophyll, and maintained higher photosynthetic rates under salt conditions. These data indicate that AtNHX1 can be used to enhance salt tolerance in peanut.

Reactive oxygen species (ROS) play a critical role in developmental and signal transduction processes during seed germination and early seedling establishment stages. Higher concentrations of ROS are known to have detrimental effects when the plant is under salt stress. Chakraborty et al., (2019) aimed to test the early (1 h) and late (48 h) response of enzyme-driven ROS detoxification system in six peanut genotypes under salt stress at early seedling stage. A prompt rise (> 50-fold) in SOD transcript was occurred within 1 h of salt stress in the tolerant genotypes (early response). But induction in SOD activity was observed only after 48 h of salt stress (late response). After 48 h of salt stress, the tolerant genotypes showed greater induction of POD activity, whereas in the sensitive genotypes CAT activity was more pronounced. They found POD and CAT played a greater role in H2O2 detoxification in tolerant and sensitive genotypes, respectively, during longer duration of the stress.

Several ethylene-responsive element binding factor (ERF) family proteins have been demonstrated to play important roles in transcriptional regulation of a variety of biological processes, including responses to environmental conditions such as drought, salt, and cold. In their study, 40 ESTs in a peanut cDNA library, whose amino acid sequences contained AP2/

ERF domain, have been identified by Chen et al., (2012). Of these, full-length sequences of six genes were cloned. The six genes were designated Arachis hypogaea ERF 1–6 (AhERF1–6). The expression patterns of AhERF1–6 were analyzed under cold, salt and drought stress. The results indicated that the expression of AhERF4 and AhERF6 were rapidly and substantially enhanced under abiotic stress. Some genes were down-regulated when under stress, such as AhEERF3 in leaves under salt stress and AhERF2 in leaves under drought stress. Interestingly, the expression of AhERF3 and AhERF5 exhibited contrary expression patterns in peanut leaves and roots upon PEG treatment. These results suggested that different ERF proteins may have different functions in peanut abiotic stress acclimation.

The cultivated peanut (*Arachis hypogaea* L.) is important oil crop and cold stress seriously influences its development and yields. Chen et al., (2014) screened genes regulated by cold stress in peanut. In total, 1478 up-regulated and 1510 down-regulated probe sets were successfully identified in leaves of peanut subjected to cold stress using the microarray technique. Data analysis indicated that the main biological processes involved in cold stress response included signal transduction, transcript regulations and accumulation of soluble metabolites. Regulation of cell division, translation, protein modification, transport and DNA/RNA-related processes were also involved in peanut cold acclimation. The study also revealed that protein kinases, transcription factors, heat shock proteins, resistance proteins, stilbene synthase, and so on, may play important functions in cold stress regulation of peanut.

Ubiquitin (Ub)-conjugating enzymes (UBCs) are key enzymes involved in ubiquitination. UBCs have been shown to play important roles in regulating various aspects of plant growth and development. Wan et al., (2011) reported the characterization of a ubiquitin-conjugating enzyme gene AhUBC2 from dehydrated peanut plants. The expression of AhUBC2 gene in peanut plants is responsive to physiological water-stress induced by polyethylene glycol, high salinity, abscisic acid or low temperature.

The MYB superfamily constitutes one of the most abundant groups of transcription factors and plays central roles in developmental processes and defense responses in plants. 30 unique peanut MYB genes that contained full-length cDNA sequences were isolated by Chen et al., (2014). The 30 genes were grouped into three categories: one R1R2R3-MYB, nine R2R3-MYBs and 20 MYB-related members. Expression analysis during abiotic stress identified a group of MYB genes that responded to at least one stress treatment.

Aluminum (Al) toxicity is an important factor in limiting peanut growth on acidic soil. The molecular mechanisms underlying peanut responses to Al stress are largely unknown. Root tips of peanuts that treated with 100 μM Al for 8 h and 24 h were analyzed by RNA-Seq, and a total

of 8,587 differentially expressed genes (DEGs) were identified in the study of Xiao et al., (2021). A group of important Al-responsive genes related to organic acid transport, metal cation transport, transcription regulation and programmed cell death (PCD). These homologs were promising targets to modulate Al tolerance in peanuts. MAPK signal transduction played important roles in the early response to Al stress in peanuts.

Adequate soil calcium (Ca2+) levels are crucial for sustained reproductive development of peanut (Arachis hypogaea). A role for calcium dependent protein kinase was evaluated by Jain et al., (2011) during peanut fruit development under sufficient and deficient soil Ca2+ conditions. Quantitative RT-PCR and protein gel blot analyses confirmed transcriptional upregulation of CDPK in seeds developing under inadequate soil Ca2+ regimen, as well as spatiotemporal regulation of CDPK expression during early mitotic growth and later during the storage phase of seed development. However, a consistent basal level of CDPK was present during similar developmental stages of pod tissue, irrespective of the soil Ca2+ status. Immunolocalization data showed CDPK decoration primarily in the outer most cell layers of the pericarp and around vascular bundles linked by lateral connections in developing pods, as well as the single vascular trace supplying nutrients to the developing seed.

Bowman–Birk inhibitor (BBI) genes encode serine protease inhibitors well known for their anticarcinogenic properties and roles in plant defense against insects and pathogens. Here we investigated the expression of a BBI gene in response to water deficit, recovery and phytohormones. A full length cDNA encoding a novel BBI (AhBBI) was isolated from peanut leaves by Drame et al., (2013). Real-time PCR analyses indicated that in peanut leaves, AhBBI is upregulated by water deficit and exogenous jasmonic acid (JA) but repressed by abscissic acid (ABA) after 24 h of treatment. AhBBI transcripts accumulated earlier and stronger in the tolerant cultivar (cv. Fleur11) compared to the susceptible one (cv. 73–30) suggesting that BBI genes are involved in drought stress tolerance.

APETALA2 (AP2) belongs to the AP2/Ethylene Responsive Factor (ERF) family and regulates expression levels of downstream stress responsive genes as a transcription factor. Park & Grabau, (2016) cloned six different isoforms of AhAP2 from peanut (Arachis hypogaea). Increased levels of AhAP2.1 and AhAP2.2 transcripts were observed in drought-treated peanut leaves, suggesting differential transcriptional regulation under drought stress conditions.

Although peanut is a relatively drought-tolerant crop, its productivity and quality is adversely affected by drought stress. The identification of novel genes, the analysis of gene expression patterns in response to dehydration stress, and the evaluation of their potential functions in stress adaptation will provide the basis for effective engineering strategies to improve crop

drought tolerance. To investigate genes that are involved in the response to drought stress in peanut, a survey of genes responsive to drought stress was done by cDNA macroarray analysis, and about 277 unigenes were selected, including genes related among others to stress response and transcription factors in a study of Hou et al., (2014). Totally, it was found that about 21 clones could respond to dehydration. The expression patterns of these 21 candidate drought-responsive genes and another 30 selected non-responsive genes were further analyzed by real-time PCR, and then we found another responsive gene P3617. Among these genes, 18 genes were up-regulated, and 4 genes were down-regulated by drought. The functional classification indicated that these genes belonged to gene families encoding stress-responsive proteins, transcription factors, auxin-responsive protein, Na+/H+ transporter SOS1, and chloroplast photosynthetic oxygen-evolving protein subunit of peanut.

Late embryogenesis abundant (LEA) protein family is a large protein family that includes proteins accumulated at late stages of seed development or in vegetative tissues in response to drought, salinity, cold stress and exogenous application of abscisic acid. In order to isolate peanut genes, an expressed sequence tag (EST) sequencing project was carried out using a peanut seed cDNA library in a study of Su et al., (2011). From 6258 ESTs, 19 LEA-encoding genes were identified and could be classified into eight distinct groups. Expression levels of LEA genes were generally high in seeds. Some LEA protein genes were expressed at a high level in non-seed tissues such as root, stem, leaf, flower and gynophore.

4. Biotic factors

PLP (patatin-like phospholipase family) is a class of proteins with enzyme activity that respond to pathogenic bacteria infection and adversity stress in plants. Gao et al., (2021) identified 26 PLP family members. Promoter analysis showed that PLP-encoding genes contained cis-acting regulatory elements related to hormone responses, environmental adaptability and stress response induction. RNA-seq data showed that these genes were expressed under different spatiotemporal conditions. AhPLP1 and AhPLP10 expression levels in flowers were relatively high, while AhPLP4 expression level in roots, stems, and flowers was extremely low, which indicated the potential functions of PLPs in peanut.

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ALGAE AS A BIO-FERTILIZER IN THE SOIL-PLANT SYSTEM

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ABSTRACT
Due to the high demand for food is increasing the application of synthetic fertilizers, and pesticides which cause environmental pollution, reduce soil fertility, and are a threat to all living organisms. Biofertilizers are alternative to synthetic fertilizers without causing environmental pollution as well as improving soil quality and providing better conditions for plants to grow and develop. The use of algae as a biofertilizer has shown positive effects in increasing plant yields. They enable the fixation of nitrogen and phosphorus for the plant, produce growth hormones, increase the tolerance of plants to environmental stresses, increase the amount of organic matter in the soil and regulate its pH and porosity, etc. This review will explore the potential of algae as a biofertilizer in the soil-plant system.

Keywords: environmental pollution, algae, biofertilizers, soil fertility.

1. INTRODUCTION

Biofertilizers mean organic compounds derived from living microorganisms that enable plant growth, utilizing soil nutrients such as nitrogen, potassium, phosphorus as well as macro and other microelements. (Win et al., 2018; Reddy and Saravanan,2013; Bhattacharjee and Dey, 2011.). Biofertilizers have several advantages that include: increasing the productivity of plants without spending large amounts of energy and without polluting the soil and water; biological control of phyto-pathogens, and increase soil fertility. (Carvajal-Muñoz and Carmona-Garcia, 2012). Biofertilizers include: nitrogen fixers; bio-fertilizers that digest potassium and phosphates, bio-fertilizers for secondary macronutrients, and plant growth-promoting rhizobacteria (PGPR). (Bhattacharjee and Dey, 2014). These living microorganisms and metabolites called "bio-fertilizers" (bacteria, algae, fungi) can be used as an environmentally friendly alternative to synthetic fertilizers. (Das et al., 2019). Only the possible use of algae (both microalgae and cyanobacteria) as biofertilizer and the challenges associated with them are discussed in this review. Algae include a large group of photosynthetic eukaryotic microorganisms (green microalgae, diatoms) and prokaryotes (cyanobacteria), which are traditionally used as agar, carrageenan, fodder and phytochemicals (Baweja et al., 2019; Sahoo 2000). Microalgae include several groups of algae: Rhodophyta (red algae), Chlorophyta (green algae), Phaeophyta (brown algae), Pyrrophyta Euglenophyta, Chrysophyta. Cyanobacteria are the only photosynthetic prokaryotes capable of producing oxygen. (Singh et al., 2015). There are about 30,000 species of unicellular microalgae and more complex multicellular organisms. (Rath, 2012). Among them, 150 genera and more than 2000 species of microalgae. (Das et al., 2019; Kumar, 2016; Guiry, 2012). algae possess several advantages over other organisms: their ability to grow with minimal freshwater inputs and to exploit unproductive agricultural lands; have the ability to reduce greenhouse gas emissions by seizing carbon dioxide and nitrogen oxides from industrial sources; have great ecosystem impact as they can be cultivated in wastewater and agricultural runoff, recovering excess nutrients and water for further use. (Wang et al., 2018; Win et al., 2018). The use of algae-based natural fertilizers is proposed as an alternative to the various challenges of creating sustainable agriculture, as well as to provide the nutrients needed for the plant and increase tolerance to various environmental stresses (Kumar et al. 2012; Khan et al., 2009). The applications of algae in agriculture as fertilizers are attributed to the presence of high amounts of micronutrients and macronutrients, phytohormones, vitamins and amino acids necessary for better plant development (Tay et al. 1985; Khan et al. 2006).

2. TYPES OF ALGAE AND THEIR USE AS A BIOFERTILIZER

The group of algae used in agriculture includes: a) microalgae and b) macroalgae. a) Microalgae are found in tropical and subtropical regions, and temperate regions (Zutshi and Fatima 2015). Blue-green algae (BGA) are one of the most important representatives of microalgae because they possess some common features of plants and bacteria. Due to the presence of chlorophyll 'a' and phycobiliprotein they resemble eukaryotic plant cells, and their genomic sequence RNAs 16S and 5S) and the metabolic system resemble bacteria. (Baweja et al., 2019). In blue-green algae we distinguish the main pigments. such as: chlorophyll a, carotenes, xanthophylls, c-phycoerythrin and c-phycocyanin. The photosynthetic product is glycogen and algae has a blue-green color. Blue-green algae (BGA) can perform photosynthesis and have the ability to fix nitrogen, therefore they are of great importance in agriculture (Singh et al. 2016). The BGA includes: *Cyanophyta* (Myxophyta, Cyanophyceae), which in the last decade, they are grouped as Cyanobacteria. Some of the prominent blue-green algae are: *Anabaenopsis*, *Anabaena, Cylindrospermum, Nostoc, Tolypothlatrix, Caloth, Phormidium, Aphanothece, Calothrix, Aulosira,* and *Cylindrospermum.* Among them, *Nostoc muscorum, Aulosira fertissima, Anabaena variabilis,* and *Tolypothrix tenuis* have been shown to be effective as biofertilizer. (Baweja et al., 2019). Table 1. b) Macroalgae also known as seaweed, have found use as organic fertilizers in many countries. They are divided into three categories: red brown algae and green. Seaweed affects plant growth and development by improving the physical, biological, and chemical properties of the soil (Temple and Bomke 1990, 1988). They cause the growth of soil flora by increasing the moisture holding capacity. Some of the common marine algae used as biostimulants are: *Enteromorpha, Caulerpa, Laminaria, Undaria, Ulva, Turbinaria, Sargassum, Gracilaria,* etc. (Baweja et al., 2019). (Table 1).

Table 1. Types of algae being used as biofertilizers (Baweja et al., 2019)

S. No	Name of algae	Class
1	Ulva sp.	Chlorophyceae
2	Enteromorpha sp.	Chlorophyceae
3	Caulerpa sp.	Chlorophyceae
4	Ascophyllum nodosum.	Phaeophyceae
5	Palisada perforate	Rhodophyceae
6	Ecklonia maxima	Phaeophyceae
7	Sargassum sp.	Phaeophyceae
8	Macrocystis pyrifera	Phaeophyceae
9	Laminaria japonica	Phaeophyceae
10	Turbinaria decurrens	Phaeophyceae
11	Undaria pinnatifida	Phaeophyceae
12	Gracillaria sp.	Rhodophyceae
13	Dictyota dichotoma	Phaeophyceae
14	Kappaphycus alvarezii	Rhodophyceae
15	Rosenvingea intricata	Phaeophyceae

3. ALGAE IN SOIL-PLANT SYSTEM

Algae in agriculture play an important role in many aspects: Increase seed germination rate, source of plant growth substances, biocontrol of phytopathogen, treatment of heavy metals, improve soil quality by using it as a biofertilizer. In agricultural production, special care should be paid to the seed germination phase, as if seed germination is not possible, it means that we will not have the expected yield. Algae, their biomass, and algae biomass extracts increase the rate of seed germination. (Das et al., 2019). In 1967, it was discovered that the aqueous extract of *Phormidium foveolarum* had beneficial effects on rice seed germination; (Shukla and Gupta 1967). *Nostoc muscorum* had a beneficial effect on the germination of cotton seeds, wheat, corn and lentils (Ibraheem 2007; Adam 1999). The extract of *Phormidium foveolarum* also had a positive effect on the germination of corn seeds (Kushwaha and Gupta 1970). With the use of *Chlorella* sp. the germination of wheat, corn and seeds was significantly increased. (Uysal et al. 2015; Odgerel and Tserendulam 2017). Various algae and cyanobacteria are capable of producing various compounds with biological activity such as: vitamin B12 and biotin (Misra and Kaushik, 1989), as well as nitrogen compounds (Jones and Stewart, 1969). Furthermore, various plant hormones have been found in the group of microalgae (axins, gibberellins, cytokines, abscisic acid, ethylene, jasmonic acid, salicylic acid, and brassinosteroids) (Romanenko et al., 2015; Lu and Xu 2015). These produced hormones stimulate the growth of agricultural crops or affect the activation of certain cascades of plant metabolism that cause an increase in crop quality (Zhao et al. 2005). Also these phytohormones can increase the tolerance of plants to various stresses. environmental (Maršálek et al. 1992). Auxins and cytokinins, produced by *Chroococcidiopsis* sp. and *Anabaena* sp., had shown positive effect in increasing

shoot length, lateral root and grain weight of wheat plants (Hussain and Hasnain 2011). Cyanobacteria inoculated in the rice plant stimulate the production of the hormone gibereline (Dong et al., 2016). Nowadays, in order to protect the environment from pollution and to create a sustainable agriculture, there is an attempt to replace pesticides with various agents of plant origin such as microalgae. They act as: fungicides (Hassan, 2007; Volk and Furkert, 2006; Safonova and Reisser, 2005), insecticides (Nassar et al., 1999), and acaricides (Sanchez-Ramos and Castanera, 2001; Duke, 2002). Cyanobacterial extracts have been shown to cause immobility, and mortality of parasitic nematodes in plants (Hashem and Abo-Elyousr, 2011). It was also found that *N. muscorum* extracts or extracellular products of this cyanobacterium inhibited the growth of the plant pathogens *Sclerotinia sclerotiorum* and *Rhizoctonia solani*, (Zaccaro et al., 1991). A large number of algae have the ability to concentrate metal ions present in their environment (Samhan, 2008; Shaaban et al., 2004; Abdel-Raouf and Ibraheem, 2001;). Many algae synthesize phytokelatins and metallothioneins that serve to form complexes with heavy metals, and move them into vacuoles (Suresh and Ravishankar 2004). Algae such as *Spirulina* and *Chlamydomonas* have been studied for their ability to accumulate heavy metals such as Pb, Zn, and Cu (Payne, 2000). Also *M. tenera* has the ability to improve lead-contaminated soils and waters (Zaccaro, 2000).

4. ALGAE AS BIOFERTILIZER

4.1 N and P Fixation

Cyanobacteria can be used as biofertilizers as they have the ability to fix free nitrogen from the air (diazotrophs). Cyanobacteria convert the inorganic nitrogen (N_2) they receive from the air into organic nitrogen, which is used by higher plants. (Kumar, 2016). The annual circulation of nitrogen in the biosphere is approximately 100-200 million metric tons, of this amount 2/3 are of biological origin in which blue-green algae have a key role in this content. (Pabbi, 2015). According to Watanabe et al., (1977), 23 consecutive crops can be successfully cultivated for 12 years using only blue-green algae as fertilizer without the need for nitrogen fertilizer addition. However, there are factors that affect the nitrogen content fixed by algae such as: physico-chemical properties of the soil, and biotic and abiotic factors (Roger and Kulasooriya, 1980). Organisms that are capable of fixing nitrogen are known to belong to the group of prokaryotes. Because these organisms possess the enzyme nitrogenase they are able to fix atmospheric nitrogen in ammonium using 16 molecules of ATP as an energy source for each molecule of N_2 (Baweja et al., 2019; Lee, 2008). 2-Oxoglutarate fixes this ammonium through the enzyme glutamate dehydrogenase and forms glutamic acid, and with the addition of a

second ammonium produces glutamine. In this way the blue-green algae also contain nitrogenase which consists of two components: dinitrogenase reductase (iron protein) and dinitrogenase (molybdenum-iron protein) encoded by opif nif HDK (Baweja et al., 2019; Lee, 2008; Henson et al., 2004). Efforts to use cyanobacteria as biofertilizers in the rice plant have been made in India and Chile. Local cyanobacterial species in Chile have been shown to increase nitrogen fixation efficiency in the rice plant. (Ashok et al., 2017). Vaishampayan et al. recommended that the *Azolla-Anabaena* symbiotic complex be used for nitrogen fixation, to reduce the use of inorganic nitrogen. (Vaishampayan et al., 2001). Through a comparative study between chemical fertilizers and indigenous cyanobacteria, it was concluded that the recovery of N_2 from the soil-plant system through cyanobacteria was higher than that from chemical fertilizers. (Valiente et al., 2000). A more comprehen- sive description of cyanobacteria use in agriculture as biofertilizers can be found in (**Table 2).** In the group of Cyanobacteria there are several species that digest soil phosphate. Phosphorus (P) is a nutrient that according to the importance in plants is second only to nitrogen (Win et al., 2018). In the absence of P, algae excrete extracellular phosphatases and can change the pH of their environment to enable the availability of P. (Healy, 1973). Cyanobacterial fertilization has been compared with inorganic fertilization in rice and lettuce seedlings (Ibraheem, 2007).

4.2 Enhancement of Soil Quality

4.2.1 The effect of algae on organic matter, porosity, and soil aggregates

With the use of the agricultural mechanism is caused the loss of organic matter in the soil. (Choudhury et al., 2014). Algae in the soil through the fixation of carbon dioxide enable the increase of the amount of organic matter. Also some cyanobacteria have the ability to convert inorganic nitrogen into organic nitrogen (Bergman et al. 1997). Algae also have the ability to produce and secrete extracellular polymeric substances (EPS), which are composed of monosaccharides as well as non-carbohydrate compounds (e.g., proteins, lipids, nucleic acids, etc.) (Angelis et al. 2012; Delattre et al. 2016). Soil EPS content implies increased soil organic content (Thomas and Dougill 2007). Another way to increase the content of organic matter in the soil is through the death and decay of algae cells (Chamizo et al. 2018). The results of Roychoudhary et al. showed that algae have an impact on the collection and improvement of soil aggregates that enable a better water holding capacity in the soil. (Roychoudhury et al., 1979). Algae possess adhesive properties, which easily bind cells to solid surfaces and thus accumulate soil particles (Flaibani and Olsen, 1989). This process is of great importance as it directly affects the temperature, aeration and infiltration rate of the soil, which consequently improves the physical environment of the plant. excessive addition of water. (Falchini et al.,

1996). Soil cyanobacteria, in interaction with indigenous bacteria, form micro-networks using filaments and EPS that enable the improvement of soil structures with increased porosity and water permeability (Sadeghi et al. 2017). It has been shown that if we add 10 kg / ha of blue-green algae to alkaline soils it can reduce the increase of gypsum up to 1 ton / ha (Kaushik and Krishna Murti 1981).

4.2.2 Effect of algae on microbial content, PH, and sodic soils

Cyanobacteria and other microalgae have the ability to colonize different parts of plants and the space around their roots. (Uzoh and Babalola 2018). This colonization plays an important role in plant growth and development, seed germination, and disease control. (Yang et al. 2017). Through various mechanisms, cyanobacteria and other microalgae enable the colonization of vascular and non-vascular parts of plants as well as the rhizosphere. Many cyanobacteria penetrate plants through stomata and then pass into intercellular spaces, and parenchymal cells (Li et al. 2014; Garcia-Gonzalez and Sommerfeld 2016). Other cyanobacteria can colonize the epidermis and cortical root cells. (El-Zemrany 2017). In one study at chickpea it was established that cyanobacteria can colonize plant roots by improving the rhizosphere microbial flora, which affects the increase of soil fertility and plant yield (Prasanna et al. 2017). Algae during plant colonization release metabolites to different as: vitamins peptides, polysaccharides and phytohormones which cause signal transductions and responses from genes, which as a result show phytochemical changes in plants (Singh 2014). These phytochemical changes are attributed to the production of anthocyanins, ascorbic acid, phenolic compounds in apples and mangoes; increasing the amounts of flavonoid compounds in strawberries; lycopene and beta-carotene in tomatoes; limonene, terpene and karyophylene in carrots; and capsaicin and anthocyanin in pepper; sterols in potatoes; (Rudell et al. 2002; Pandhair and Gosal 2009). It has been proven that algae also have a positive effect on soil pH. Saha and Mandal showed that algae cause an increase in soil pH, (Saha and Mandal,1979) but Subhashini and Kaushik reported a decrease in pH as well as hydraulic conductivity, electrical conductivity and soil aggregation (Subhashini and Kaushik 1981). One of the biggest problems caused by the loss of agricultural production is sodic and saline soils (Rhoades et al., 1992; Bernestein, 1975). The difference between sodicity and salinity is that: a soil is sodic when the sodium content is more than 5% of all the cations attached to the clay particles. Sodicity can increase the alkalinity of the soil at pH 10 and cause wide dispersion of the clay, leading to poor hydraulic conductivity and reduced soil aeration (Gupta, 1990). As a result, crop production on these lands is poor. Whereas, saline soils contain high concentrations of salts (mainly NaCl, Na2SO4 and rarely NaNO3) in liquid and solid phases, which results in high osmotic pressure and poor agricultural

yield and productivity. (Kaushik, 1985). Cyanobacteria, characterized by tolerance to salinity grow in large quantities in alkaline soil (Singh,1950). Reasons why algae may grow under saline conditions are: the content of some salt-reactive proteins, the synthesis of osmoregulatory compounds, and the production of extracellular polysaccharides. (Kaushik, 2005). Forms of algae such as Nostoc, Plectonema, Calothrix, Scytonema, Microchaete, Westiellopsis and Hapalosiphon, have appeared in saline soils (Kaushik, 1990).

Table 2. Application of various algal strains as bio-fertilizers (Das et al., 2019)

No.	Algal strain	Mode of action as bio-fertilizer
1	*Chlorella*	Enhanced germination rate of wheat, maize, barley
2	*Nostoc muscorum*	Enhanced seed germination rate in cotton, maize, wheat, lentils
3	*Phormidium foveolarum*	Promotes seed germination, enhanced root and shoot growth
4	*Spirulina*	Promoted seed germination in cress and winter wheat
5	*Acutodesmus dimorphus*	Faster seed germination in Roma tomato
6	*Dunaliella salina*	Promoted seed germination in wheat
7	*Dunaliella salina*, and *Phaeodactylum tricornutum*	Enhanced germination rate in bell pepper seeds
8	*Nostoc*	Improved stability and mineral content of saline soil
9	*Botryococcus, Chlamydomonas, and Chlorella*	Improved soil stability
10	*Chroococcidiopsis* and *Anabaena*	Enhanced shoot length, spike length, lateral root, grain weight in wheat plant
11	*Scenedesmus obliquus*	Increased growth rate in Rhizobium japonicum
12	*Haematococcus pluvialis*	Increased root growth and secondary metabolite in Beta vulgaris and Tagetes patula
13	*Spirulina platensis*	Enhanced secondary metabolite production in Beta vulgaris
14	*Calothrix elenkinii*	Improved microbial community in roots of rice plants
15	*Chlorella vulgaris*	Biocidal effect and promoted lettuce yield
16	*Spirulina platensis*	Increased pepper and beet yields
17	*Spirulina*	Improved postharvest shelf life of eggplant
18	*Chlorella* and *Spirulina*	Increased potato, pea, and wheat yield and quality
19	*Scenedesmus dimorphis*	Increased plant and flower growth in tomato
20	*Dunaliella salina*	Improved germination and seed growth in wheat plants
21	*Chlorella*, *Scenedesmus*, and *Spirulina platensis*	Improved growth in leafy vegetables, wheat, and tomato
22	*Chlorococcum humicolum*	Inhibited growth of Botrytis cinerea in strawberry and Erysiphe polygoni in tomato, turnips, and saprophytes

5.CONCLUSIONS

This review concludes that different species of algae have a great potential to be used as biofertilizer, not only because they are environmentally friendly and have low cost, but also other properties that have a positive impact on the soil-plant system. Algae as biofertilizer: affect the increase of seed germination rate, source of plant growth substances, biocontrol of phytopathogens, treatment of heavy metals and increase of soil quality. So, compared to synthetic fertilizers, algae as biofertilizer are better alternatives that enable increased crop yields and promote sustainable agriculture.

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YEM BEZELYESİ TOHUMLUKLARINDA DEPOLAMA ÖNCESİ VE SONRASI CANLILIK PERFORMANSLARININ BELİRLENMESİ

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ÖZET

Araştırma 2021-2022 yıllarında Tohumluk Tescil ve Sertifikasyon Merkez Müdürlüğü laboratuvarlarında yürütülmüştür. Araştırmada Uysal, Özkaynak, Kurtbey, Ürünlü, Taşkent ve Nany yem bezelyesi çeşitlerinin tohumları materyal olarak kullanılmıştır. Bu araştırma altı farklı yem bezelyesi tohumluklarında depolama öncesi, oda koşullarında depolama ve tohum saklama odasında depolama sonrası canlılık performanslarının laboratuvar çalışmaları ile belirlenmesi amacı ile yürütülmüştür. Araştırmada, ilk olarak hasat edilen yem bezelyesi bitkilerinden elde edilen tohumlara depolama öncesi çimlendirme ve iletkenlik testleri uygulanmış, İkinci aşamada hasat sonrası elde edilen tohumlar normal oda koşullarında ve +5 °C ve % 60 nemde 3 ay süre ile tohum saklama odasında depolanmış ve sonrasında laboratuvar analizlerine tabi tutulmuştur. Tohumlara 20 °C'de 8 gün kum ortamda çimlendirme testi, 20 °C'de 24 saat bekletildikten sonra iletkenlik testi uygulanmış ve sürme hızı ve sürme gücü tespit edilmiştir. Araştırmada en yüksek iletkenlik değerinin oda koşullarında depolama sonrası ve çeşitler bazında Ürünlü yem bezelyesi çeşidinde, en yüksek çimlenme hızı ve çimlenme gücü değerlerinin tohum saklama odasında (Soğuk Hava) depolama dönemine ve çeşitler bazında Taşkent çeşidinde belirlenmiştir. Araştırma sonucunda çimlendirme ve iletkenlik testinin yem bezelyesinde tohum partilerinin güçlerini belirlemede sınıflandırıcı olduğu, tarlaya ekilebilirlilik değerlerinin belirlemesinde ve ayrıca hızlı, güvenilir ve tekrar edilebilir olması nedeni ile kullanılabileceği belirlenmiştir.

Anahtar kelimeler: Yem bezelyesi, İletkenlik testi, Çimlenme hızı, Çimlenme gücü, Depolama

DETERMINATION OF VITALITY PERFORMANCES OF FEED PEA SEEDS BEFORE AND AFTER STORAGE

ABSTRACT

The research was carried out in the laboratories of the Center for Seed Registration and Certification in 2021-2022. In the research, the seeds of Uysal, Özkaynak, Kurtbey, Ürünlü, Taşkent and Nany fodder pea varieties were used as material. This research was carried out to determine the viability performances of six different forage pea seeds before storage, at room conditions and after storage in the seed storage room by laboratory studies. In the research, pre-storage germination and conductivity tests were applied to the seeds obtained from the first harvested forage pea plants. In the second stage, the seeds obtained after harvest were stored in the seed storage room at +5 °C and 60% humidity for 3 months and then in the laboratory. subjected to analysis. The germination test was applied to the seeds at 20 °C for 8 days in a sand environment, and after they were kept at 20 °C for 24 hours, the conductivity test was applied and the spreading speed and driving power were determined. In the study, the highest conductivity value was determined after storage in room conditions and on the basis of varieties, in the forage pea variety with Product, the highest germination rate and germination power values were determined in the Tashkent variety on the basis of varieties and storage period in the seed storage room (Cold Weather). As a result of the research, it was determined that the germination and conductivity test is a classifier in determining the strength of seed lots in forage peas, and it can be used in determining the cultivability values in the field and also because it is fast, reliable and repeatable.

Keywords: Feed pea, Conductivity test, Germination rate, Germination power, Storage

GİRİŞ

Ülkemizde hayvansal kaynaklı protein ihtiyacını karşılamada büyükbaş ve küçükbaşlardan elde edilen et, süt vb. gibi ürünler ön plana çıkmaktadır. Bahsedilen bu ürünlerin üretim aşamasında yapılan masrafların yaklaşık % 70'lik kısmını oluşturan yem ve besleme masrafları işletmenin karlılığını önemli ölçüde etkileyerek hayvancılık işletmelerinin azalmasına, hayvansal ürün üretim miktarının azalmasına, hayvansal gıda fiyatlarında önemli bir artışa sebep olmakta ve bu durum kişi başı hayvansal protein tüketimini olumsuz yönde etkilemektedir. Hayvancılık işletmelerinin ve hayvansal ürün üretim miktarının bu denli azalmasının nedeni ise hayvanlar için önemli olan kaba yem ihtiyacının tam anlamıyla ve yeterince karşılanamamasından kaynaklandığı bilinmektedir.

Türkiye'nin son verilerine bakıldığında 19 milyon (BBHB) civarında büyükbaş hayvan varlığı olup, bu hayvan varlığının refah yaşam payı ve istenilen günlük canlı ağırlık artışı için her bir BBHB için günlük 12.5 kg'dan yıllık 86 milyon ton kaliteli kaba yeme ihtiyaç vardır. Ülkemizde tarımsal üretimden ve çayır-mera alanlarından yılda 31 milyon ton kuru ot temin 2 edilirken, mevcut üretim ile ihtiyaç duyulan gerekli kaba yem miktarı arasında 55 milyon tonluk bir açık bulunmaktadır (Acar vd., 2020).

Son yıllarda yem bitkileri ekimine talepler artış gösterse bile kaliteli kaba yem üretimi hayvanlarımızın kaba yem ihtiyacını karşılamamaktadır. Bu durum üretimi azaltan unsurların başında gelmektedir. Bu konuda hem nispi olarak ucuz olan, hem de ruminantların sindirim faaliyetlerini olumlu yönde etkileyen kaba yemler, bu yemlerin kaynakları ve alternatif kaba yem kaynakları ön plana çıkmaktadır.

Yem bezelyesi tek yıllık bir baklagil yem bitkisi olup otunun besleme değeri oldukça yüksek ve lezzetlidir. Her türlü hayvan için lezzetli ve besleyici bir ota sahiptir. Geniş bir adaptasyon yeteneğine sahip olması yanında, verim ve kalite özellikleri bölge koşullarında tercih edilen yem bezelyesi, toprağa 5-15 kg/da arasında azot bağlaması ve kendisinden sonra gelen bitkiye temiz bir anız bırakması ile önemli bir serin iklim bitkisidir. (Uzun ve ark. 2012). Tam çiçeklenme döneminde 30-200 cm boylanan bitki (Tamkoc vd., 2009) koşulların uygun olması durumunda 4 metreye kadar boylanmakta (Tekeli ve Ateş, 2011) olup bu dönemde biçilen yem bezelyesinden yetiştiriciliğin yapıldığı iklim ve toprak şartları, genotip (Açıkgöz, 2009) ile uygulanan kültürel işlemlere bağlı olarak 1000-7000 kg/da arasında yeşil ot verimi alınabilmektedir (Büyükburç vd., 1994; Tekeli ve Ateş, 2011; Turk vd., 2011).

Kaba yem üretimi için büyük öneme sahip olan yem bezelyesinin ilk aşamada ekim değerinin bilinmesi oldukça önemlidir. Aynı çeşit, aynı tohumluk sınıfı ve yüksek çimlenme kabiliyetli tohumluk partileri depolamadan sonra ya da tarlada farklı performans gösterebilirler. Yine

çimlenme analizinde farklılık göstermeyen tohum partileri aynı tarlada aynı zamanda ekildiklerinde farklı tarla çıkış oranı gösterebilirler. Tohumluk partileri arasındaki bu performans farklılıkları tohum gücünden (seed vigor) kaynaklanmaktadır. Tohum gücü tohumun yada tohumluk partilerinin çim çıkışı ve çimlenme boyunca göstermiş oldukları performans ve aktifliğin derecesinin toplamı olarak tanımlanabilir (ISTA, 1993). Çimlenme testleri tekrar edilebilir olması ve optimum şartlar altında çimlenme için tohum partilerinin potansiyeli hakkında bilgi sağlaması açısından oldukça önemlidir (Matthews, 1981). Bununla birlikte, Çimlenme testi bir tohum partisinin maksimum çimlenme potansiyelini belirleme ve aynı zamanda tarlada yetiştirme, dikim değerlerini hesap etme ve farklı partilerin kalitesini karşılaştırmak açısında da önem arz etmektedir (ISTA, 1993).

Bu araştırma, tohum gücünün önceden belirlenmesi ile tohumluk yem bezelyesi çeşitlerinin hangi ekim şartlarında ve saklanma koşullarında üstünlük göstereceği tespit edilmesi ve üreticilerin tohumluk seçimi de ışık tutulması amacı ile yürütülmüştür.

MATERYAL VE YÖNTEM

Tohumluk Tescil ve Sertifikasyon Merkez Müdürlüğü laboratuvarlarında 2021-2022 yıllarında yürütülen araştırmada Uysal, Özkaynak, Kurtbey, Ürünlü, Taşkent ve Nany yem bezelyesi çeşitlerinin tohumları materyal olarak kullanılmıştır.

Materyal olarak kullanılan tohumlar hakkında gerekli bilgiler aşağıdaki çizelgede verilmiştir. Çeşitlerin bin dane ağırlıkları tohumlar temin edildiğinde belirlenmiştir. Dane nemleri uygulamalar öncesi belirlenmiş olup %10-14 arasında düzenlenmiştir.

Tablo 1. Yem bezelyesi tohumlarının bin dane ağırlığı, depolama öncesi dane nemi ve depolama sonrası dane nemi.

Yem bezelyesi Çeşitleri	Bin Dane Ağırlığı (g)	Depolama Öncesi Dane Nemi (%)	Depolama Sonrası Dane Nemi (%)
Uysal	160.80	13.4	12.6
Özkaynak	141.60	11.4	13.2
Taşkent	146.40	11.0	10.6
Kurtbey	194.60	10.6	10.4
Ürünlü	123.38	11.6	13.8
Nany	118.00	11.7	10.8

Yem bezelyesi çeşitlerin hepsi 2021 yılı ürünü olup hasat sonrasında temin edilmişdir, hiçbir muameleye tabi tutulmadan nem değerleri %10-14 arasında olacak şekilde ayarlandıktan sonra nem geçirmeyen alüminyum folyo kaplı özel tohum depolama kağıtlarına aktarılarak

depolanmıştır. Çalışma iki aşama halinde yapılmıştır. Birinci aşama laboratuvarda sürdürülmüş olup hasat edilen bitkilerden elde edilen tohumlara muamelesiz olarak testler uygulanmıştır. İkinci aşamada, hasat sonrası elde edilen oda koşullarında bekletilen tohumlar ve 3 ay süre ile +5 °C ve %60 nemdeki tohum saklama odasında bekletilen tohumlar ile çalışılmıştır.

Laboratuvar çalışmalarında standart çimlenme testleri ve iletkenlik testi, çimlenme hızı, çimlenme gücü ölçümleri yapılmıştır.

Çimlendirme Testi:

Uluslararası Tohum Test Birliğinin (ISTA) metot ve uygulamaları doğrultusunda her bir çeşit için 100 tohum 4 tekerrür sayılarak çalışma masasına bırakılmıştır. Çeşit ve tekerrürlerin takibi için numaralandırma etiketleri yazılmıştır. Çimlendirme ortamı olarak 20 cm uzunluğunda, 16 cm genişliğinde, 5 cm derinliğinde nem kaybını önleyen kapaklı kaplar kullanılmıştır. Çimlendirme kaplarına 0,9 mm çapındaki elekten geçirilen ve 150 °C'de 2 saat boyunca steril edilen kumdan (kumun nemi %60 dolayındadır) 2 cm kalınlığında bırakılarak bastırılmadan düzeltilerek önceden sayımı yapılan 4x100 adet tohumlar ayrı ayrı çimlendirme kutularına yeknesak bir şekilde dağıtıldı. Üzerine 1-2 cm kalınlığında aynı kumdan kapatıldı. Çimlendirme kapları bu şekilde sıcaklığı 20°C olarak ayarlanan ve ± 1 °C hassasiyetle çalışan çimlendirme kabinine bırakıldı. Çimlendirme kabininin sıcaklık ve nem değerleri test boyunca günlük kontrol edildi. 5. günde toprak yüzeyine çıkanların %'si çimlendirme hızı olarak kayıt altına alındı. 8. günde ise numunelerin normal çimleri değerlendirilerek çimlenme gücü belirlendi.

İletkenlik Testi:

İletkenlik testi için iletkenlik sayacı, su (deiyonize veya distile), erlenmayer, beher, çimlendirme kabini, nem test cihazı, terazi (0,01 g ağırlığa kadar ölçebilen) ve potasyum klorid hazırlanmıştır.

Tam olarak 250 ml saf su ölçülüp 500 ml'lik erlenmayerlere konularak, buharlaşmasını önlemek ve 20 °C'de dengede tutmak için erlenmayerlerin ağzı alüminyum folyo ile kapatılmıştır. Kullanılan saf suyun kalitesini belirlemek için sadece saf su içeren bir tane kontrol erlenmayeri hazırlandı. Hazırlanan bu erlenmayerler ± 1 °C hassasiyetle çalışan ve iletkenlik testi için gerekli olan 20 °C'yi sağlayan çimlendirme kabinine 24 saat kalmak üzere bırakılmışlardır. Her çeşit için 4 adet 50'li örnek olacak şekilde 4 erlenmayer hazırlanmıştır.

Bir gün sonra saf suya konulmak üzere iletkenlik ölçümü yapılacak bir çeşit için 50 tane tohum içeren 4 tekerrür hazırlanmıştır. Tohumların dane nemleri belirlenip kayıt altına alınmıştır. Sayımı yapılan tohumların içerisinde kırık, çürük vb. tohumların olmamasına dikkat edilmiştir. Tohumların iki ondalık hane içerecek şekilde ağırlığı alınmış bu işlemden sonra tohumlar bir gün önce 20 °C sıcaklığa bırakılan saf suya konulmuştur. Her bir erlenmayer tohumların suya

batmasını sağlamak için hafifçe çalkalandıktan sonra bir gün boyunca kalması için çimlendirme kabinine yerleştirilmiştir.

İletkenlik ölçümü yapılmadan önce HI 9033 markalı ve 1x9 voltluk batarya ile çalışan iletkenlik sayacı kalibre edilmiştir. Kalibre için 0,745 g çözünmüş saf KCL 150 °C'de 1 saat boyunca kurutulmuş ve desikatörde soğutulduktan sonra 1 litre saf suda 0,01 M KCL solüsyonu hazırlanmıştır. İletkenlik sayacı kalibre edilmeden önce hazırlanan solüsyonun sıcaklığının 20 °C olmasına dikkat edilmiş ve bu sıcaklıkta iletkenlik sayacının 1273 μScm^{-1} okuması sağlanmıştır.

Testten en az 15 dakika önce iletkenlik sayacı çalıştırılmış, her ölçümden sonra probu çalkalamak için saf su içeren iki tane beher doldurulmuştur. Çalkalama suyunun iletkenliğinin ≤ 2 μScm^{-1} olmasına dikkat edilmiştir.

24 saatlik ıslatma periyodunun sonunda tohumların iletkenlik ölçümü yapılmıştır. Tohumların iletkenlik ölçümünden önce 20 °C'deki saf suyun (kontrol suyunun) iletkenlik ölçümü yapılmıştır. Çıkan değerin 1-5 μScm^{-1} olmasına dikkat edilmiştir. İletkenlik ölçümü sırasında kontrol suyunun değeri 000 veya 001 arasında çıkmıştır. Çimlendirme kabininden tek tek alınan erlenmayerler ilk önce hafifçe çalkalanmış suyun biraz durgunlaşmasından sonra prob solüsyona daldırılmıştır. İletkenlik değeri sabitlenene kadar prob suda kalmış ve değer sabitleştikten sonra prob temizlenip diğer tekerrüre geçilmiştir. Ölçümler sırasında suyun sıcaklığının 20 °C'de tutulmasına ve 15 dakika içinde ölçümün yapılmasına dikkat edilmiştir. Çıkan iletkenlik değeri tohum ağırlığına bölünmüş, bir çeşit için alınan 4 değerin ortalaması da alınarak o çeşide ait iletkenlik değeri belirlenmiştir.

Bu testin esası bitki dokularından elektrolit sızıntısının ölçülmesi esasına dayanır. Elektrolit sızıntısı fazla olduğu zaman çıkan sonuç yüksek olacağından bu tür tohumlar düşük vigorludur. Çıkan değerin küçük olması tohum gücünün fazla olduğu anlamını taşımaktadır.

Çimlenme Hızı:

Çimlenme ortamına bırakılan tohumların 5'inci günün sonunda toprak yüzeyine ulaşanlarının %'si çimlenme hızı değeri olarak belirlendi. Her bir çeşit 4 tekerrür olarak yürütülmüştür ve tüm bitkiler değerlendirilmiştir.

Çimlenme Gücü:

Çimlenme ortamına bırakılan tohumların 8'inci günün sonunda toprak yüzeyine ulaşanlarının %'si çimlenme gücü değeri olarak belirlendi. Her bir çeşit 4 tekerrür olarak yürütülmüştür ve tüm bitkiler değerlendirilmiştir.

BULGULAR VE TARTIŞMA

1. Depolama Öncesi Elde Edilen Sonuçlar

1.1. İletkenlik Testi

Tohum kalitesinin veya gücünün belirlenmesine yönelik olarak yapılacak çalışmalarda, özellikle iletkenlik testleri önemli rol oynamaktadır. Gerekli ön araştırmaların yapılması koşulu ile, bu yöntemden yararlanılarak, bir tohum partisinin gücü hakkında kısa sürede bilgi edinilebileceği bildirilmiştir (Tilki ve Çalıkoğlu, 1998).

Bu çalışmada, yem bezelyesi çeşitlerinin hasat sonrası muamelesiz uygulamada tespit edilen iletkenlik testi sonuçlarına ait değerler Tablo 2'de verilmiştir. Tablo 2'de görüldüğü üzere farklı yem bezelyesi çeşitlerinin, depolama öncesi iletkenlik değerleri çeşitler bazında istatistiksel olarak % 0.1 düzeyinde önemli bulunmuştur. Bununla birlikte, çeşitlere ait ortalama iletkenlik testi değerleri incelendiğinde, en yüksek değerin 3.88 µS $cm^{-1}g^{-1}$ değer ile Ürünlü yem bezelyesi çeşidine ait olduğu en düşük iletkenlik değerinin ise 2.51 µS $cm^{-1}g^{-1}$ değerle Taşkent yem bezelyesi çeşidinden elde edildiği görülmektedir. Kolasinska vd., (2000) tarafından baklagil bitkisi olan fasulyede yaptığı çalışmada, 39 hat ve çeşide ait tohum partisini 3 yıl tarla ve laboratuvar testlerine tabi tutmuşlardır. Tohum partilerinin elektriksel iletkenlik değerlerinin 7 ile 45 µScm-1 g -1 arasında değiştiğini belirlemişlerdir. Çalışma sonunda tarla çıkışının tahmininde en etkili test olarak elektriksel iletkenlik testi olduğunu belirtmişlerdir. Bu çalışma sonucu bizim bulgularımızdan farklıdır.

Tablo 2. Yem Bezelyesi Çeşitlerinde Depolama Öncesi Tespit Edilen İletkenlik Testi Değerleri (µs $cm^{-1}g^{-1}$)

Çeşit	İletkenlik Değeri
Ürünlü	3.88 a
Uysal	3.64 a
Özkaynak	3.21 b
Nany	2.97 bc
Kurtbey	2.77 cd
Taşkent	2.51 d
F	**
AÖF	0.31
VK	6.6

** İşaretli F değerleri, işlemler arasındaki farklılığın %0.1 ihtimal sınırına göre önemli olduğunu göstermektedir.

1.2. Çimlenme Hızı

Yem bezelyesi çeşitlerinin hasat sonrası depolama öncesi tespit edilen çimlenme hızı testi sonuçlarına ait değerler Tablo 3'de verilmiştir. Tablo 3'de görüldüğü gibi farklı yem bezelyesi çeşitlerinin, depolama öncesi çimlenme hızı değerleri çeşitler bazında istatistiksel olarak % 0.1

düzeyinde önemli bulunmuştur. Bununla birlikte, çeşitlere ait ortalama çimlenme hızı değerleri incelendiğinde, en yüksek değerin %90 ile Nany yem bezelyesi çeşidine ait olduğu, en düşük çimlenme hızı değerinin ise %60 ile Uysal yem bezelyesi çeşidine ait olduğu görülmektedir**.** Çaçan vd., 2016 tarafından yem bezelyesinde çimlenme hızını belirlemeye yönelik yapılan benzer bir çalışmada, yem bezelyesi hat ve çeşitlerin çimlenme oranı ortalama olarak; 10 ^{0} C sıcaklıkta %72.6, 20 ^{0} C sıcaklıkta %78.5, 24 ^{0} C sıcaklıkta %71.2 ve 30 ^{0} C sıcaklıkta ise %75.5 olarak tespit edilmiştir. Bizim bulgularımız kısmen benzemektedir.

Tablo 3. Yem Bezelyesi Çeşitlerinde Depolama Öncesi Tespit Edilen Çimlenme Hızı Değerleri (%)

Çeşit	Çimlenme Hızı
Nany	90 a
Ürünlü	86 b
Özkaynak	86 b
Taşkent	84 b
Kurtbey	74 c
Uysal	60 d
F	**
AÖF	2.1
VK	1.8

** İşaretli F değerleri, işlemler arasındaki farklılığın %0.1 ihtimal sınırına göre önemli olduğunu göstermektedir.

1.3. Çimlenme Gücü

Yem bezelyesi çeşitlerinin depolama öncesi tespit edilen çimlenme gücü testi sonuçlarına ait değerler Tablo 4'de verilmiştir. Tablo 4' de görüldüğü üzere farklı farklı yem bezelyesi çeşitlerinin, depolama öncesi çimlenme gücü değerleri çeşitler bazında istatistiksel olarak % 0.1 düzeyinde önemli bulunmuştur. Ayrıca, çeşitlere ait ortalama çimlenme gücü değerleri incelendiğinde, en yüksek değerin %96 ile Nany yem bezelyesi çeşidine ait olduğu, en düşük çimlenme gücü değerinin ise %66 ile Uysal yem bezelyesi çeşidinden elde edildiği görülmektedir. Bulgularımıza benzer olarak, Santos vd., 2003 tarafından Fasulyede yapılan bir çalışmada, çimlenme gücü değerleri %70 ile 88 arasında değişmiştir.

Tablo 4. Yem Bezelyesi Çeşitlerinde Depolama Öncesi Tespit Edilen Çimlenme Gücü Değerleri (%).

Çeşit	Çimlenme Gücü
Nany	96 a
Ürünlü	93 ba
Özkaynak	93 ba
Taşkent	91 b
Kurtbey	83 c
Uysal	66 d
F	**
AÖF	3.4
VK	2.6

** İşaretli F değerleri, işlemler arasındaki farklılığın %0.1 ihtimal sınırına göre önemli olduğunu göstermektedir.

2. Depolama Sonrası Elde Edilen Sonuçlar

2.1. Oda Koşulları

2.1.1. İletkenlik Testi

Elektriksel iletkenlik testi, ISTA tarafından öncelikle bezelye ve daha sonra da fasulye ve soya tohumlarında olmak üzere, sadece üç türde güç testi olarak onaylanmıştır. Diğer türler için henüz tavsiye niteliği taşımaktadır (ISTA, 2020). Araştırmada, yem bezelyesi çeşitlerinin oda koşullarında depolanması sonrası tespit edilen iletkenlik testi sonuçlarına ait değerler Tablo 5'de verilmiştir. Tablo 5'de görüldüğü gibi farklı yem bezelyesi çeşitlerinin, oda koşullarında depolanması sonrası iletkenlik değerleri çeşitler bazında istatistiksel olarak % 0.1 düzeyinde önemli bulunmuştur. Çeşitlere ait ortalama iletkenlik testi değerleri incelendiğinde, en yüksek değerin 4,67 µS $cm^{-1}g^{-1}$ değer ile Ürünlü yem bezelyesi çeşidine ait olduğu en düşük iletkenlik değerinin ise 3.03 µS $cm^{-1}g^{-1}$ değerle Taşkent yem bezelyesi çeşidinden elde edildiği görülmektedir. Bu sonuçları, depolama öncesi yem bezelyesi çeşitlerinin iletkenlik testi değerleri ile karşılaştırdığımızda, oda koşullarında depolanması sonrası tespit edilen iletkenlik testi değerlerinin artığını görmekteyiz. Soya fasulyesinde yapılan bir çalışmada, elektriksel iletkenlik değerlerinin 57 ile 120 µS$cm^{-1}g^{-1}$ arasında değiştiğini saptamışlardır (Vieira vd., 2004). Bu sonuç bizim bulgularımızdan oldukça farklıdır.

Tablo 5. Yem Bezelyesi Çeşitlerinde Oda Koşullarında Depolama Sonrası Tespit Edilen İletkenlik Testi Değerleri (µs $cm^{-1}g^{-1}$).

Çeşit	İletkenlik Değeri
Ürünlü	4.67 a
Uysal	4.64 a
Özkaynak	4.21 b
Nany	3.63 c
Kurtbey	3.04 d
Taşkent	3.03 d
F	**
AÖF	0.12
VK	2.1

** İşaretli F değerleri, işlemler arasındaki farklılığın %0.1 ihtimal sınırına göre önemli olduğunu göstermektedir.

2.1.2. Çimlenme Hızı

Çimlenme hızı en eski tohum gücü kavramlarından biridir. Çoğunlukla benzer çimlenme oranına sahip olan tohum partilerinin çimlenme hızı ve dolayısıyla fide gelişme hızı farklı olmaktadır (Sivritepe, 2011). Yem bezelyesi çeşitlerinin oda koşullarında depolama sonrası tespit edilen çimlenme hızı testi sonuçlarına ait değerler Tablo 6'da verilmiştir. Tablo 6' da görüldüğü gibi farklı yem bezelyesi çeşitlerinin, oda koşullarında depolama sonrası çimlenme hızı değerleri çeşitler bazında istatistiksel olarak % 0.1 düzeyinde önemli bulunmuştur. Bununla birlikte, çeşitlere ait ortalama çimlenme hızı değerleri incelendiğinde, en yüksek değerin %89 ile Taşkent yem bezelyesi çeşidine ait olduğu, en düşük çimlenme hızı değerinin ise %38 değerle Uysal yem bezelyesi çeşidinden elde edildiği görülmektedir. Çimlenme hızlarının depolama öncesi elde edilen değerlere göre düşük olduğu görülmektedir.

Tablo 6. Yem Bezelyesi Çeşitlerinde Oda Koşullarında Depolama Sonrası Tespit Edilen Çimlenme Hızı Değerleri (%).

Çeşit	Çimlenme Hızı
Taşkent	89 a
Özkaynak	85 b
Nany	85 b
Kurtbey	80 c
Ürünlü	78 d
Uysal	38 e
F	**
AÖF	1.7
VK	1.5

** İşaretli F değerleri, işlemler arasındaki farklılığın %0.1 ihtimal sınırına göre önemli olduğunu göstermektedir.

2.1.3. Çimlenme Gücü

Yem bezelyesi çeşitlerinin oda koşullarında depolama sonrası tespit edilen çimlenme gücü testi sonuçlarına ait değerler Tablo 7'de verilmiştir. Tablo 7'de görüldüğü gibi farklı yem bezelyesi çeşitlerinin, oda koşullarında depolama sonrası çimlenme gücü değerleri çeşitler bazında istatistiksel olarak % 0.1 düzeyinde önemli bulunmuştur. Bununla birlikte, çeşitlere ait ortalama çimlenme gücü değerleri incelendiğinde, en yüksek değerin %96 ile Taşkent yem bezelyesi çeşidine ait olduğu, en düşük çimlenme gücü değerinin ise %43 ile Uysal yem bezelyesi çeşidinden elde edildiği görülmektedir**.**

Tablo 7. Yem Bezelyesi Çeşitlerinde Oda Koşullarında Depolama Sonrası Tespit Edilen Çimlenme Gücü Değerleri (%).

Çeşit	Çimlenme Gücü
Taşkent	96 a
Özkaynak	93 b
Nany	93 b
Kurtbey	91 b
Ürünlü	83 c
Uysal	43 d
F	**
AÖF	2.4
VK	1.9

** İşaretli F değerleri, işlemler arasındaki farklılığın %0.1 ihtimal sınırına göre önemli olduğunu göstermektedir.

2.2.Tohum Saklama Odası (Soğuk Hava)

2.2.1. İletkenlik Testi

Yem bezelyesi çeşitlerinin tohum saklama odasında (soğuk hava) depolanması sonrası tespit edilen iletkenlik testi sonuçlarına ait değerler Tablo 8'de verilmiştir. Tablo 8'de görüldüğü gibi farklı yem bezelyesi çeşitlerinin, tohum saklama odasında (soğuk hava) depolanması sonrası iletkenlik değerleri çeşitler bazında istatistiksel olarak % 0.1 düzeyinde önemli bulunmuştur. Bununla birlikte, çeşitlere ait ortalama iletkenlik testi değerleri incelendiğinde, en yüksek değerin 4.06 µS $cm^{-1}g^{-1}$ değer ile Uysal yem bezelyesi çeşidine ait olduğu en düşük iletkenlik değerinin ise 2.67 µS $cm^{-1}g^{-1}$ değerle Taşkent yem bezelyesi çeşidinden elde edildiği görülmektedir. Bu sonuçlar depolama sonrası oda koşullarında elde edilen iletkenlik testi değerlerine yakın olduğu için soğuk hava koşullarının iletkenlik değerlerini değiştirmediği görülmektedir. Bulgularımıza benzer olarak, Kolasinska vd., (2000) fasulye bitkisinde yaptıkları çalışmada iletkenlik testi sonuçlarının 7 ile 45 µS $cm^{-1}g^{-1}$ arasında değiştiğini bildirmişlerdir.

Tablo 8. Yem Bezelyesi Çeşitlerinde Tohum Saklama Odasında (Soğuk Hava) Depolama Sonrası Tespit Edilen İletkenlik Testi Değerleri (µs $cm^{-1}g^{-1}$).

Çeşit	İletkenlik Değeri
Uysal	4.06 a
Özkaynak	3,78 b
Ürünlü	3,73 cb
Kurtbey	3.48 cd
Nany	3.30 d
Taşkent	2.67 e
F	**
AÖF	0.2
VK	4.7

** İşaretli F değerleri, işlemler arasındaki farklılığın %0.1 ihtimal sınırına göre önemli olduğunu göstermektedir.

2.2.2. Çimlenme Hızı

Yem bezelyesi çeşitlerinin tohum saklama odasında (soğuk hava) depolama sonrası tespit edilen çimlenme hızı testi sonuçlarına ait değerler Tablo 9' da verilmiştir. Tablo 9'da görüldüğü gibi farklı yem bezelyesi çeşitlerinin, tohum saklama odasında (soğuk hava) depolama sonrası çimlenme hızı değerleri çeşitler bazında istatistiksel olarak % 0.1 düzeyinde önemli bulunmuştur. Bununla birlikte, çeşitlere ait ortalama çimlenme hızı değerleri incelendiğinde, en yüksek değerin %92 ile Taşkent yem bezelyesi çeşidine ait olduğu, en düşük çimlenme hızı değerinin ise %48 değerle Uysal yem bezelyesi çeşidinden elde edildiği Tablo 9' dan izlenmektedir. Yem bezelyesi çeşitlerinin tohum saklama odasında (soğuk hava) depolamalanmasının çimlenme hızını artırdığı görülmektedir.

Tablo 9. Yem Bezelyesi Çeşitlerinde Tohum Saklama Odasında Depolama Sonrası Tespit Edilen Çimlenme Hızı Değerleri (%).

Çeşit	Çimlenme Hızı
Taşkent	92 a
Nany	88 b
Özkaynak	85 c
Ürünlü	83 d
Kurtbey	80 e
Uysal	48 f
F	**
AÖF	1.4
VK	1.2

** İşaretli F değerleri, işlemler arasındaki farklılığın %0.1 ihtimal sınırına göre önemli olduğunu göstermektedir.

2.2.3. Çimlenme Gücü

Yem bezelyesi çeşitlerinin tohum saklama odasında (soğuk hava) depolama sonrası tespit edilen çimlenme gücü testi sonuçlarına ait değerler Tablo 10'da verilmiştir. Tablo 10'da görüldüğü gibi farklı yem bezelyesi çeşitlerinin, tohum saklama odasında (soğuk hava)

depolama sonrası çimlenme gücü değerleri çeşitler bazında istatistiksel olarak %0.1 düzeyinde önemli bulunmuştur. Bununla birlikte, çeşitlere ait ortalama çimlenme gücü değerleri incelendiğinde, en yüksek değerin %97 ile Taşkent yem bezelyesi çeşidine ait olduğu, en düşük çimlenme gücü değerinin ise %51 ile Uysal yem bezelyesi çeşidinden elde edildiği belirlenmiştir**.**

Tablo 10. Yem Bezelyesi Çeşitlerinde Tohum Saklama Odasında (Soğuk Hava) Depolama Sonrası Tespit Edilen Çimlenme Gücü Değerleri (%).

Çeşit	Çimlenme Gücü
Taşkent	97 a
Nany	94 b
Özkaynak	92 cb
Ürünlü	91 cb
Kurtbey	89 c
Uysal	51 d
F	**
AÖF	3
VK	2.3

** İşaretli F değerleri, işlemler arasındaki farklılığın %0.1 ihtimal sınırına göre önemli olduğunu göstermektedir.

SONUÇLAR

Araştırma sonunda, yem bezelyesi çeşitlerinde depolama öncesi yapılan iletkenlik testlerinde en yüksek iletkenlik değeri 3.88 µS $cm^{-1}g^{-1}$ değer ile Ürünlü yem bezelyesi çeşidinden, en düşük iletkenlik değeri ise 2.51 µS $cm^{-1}g^{-1}$ değerle Taşkent yem bezelyesi çeşidinden elde edilmişdir. Depolama sonrası oda koşullarında yapılan iletkenlik testinde ise, en yüksek iletkenlik değeri 4,67 µS $cm^{-1}g^{-1}$ değer ile Ürünlü yem bezelyesi çeşidinden, en düşük iletkenlik değeri ise 3.03 µS $cm^{-1}g^{-1}$ değerle Taşkent yem bezelyesi çeşidinden elde edilmiştir. Depolama sonrası tohum saklama odasında soğuk hava koşullarında yapılan iletkenlik testinde ise, en yüksek iletkenlik değeri 4.06 µS $cm^{-1}g^{-1}$ değer ile Uysal yem bezelyesi çeşidinden, en düşük iletkenlik değeri ise 2.67 µS $cm^{-1}g^{-1}$ değeri ile Taşkent yem bezelyesi çeşidinden elde edilmiştir. Yem bezelyesi çeşitlerinin iletkenlik değerlerinin depolama sonrasında arttığı tespit edilmiştir.

Yem bezelyesi çeşitlerinde depolama öncesi yapılan çimlenme hızı testlerinde en yüksek çimlenme hızı değeri %90 ile Nany yem bezelyesi çeşidinden, en düşük çimlenme hızı değeri ise %60 ile Uysal yem bezelyesi çeşidinden elde edilmişdir. Depolama sonrası oda koşullarında yapılan çimlenme hızı testinde ise, en yüksek çimlenme hızı değeri %89 ile Taşkent yem bezelyesi çeşidin den, en düşük çimlenme hızı değeri ise %38 değerle Uysal yem bezelyesi çeşidinden elde edilmiştir. Depolama sonrası tohum saklama odasında soğuk hava koşullarında yapılan çimlenme hızı testinde ise, en yüksek çimlenme hızı değeri %92 ile Taşkent yem

bezelyesi çeşidinden en düşük çimlenme hızı değeri ise %48 değerle Uysal yem bezelyesi çeşidinden elde edilmiştir. Yem bezelyesi çeşitlerinin çimlenme hızı değerlerinin depolama sonrasında özellikle soğuk hava koşullarında arttığı tespit edilmiştir.

Yem bezelyesi çeşitlerinde depolama öncesi yapılan çimlenme gücü testlerinde en yüksek çimlenme gücü değeri %96 ile Nany yem bezelyesi çeşidinden, en düşük çimlenme gücü değeri ise %66 ile Uysal yem bezelyesi çeşidinden elde edilmişdir. Depolama sonrası oda koşullarında yapılan çimlenme gücü testinde ise, en yüksek çimlenme gücü değeri %96 ile Taşkent yem bezelyesi çeşidin den, en düşük çimlenme gücü değeri ise %43 değerle Uysal yem bezelyesi çeşidinden elde edilmiştir. Depolama sonrası tohum saklama odasında soğuk hava koşullarında yapılan çimlenme gücü testinde ise, en yüksek çimlenme gücü değeri %97 ile Taşkent yem bezelyesi çeşidinden en düşük çimlenme gücü değeri ise %51 değerle Uysal yem bezelyesi çeşidinden elde edilmiştir. Yem bezelyesi çeşitlerinin çimlenme gücü değerlerinin depolama öncesinde ve sonrasında çok fazla değişmediği tespit edilmiştir.

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ENDÜSTRİYEL ATIKSULARDAN BOYARMADDELERİN UZAKLAŞTIRILMASI İÇİN MISIR KOÇANLARINDAN POTASYUM KARBONAT AKTİVASYONU İLE ÜRETİLEN YENİ BİR AKTİF KARBONUN PERFORMANSININ ARAŞTIRILMASI

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ÖZET

Birçok farklı yapıda kirleticiyi her türlü ortamdan uzaklaştırma potansiyeline sahip aktif karbon, dünyada çok tanınan ve kullanılan eşsiz bir adsorbandır. Ticari üretimi oldukça maliyetli olduğundan ekonomik değeri çok düşük materyallerden aktif karbon üretimi ve adsorpsiyon performansının incelenmesi son yıllarda oldukça popüler bir çalışma alanı olmuştur. Bu çalışmada ekonomik değeri neredeyse sıfır olan mısır koçanlarından kimyasal olarak K_2CO_3 aktivasyonu ile yeni bir aktif karbon üretilmiş, karakterize edildikten sonra sulu çözeltiden Remazol Brillant Blue (RBB) ve Indigo Carmin (IC) boyar maddelerini uzaklaştırma potansiyeli incelenmiştir. K_2CO_3 aktivasyonu ile mikro gözenek yapılı (AK-PK) aktif karbon elde edildi. Karakterizasyon analizlerinden uçucu madde miktarı, sabit karbon miktarı, nem miktarı, kül miktarı tayini, pH–pHpzc ve yüzey asidik fonksiyonel grupların tayini (Boehm titrasyonu) elementel analiz (C, H, N, S ve O tayinleri), BET yüzey alanı, SEM analizleri, mikro-mezogözenek alanları, gözenek hacim ve dağılımları, FT-IR analizleri gibi analizler gerçekleştirildi. AK-PK'nın karakterizasyonu için sulu çözeltiden adsorpsiyon testleri olarak pH'nın, temas süresinin, sıcaklığın, adsorbat-adsorbent miktarının etkileri denge, kinetik ve termodinamik parametreler eşliğinde incelenmiştir. Elde edilen adsorpsiyon testleri sonucunda üretilen aktif karbonun sulu çözeltiden kirletici tür olan boyaları yüksek performansla uzaklaştırdığı tespit edildi. Bu çalışma sayesinde, ekonomik değeri olmayan mısır koçanlarından aktif karbon üreterek onların ekonomik bir değer kazanması sağlanmış ve ilaveten atıkların çevre kirliliğine yol açma ihtimalleri de ortadan kaldırılmıştır.

Anahtar Kelimeler: Adsorpsiyon, Aktif karbon, Biyoteknoloji, Boyar madde, Mısır (*Zea mays L.*) koçanı.

INVESTIGATION OF THE PERFORMANCE OF A NEW ACTIVATED CARBON PRODUCED BY THE ACTIVATION OF POTASSIUM CARBONATE FROM CORNCOB TO REMOVE DYESTUFFS FROM INDUSTRIAL WASTEWATER

ABSTRACT

Activated carbon, which has the potential to remove many different types of pollutants from all kinds of environments, is a unique adsorbent that is well known and used in the world. Since its commercial production is quite costly, the production of activated carbon from materials with very low economic value and the investigation of its adsorption performance has been a very popular field of study in recent years. In this study, a new activated carbon was produced by chemically K_2CO_3 activation from corn cobs with almost zero economic value, and its potential to remove Remazol Brilliant Blue (RBB) and Indigo Carmin (IC) dyestuffs from aqueous solution was investigated after characterization. Microporous (AK-PK) activated carbon was obtained with K_2CO_3 activation. Volatile matter content, fixed carbon content, moisture content, ash content determination from characterization analyzes, determination of pH–pHpzc and surface acidic functional groups (Boehm titration), elemental analysis (C, H, N, S and O determinations), BET surface area, SEM analyzes such as micro-mesopore areas, pore volumes and distributions, FT-IR analyzes were carried out. For the characterization of AK-PK, the effects of pH, contact time, temperature, adsorbate-adsorbent amount as adsorption tests from aqueous solution were investigated in conjunction with equilibrium, kinetic and thermodynamic parameters. As a result of the obtained adsorption tests, it was determined that the activated carbon produced from the aqueous solution removed the polluting type dyes with high performance. Thanks to this study, by producing activated carbon from corn cobs that have no economic value, they gain an economic value and in addition, the possibility of wastes causing environmental pollution is eliminated.

Keywords: Adsorption, Activated carbon, Biotechnology, Dyestuff, Corn (*Zea mays L.*) cob.

1.GİRİŞ

Aktif karbon, gaz ve sulu fazdan hem organik hem de inorganik karakterli çok çeşitli kirletici türleri üstün performansla adsorplama yeteneğine sahip eşsiz bir adsorbandır. Yüksek karbon içeriğine sahip kömür, ceviz kabuğu, odunsu atıklar, kayısı çekirdeği gibi çeşitli materyallerden üretilen aktif karbonların günümüzde pek çok alanda kullanımı mevcuttur. Ticari olarak üretilen aktif karbonların maliyetinin yüksek olması onların etkin kullanımını sınırlamaktadır. Bu nedenle düşük maliyetli materyallerden çok farklı özellikte ve etkinlikte aktif karbon üretim çalışmaları günden güne artan ilgi ile takip edilmektedir. Birçok tarımsal atık, kolay temin edilmesi, düşük maliyetli olması ve lignoselülozik içeriğinin yüksek olması sayesinde aktif karbon üretiminde yaygın olarak kullanılır.

Su, canlıların yaşamlarını sürdürebilmesi için hayati bir sıvıdır. Tüm yaşamsal olaylar için gerekli olan suyun insanlara, içerisinde zararlı kimyasalları ve hastalık yapıcı mikroorganizmaları içermeyecek şekilde sağlanması gerekir. Çeşitli faaliyetler sonucu oluşan atık sular uygun teknolojilerle arıtılmalı ve canlılara zarar vermeyecek özelliklere kavuşturularak doğaya tekrar verilmelidir. Böylece temiz su döngüsünün doğada sürdürülmesine yardımcı olunmalıdır (Güler ve Çobanoğlu, 2001).

Kirliliğe neden olan maddelerin doğal ortamdaki seviyelerinin belirlenmesi ve uzaklaştırılması konusunda çok sayıda bilimsel araştırma ve inceleme yapılmış olup pek çok analitik teknik ve yöntem araştırmacılar tarafından kullanılmıştır. Bunlara; kimyasal çöktürme, iyon değiştirme, membran filtrasyonu, adsorpsiyona dayalı teknikler, elektroliz ve biyolojik yöntemler örnek olarak verilebilir. Bu teknik ve yöntemler arasında en yaygın olarak kullanılanı adsorpsiyona dayalı yöntemlerdir. Günümüzde aktif karbon kullanılarak adsorpsiyon yöntemiyle atık sularda mevcut farklı tipteki birçok kirletici tür tatmin edici performanslarla temizlenebilmektedir.

Aktif karbonlar, hazırlama tekniklerinin detayları, yüksek derecede gözeneklilik, geniş bir iç yüzey alanı, çok çeşitli gözenek boyutu dağılımı ve yüzey kimyasına bağlı olarak sınıflandırılan karbon ağırlıklı organik maddelerdir. Aktif karbonlar içerdikleri gözenekli yapılara göre sınıflandırılmaktadır (Bansal ve Goyal, 2005).

IUPAC'a göre gözenekler şöyle sınıflandırılır:

- Mikro gözenekler (yarıçapı 1 nm'den küçük olanlar),
- Mezo gözenekler (yarıçapı 1-25 nm olanlar),
- Makro gözenekler (yarıçapı 25 nm'den büyük olanlar).

Bu çalışmada önemli olan mikro ve mezo gözeneklerden oluşturulan aktif karbonlar büyük önem taşır. Çünkü karbona adsorplama kapasitesi kazandıran ve aktif karbonun kalitesi hakkında fikir veren yapılar aktivasyon prosesi boyunca oluşan mikro ve mezo gözeneklerdir.

(Akyıldız, 2007). Aktif karbonların kullanım alanları, genel olarak iki başlık altında sınıflandırılabilir. Bunlar, sıvı faz ve gaz faz uygulamalarıdır. Aktif karbon uygulamalarının % 79'u sıvı fazda, % 21'i gaz fazdadır (Matandabuzo, 2018). Genel olarak aktif karbonun uygulama alanları; su ve atık su arıtımı, boya üretimi, gaz maskeleri yapımı, petrokimya endüstrisi, gazların saflaştırma ve arıtımı, karışımların ayrımı, gıda sanayisi saflaştırma işlemleri, metal sanayisi, savunma sanayisinde koruyucu giysi yapımı, silah sanayisi, hidrometalurji alanlarında altın gümüş geri kazanımı vs. şeklindedir.

Aktif karbon üretimi iki prosese dayalı olarak üretilir. Kimyasal aktivasyon yöntemi kimyasal ajanların hammaddeye yüksek derecede ısı ile maruz bırakılması esasına dayanır. İkinci yönetim ise karbonizasyon ve aktivasyon basamaklarının iki aşamada gerçekleştiği fiziksel aktivasyondur.

Fiziksel aktivasyon iki adımda gerçekleşen bir prosestir. İlk adımda karbon içerikli materyalin karbonizasyonu gerçekleştirilirken ikinci adımda karbonizasyon sonucu oluşan ürünün yüksek sıcaklıklarda karbondioksit, su buharı, hava veya bunların karışımı gibi uygun yükseltgen gazların varlığında aktivasyonu gerçekleştirilir. Endüstriyel uygulamalarda buhar ve CO_2 en çok karşılaşılan fiziksel aktive edici maddelerdir. Bununla birlikte fiziksel aktivasyonla üretilen aktif karbonlar adsorban ya da filtre olarak kullanım için uygun niteliklere sahip değildirler (Bozbeyoglu P.and Duran C., 2020).

Kimyasal aktivasyon ise fosforik asit, sülfürik asit, borik asit ve potasyum karbonat gibi kimyasal ajanların eklenmesiyle karbonizasyon prosesinin modifiye edilmesidir. Bu yöntem ile az miktarda kimyasal maddenin oluşturulmak istenen üründe kalması dezavantaj olabilir. Bu problemlere rağmen düşük sıcaklıklarda ve kısa sürede, yüksek karbonizasyon dönüşüm oranına ve yüksek yüzey alanına sahip aktive edilmiş ürüne erişilmesinden dolayı fiziksel aktivasyona tercih edilir (Nethaji S., 2013).

Kimyasal aktivasyon yöntemin fiziksel aktivasyona göre bazı üstünlükleri vardır. Kimyasal aktivasyon genellikle tek adımda ve daha düşük aktivasyon süresi ile gerçekleşir. Aynı zamanda fiziksel aktivasyona oranla daha düşük aktivasyon sıcaklığı ile daha geniş yüzey alanı oluşturabilir. Kimyasal aktivasyon ile hem gelişmiş mikro gözenek hacmi hem de daha yüksek katı ürün verimi elde edilebilir. Dezavantajları ise; kullanılan kimyasal ajanlardan kaynaklanan çevreye zararlı etki ve oluşturulan aktif karbon içerisinde zaman zaman safsızlıklar oluşabilmesi bu yüzden de yıkama işlemlerinin zorunlu hale gelmesidir (Akyıldız, 2007).

2. ÇALIŞMANIN AMACI VE YÖNTEM

Dünyada hızla artan endüstriyel faaliyetler sonucu su, toprak ve hava çeşitli atıklarla kirlenmekte ve zaman geçtikçe kirliliğin çeşidi ve boyutu da artmaktadır. Doğal sulak alanlarda kontrolsüz endüstriyel atıkların sonucu olarak karşımıza çıkan özellikle ağır metaller, fenolik bileşikler ve boyar maddeler yalnızca su kütlesinde değil, sulak alanların yapısında da birikebilmektedir. Bulundukları ortamlarda birikebilen bu kirleticiler, canlı yaşamı için toksik etkilere neden olmaktadır. Bu kirleticilerin çeşitli yöntemlerle bertaraf edilmesi ve temizlenen atık suların sağlıklı bir şekilde tekrar alıcı ortama verilmesi gerekmektedir (Bozbeyoğlu P.,2020).

Günümüzde aktif karbonla sulardan kirletici giderim prosesleri yaygın bir şekilde kullanılmaktadır. Ancak ticari aktif karbonların pahalı olması ve geri kazanımlarının da fazladan maliyet getirmesi gibi dezavantajlara sahip olmalarına karşın, geniş yüzey alanları, mikro gözenekli yapıları, yüksek adsorpsiyon kapasiteleri ve yüzey reaktiviteleri bu adsorbanların kullanımını yine de cazip kılmaktadır.

Daha düşük maliyetli, fakat yüksek performanslı aktif karbonların üretilme ihtiyacından dolayı, günümüzde yeterince karbon içeriğine sahip özellikle atık pozisyonundaki lignoselülozik içerikli tarımsal biyokütlelere olan ilgi giderek artmaktadır.

Bu çalışmanın amacı; herhangi bir ekonomik değeri olmayan, neredeyse tamamen atık olarak çevreye boşaltılan mısır koçanlarından aktif karbon üretimi, çeşitli analitiksel parametrelerle karakterizasyonu ve bu aktif karbonun endüstriyel atık sulardaki kirleticileri adsorpsiyonla uzaklaştırma potansiyelinin incelenmesidir. Ayrıca, aktif karbonların sulu ortamdan boyar madde gibi kirleticileri uzaklaştırma potansiyellerini hem orijinal mısır koçanı ile hem de literatürde bildirilen diğer adsorbanlarla karşılaştırmak da bir diğer amaçtır.

2.1. Kimyasal Aktivasyon ile Aktif Karbon Üretimi

Mısır koçanı (MK) atıklarından aktif karbon üretimi kimyasal aktivasyonla gerçekleştirildi. Kimyasal aktivasyon ajanı olarak potasyum karbonat (K_2CO_3) kullanıldı. 4 mm çapında 60 g MK + 60 g K_2CO_3 + 200 mL su karışımı hazırlandı. 60 ^oC sıcaklıkta 8 saat bekletildi. Sonra bir gece 105 ^oC'de kurutuldu. Son olarak 700 ^oC'de N_2 gaz atmosferinde reaktörde (Protherm marka atmosfer kontrollü yüksek sıcaklık tüp fırını) 1 saat süre ile piroliz edildi (700 ^oC sıcaklığa 5 ^oC/dak. zaman aralığında ulaşıldı). Sonra yıkama işlemi uygulandı, kurutuldu ve istenilen boyutlara öğütülüp elenerek kullanıldı (Ozer ve Imamoglu, 2017).

2.2. Karakterizasyon Analizleri

Elde edilen aktif karbonun ve mısır koçanının karakterizasyonu için yapılan nem, uçucu madde, sabit karbon, kül miktarı tayini, elementel analiz (C, H, N, S ve O tayinleri), BET yüzey alanı,

mikro-mezogözenek alanları, gözenek hacimleri, gözenek dağılımları, iyot ve MB (metilen mavisi) sayıları, FT-IR analizleri, pH–pH_{pzc} ve yüzey asidik grupların tayini (Boehm titrasyonu) gibi analizler yapılmıştır.

2.2.1.Kül Miktarı Tayinleri

Adsorbanların kül içeriği, ASTM (American Society for Testing Materials) standart yöntemi kullanılarak belirlenmiştir. Bu amaçla sabit tartıma getirilmiş kapaklı platin krozelere 1'er g örnek konuldu. Krozeler kül fırınına (Heatech 4851–1 model) yerleştirildi ve fırın 1 saat içinde 500 ^oC'ye, 2 saat içinde 750 ^oC'ye ulaşacak şekilde programlandı ve bu sıcaklıkta sabit tartıma gelen örnekler fırından çıkarılarak bir desikatörde soğutulduktan sonra tartıldı.

Örneklerdeki kül miktarı aşağıdaki Eşitlik kullanılarak hesaplandı.

$$TK = \frac{(D - B)}{(C - B)} \times 100$$

TK: Toplam kül miktarı (%)

B: Boş kroze kütlesi (g)

C: Numune içerikli kroze kütlesi (g)

D: Kül içerikli kroze kütlesi (g)

2.2.2.Uçucu Madde Miktarı Tayinleri

Hammaddelerin uçucu madde içerikleri, ASTM standart yöntemi kullanılarak belirlenmiştir. Bu amaçla platin kroze önce kapağı ile birlikte 950 ^oC'deki kül fırınında 30 dakika, daha sonra da 1'er g'lık örnekler konularak krozeler içeriği ile birlikte 950 ^oC'deki kül fırınında 10 dakika tutulmuştur. Örnekler fırından çıkarılarak bir desikatörde soğutulmuş ve tartılmıştır. Örneklerin uçucu madde miktarı;

$$UM = \frac{(C - D)}{(C - B)} \times 100$$

UM: Uçucu madde miktarı (%)

B: Kapaklı boş kroze kütlesi (g)

C: Kapaklı kroze ve numune kütlesi toplamı (g)

D: Kapaklı kroze ile geride kalan madde kütlesi toplamı (g)

eşitliğine göre hesaplanmıştır.

2.2.3.Elementel Analiz

Adsorbanların elementel analizleri için yaklaşık 2 mg civarında hassas tartımları alınan numuneler kalay kapsüle konulup 950–1000ºC civarında elementel analiz cihazında yakılmak amacıyla yükseltgendi. N_2, SO_2, H_2O ve CO_2'den oluşan gaz karışımı, taşıyıcı gaz olan helyum yardımıyla kromatografik kolona gönderildi. Burada oksijen yardımıyla tekrar yakılarak oluşan ve ayrılan gaz karışımları ısıl iletken dedektöre yönlendirilerek ayrılan her bir gazın miktarı ile orantılı bir elektrik sinyali elde edildi. Standartlarla elde edilen spektrumdaki pik alanlarıyla karşılaştırılmak suretiyle numunelerin C, H, N ve S içerikleri aynı anda belirlenirken oksijen içeriği ise farktan hesaplandı.

2.2.4.Boehm Titrasyonu

Boehm titrasyonu ile çeşitli adsorbanların ve özellikle de aktif karbonların yüzey fonksiyonel grupları tespit edilebilir (Boehm, 1966). Boehm titrasyon yöntemi asidik grupların belirlenmesinde etkin olmakla birlikte, bazik yüzey oksitlerin belirlenmesinde çok etkili bir yöntem değildir. Bazik yüzey oksit gruplar HCl ile nötralize edilebilmektedir. Bu amaçla iki adsorban için laktonik, fenolik ve karboksilik grupların mmol cinsinden miktarlarının Boehm titrasyonu ile belirlenebilmesi için 0.05'er g adsorban ile ayrı ayrı 0.1 N 50 mL NaOH, $NaHCO_3$ ve Na_2CO_3 ile 400 rpm karıştırma hızında bir çalkalayıcı üzerinde 24 saat muamele edilerek çalkalandı. 0.1 N NaOH ile toplam yüzey asidik grupların (laktonik, fenolik ve karboksilik) hepsi nötralleştirilerek tayin edildi. Laktonik ve karboksilik gruplar Na_2CO_3 ile sadece karboksilik gruplar da $NaHCO_3$ ile nötralleştirilerek belirlendi. Çalkalama işlemi sonunda örnekler vakum filtrasyon düzeneğine yerleştirilen 0.45 µm gözenek boyutlu selüloz nitrat membrandan süzüldükten sonra bir erlende toplandı. Süzüntü, 0.1 N HCl ile titrasyon işlemine tabi tutuldu (Duman, 2009). Boehm titrasyonu ile yüzey fonksiyonel grupların belirlenmesi için aşağıdaki eşitlik (Eşitlik 2.4) kullanıldı (Gündoğdu A., 2010)

$$YAFG = \frac{N \times (T_k - T) \times 2{,}5}{m}$$

YAFG: Yüzey asidik fonksiyonel gruplar (mmol/g)

N: Titrant (HCl) normalitesi

T_k: Tanık deneyler için titrant sarfiyatı (mL)

T: Farklı çözeltiler için titrant sarfiyatı (mL)

m: Adsorban miktarı (g)

2.2.5.pH ve Nötral Yük Noktasındaki pH (pH_{pzc})

Bir adsorban üzerinde katyonik türlerin adsorpsiyon verimi, pH'nın pH_{pzc}'den büyük olduğu (pH > pH_{pzc}) durumlarda çok daha yüksektir. Anyonik türler ise bunun tam tersi, yani adsorpsiyon verimi pH < pH_{pzc} durumunda daha yüksektir. pH_{pzc} değerinin bilinmesi ile katyonik ya da anyonik türlerin adsorpsiyonu için uygun pH değeri seçimi yapılabilir. Katyonik türler için bu değerin üzerinde, anyonik türler için de bu değerin altında bir pH'da çalışmak daha uygundur. Çünkü pH_{pzc}'nin altında adsorbanın net yüzey yükü pozitif, üstünde ise negatiftir (Bozbeyoglu P.,2020).

Adsorbanların pH_{pzc} değerlerinin tayinleri için, 0.1 g adsorban ile başlangıç pH değerleri 2–10 arasında 0.1'er M bir seri NaCl çözeltisi 24 saat çalkalandı. Çözeltilerin pH'ları 0.1 M NaOH ya da 0.1 M HNO_3 ile ayarlandı. Çalkalama sonucunda adsorbanla çözelti birbirinden santrifüjle ayrıldı ve çözeltilerin denge pH değerleri pH metre ile ölçüldü. Başlangıç pH değerlerinden denge pH değerleri çıkartılarak *y* eksenine (Δ_{pH}), başlangıç pH değerleri de *x* eksenine yerleştirilerek bir grafik çizildi. Grafiğin *x* eksenini, *y*'nin sıfır olduğu değerden kestiği nokta pH_{pzc} olarak kaydedildi.

2.2.6.Taramalı Elektron Mikroskop (SEM) Analizleri

Elde edilen aktif karbonun ve orijinal mısır koçanının SEM görüntüleri 100–10000 kat büyütülerek çekildi. Çekilen fotoğraflardan adsorbanların yüzey şekilleri ve gözenek oluşumları birbirleriyle karşılaştırılarak incelendi.

2.2.7.Yüzey Karakterizasyon Analizleri

Yüzey karakterizasyon analizleri için kuru mısır koçanı ve aktif karbon örneklerden 0.1 g civarında alınarak 77K'de (–196 ^{o}C) ve10^{-6}–1 arasındaki bağıl basınçta (P/P_o) N_2 adsorpsiyonu ile yüzey karakterizasyon cihazında (TriStar 3000, Micromeritics, USA) ölçümler gerçekleştirildi. Gözenek boyutu dağılımları da DFT plus metodu kullanılarak hesaplandı. Mikro gözenek hacimleri (V_{mikro}) ve mezo gözenek yüzey alanları (V_{mezo}) da *t*-plot metoduna göre hesaplandı (Condon, 2006).

2.2.8. FT-IR Analizleri

Adsorbanların fonksiyonel grup analizleri için iyice kurutulmuş numunelerden birkaç mg alınıp 400–4000 cm^{-1} dalga boyunda adsorpsiyon öncesi ve sonrası ölçümler FT-IR cihazında direkt spektrumları alınarak yapılmıştır.

2.2.9. Metilen Mavisi Sayısı Tayini

Metilen Mavisi sayısı (MMs), bir adsorbanın büyük molekülleri adsorplayabilme yeteneğinin bir ölçüsüdür Bu çalışmada adsorbanların MM sayısını belirlemek için, 2500 mg/L MM çözeltisi hazırlandı. 0.05 g adsorban ile 10 mL 2500 mg/L MM çözeltisi 12 saat süre ile muamele edildi. İşlem sonunda karışım 0.45 µm nitroselüloz membrandan süzüldü. Süzüntü saf su ile uygun oranlarda seyreltilerek UV-GB spektrofotometrede absorbansı ölçüldü. Daha sonra çizilen kalibrasyon grafiğinden MM sayısı önce mg/L olarak tayin edildi. Daha sonra da aşağıdaki formül yardımıyla mg/g cinsine çevrildi (Duran C., 2017).

$$MMs = \frac{C_o - C_e}{m}$$

MMs: Metilen mavisi sayısı (mg/g)

C_o: Başlangıç MM konsantrasyonu (mg/L)

C_e: Dengedeki MB konsantrasyonu (mg/L)

V: Çözelti hacmi (mL)

m: Adsorban miktarı (g)

2.2.10. İyot Sayısı Tayini

İyot sayısı ilgili adsorban için mikro gözenekliliğin (0–2 nm arası gözenek çapı) bir ölçüsüdür (Döşemen, 2009). Bu çalışmada üretilen adsorban ve mısır koçanı için iyot sayıları şu şekilde belirlendi: 50 mL hacimli plastik santrifüj tüpüne 0.2 g aktif karbon tartıldı. Üzerine 40 mL 0.1 N standart iyot çözeltisi (12.700 g iyot ve 19.100 g potasyum iyodür toplam 1 L suda çözüldü) ilave edildi ve 30 ± 1 s kadar dikkatlice çalkalandı. Karışım süzüldükten sonra çözeltide adsorplanmadan kalan iyot miktarı 0.1 N ayarlı sodyum tiyosülfat ile tire edildi. Yeni bir 40 mL daha iyot çözeltisi alındı ve adsorban ilave etmeden ve çalkalamadan 0.1 N ayarlı sodyum tiyosülfat çözeltisi ile titre edilerek sarfiyat kör olarak kaydedildi.

Adsorbanların iyot sayıları aşağıdaki formülle hesaplandı (Anonim, 2015):

$$I_2\ sayısı\ (mg/g) = F \times C$$

$$F = \frac{126.93 \times N_{I_2} \times V_F}{m \times V_K}$$

$$C = V_K - V_T$$

N_{I_2}: İyot çözeltisinin normalitesi

V_F: Filtrat hacmi (mL)

V_K: Tanık için harcanan tiyosülfat sarfiyatı (mL)

V_T: Numune için harcanan tiyosülfat sarfiyatı (mL)

m: Adsorban miktarı (g)

2.3.Denge, Kinetik ve Termodinamik Parametreler

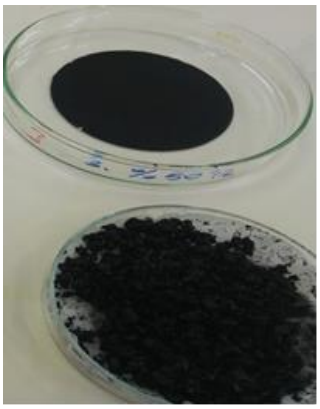
AK-PK'nın karakterizasyonu için sulu çözeltiden adsorpsiyon testleri olarak pH'nın, temas süresinin, sıcaklığın, adsorbat-adsorbent miktarının etkileri denge, kinetik ve termodinamik parametreler eşliğinde incelenmiştir.

3. ARAŞTIRMA ve BULGULAR

3.1. Karakterizasyon Sonuçları

3.1.1. Nem, Uçucu Madde, Sabit Karbon ve Kül Miktarı Sonuçları

Başlangıç hammaddesi olan mısır koçanı (MK) K_2CO_3 ile aktifleştirilerek elde edilen AK-PK kodlu aktif karbon Şekil 1'de verilmiştir. Bu aktif karbon ve orihinal mısır koçanına ait nem, kül, uçucu madde, sabit karbon analizleri ve üretim verimleri ile ilgili elde edilen sonuçlar Tablo 1'de verilmiştir. Aktif karbonların yüksek nem adsorplamaları normal olarak istenmez. Başlangıç materyali MK'ya nazaran üretilen aktif karbonun nem içerikleri daha yüksektir. Aktif karbonlar MK'ya göre daha gözenekli yapıya sahip olduğundan H_2O moleküllerinin bu gözenekler içerisine hapsolması beklenen bir sonuçtur. Adsorbanların uçucu madde içerikleri incelenecek olursa en yüksek uçucu madde miktarına, tahmin edilebileceği gibi başlangıç materyali olan MK sahiptir. Çünkü herhangi bir sıcaklık uygulaması yapılmadığı için MK, uçucu organik bileşiklerce zengindir. N_2 atmosferinde aktif karbon üretimi esnasında yapılan piroliz işlemi sonucunda pirazin, piridin, pirol ve furan gibi uçucu bazı organik moleküller ortamı gaz fazında terk etmektedir. Aslında bu moleküller sulu faza alınarak GC-MS ile kalitatif ve kantitatif olarak tayin edilebilir. Tablo 1'de görüldüğü gibi, piroliz esnasında 700 ^oC sıcaklığa çıkıldığından üretilen AK-PK'nın % uçucu bileşen içeriği oldukça düşüktür. Uçucu madde miktarı yükseldikçe bağıl olarak sabit karbon miktarı da düşer. Dolayısıyla, uçuculuğu yüksek olan MK'nın sabit karbon miktarının düşük olduğu tespit edilmiştir. Kül içerikleri incelenecek olursa AK-PK kodlu aktif karbonda MK'ya göre oldukça düşük kül içeriği bulunmuştur. Kül denilen kısım yapıdaki organik kısmın ve C iskeletin dışında kalan ve genelde inorganik karakterli tuzlardan kaynaklanır. AK üretim verileri incelendiğinde AK-PK kodlu aktif karbonun düşük verimi dikkat çekmektedir. Ancak 700 ^oC'de aktivasyon esnasında yapıda çok fazla kırılmaların oluştuğu ve karbon iskeletin bir miktarının CO_2 halinde ortamı terk etmiş olabileceği, ayrıca çözünürlüğü yüksek potasyum tuzlarının yıkama esnasında ortamı terk etmesi ile de verimde düşüşün olabileceği söylenebilir.



Şekil 1. K_2CO_3 aktivasyon Ajanı ile Üretilen Aktif Karbon

Tablo 1. Adsorbanların Kısa Analiz Sonuçları

Parametreler (%)					
Numune	**Nem**	**Uçucu madde**	**Sabit karbon**	**Kül**	**AK verimi**
MK	5.1	79.4	11.3	4.2	-
AK-PK	8.5	28.1	62.5	0.9	38.4

3.1.2. Elementel Analiz Sonuçları

Adsorbanların elementel analizleri, Leco CHNS 932 elementel analiz cihazıyla yapılmış ve sonuçları Tablo 2'de gösterilmiştir. Tabloda sunulan oksijen miktarları farktan hesaplanmıştır. Üretilen aktif karbonun sabit karbon miktarlarının MK'ya göre yüksek olduğu tespit edilmiştir (Cao vd., 2006; Rao vd., 2008). Aktif karbon üretimi esnasında yapıdan uçucu bileşenlerle birlikte gaz fazında başlıca hidrojen ve oksijen elementleri ayrılmaktadır. Kullanılan aktivasyon ajanlarının başlıca görevi, yapıdan su fazında oksijen ve hidrojen çıkartarak gözenek açmaktır. Dolayısıyla artan sıcaklıkla birlikte bağıl olarak karbon miktarları artarken hidrojen ve oksijen miktarları beklendiği gibi düşmektedir.

Tablo 2. Adsorbanın Elementel Analiz Sonuçları

Element İçerikleri (%)						
Numune	**C**	**H**	**N**	**S**	***O**	****C/H**
MK	44.19	6.37	0.571	0.048	48.83	0.583
AK-PK	74.06	2.56	0.023	-	23.35	2.424

*Farktan hesaplanmıştır.**Mol oranları- Tayin edilemedi

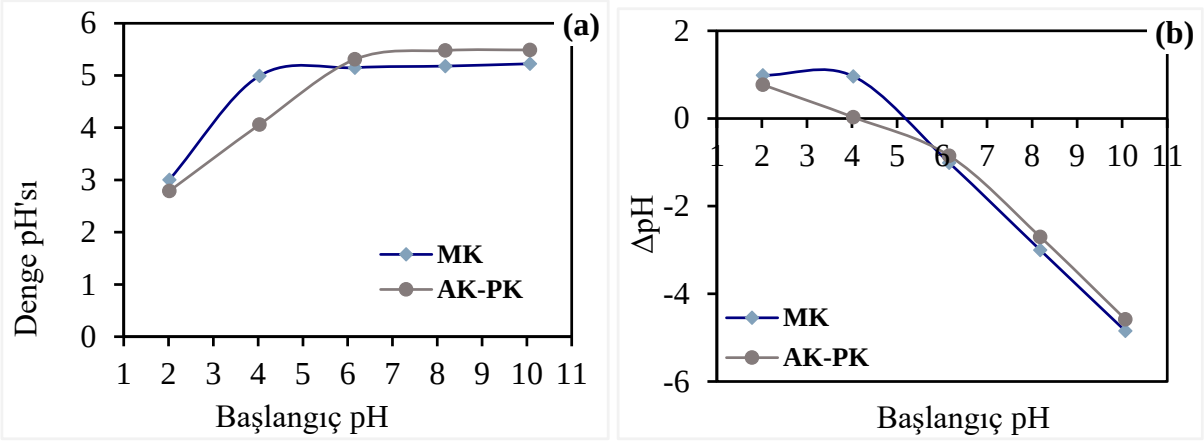
3.1.3. pH ve pH_{pzc} Tayinleri

Şekil 2.'de adsorbanların başlangıç pH'larına karşı denge pH değerleri grafiğini göstermektedir. Tamponsuz sistemde 24 saat muamelenin ardından başlangıç pH değerlerinin bir miktar değiştiği görülmektedir. Yani, başlangıç pH'ları ayarlanırken

tampon sistemi kullanılmadığından adsorbanların yüzey fonksiyonel grupları çözeltideki H^+ ve OH^- iyonları ile rahatça etkileşime girebilmektedir. Düşük pH değerlerinde çözeltiden adsorbana H^+ iyonları geçişi olurken yüksek pH'larda ise OH^- geçişleri söz konusudur. Bu nedenle zamanla pH değerlerinde değişimler meydana gelir. Bu iyon geçişleri, daha doğrusu anyon katyon değişim prosesleri (etkileşimleri) adsorbanın türü değiştikçe farklılık gösterir. Düşük pH değerlerinde pozitif, yüksek pH değerlerinde ise negatif farklar söz konusudur. Şekil 2. (b)'de bu sonuç daha net görülmektedir. Burada başlangıç pH değerlerine karşı dengede meydana gelen pH farkları (Δ_{pH}) grafiği çizilmiştir. Bu grafiğin Δ_{pH}'sının sıfır noktasındaki değerleri pH_{pzc} olarak kaydedilmiş ve değerler Tablo 3.'te verilmiştir.

pH_{pzc}, adsorbanın net yüzey yükünün sıfır olduğu noktadaki pH değeridir. Adsorbanların pH değerlerinin genelde hafif asidik bölgede olduğu görülmekte olup, $pH_{pzc}<7$ değerleri de asidik grupların bazik gruplara göre daha baskın olduğuna işaret eder (Mestre, 2007).

Boehm titrasyonundan da adsorbanların yüzeyinde asidik grupların zengin olduğu görülmektedir. pH_{pzc} değerinin altında adsorbanın net yükü pozitif, üzerinde ise negatiftir. Dolayısıyla bu değerin bilinmesi, adsorpsiyon çalışmalarında hangi pH'da çalışılacağına karar vermede yardımcı olur.



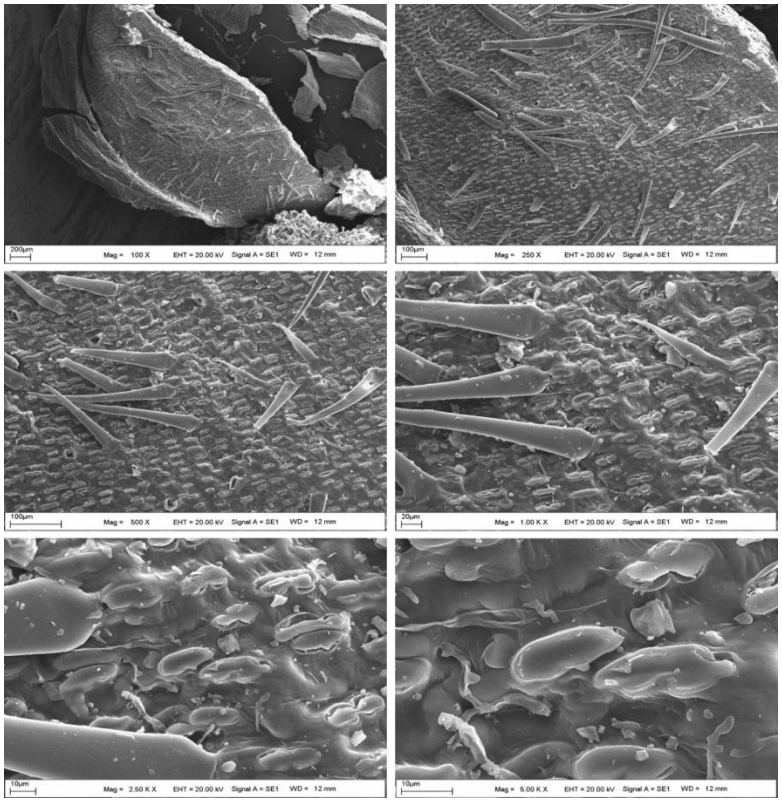
Şekil 2. (a) pH_{pzc} Tayini için Başlangıç pH'sına Karşı Denge pH'sı Grafiği (b) Başlangıç pH'sına Karşı Δ_{pH} (Başlangıç pH'sı ile Denge pH'sı Arasındaki Fark) grafiği

Tablo 3. Adsorbanların pH ve pH_{pzc} Değerleri

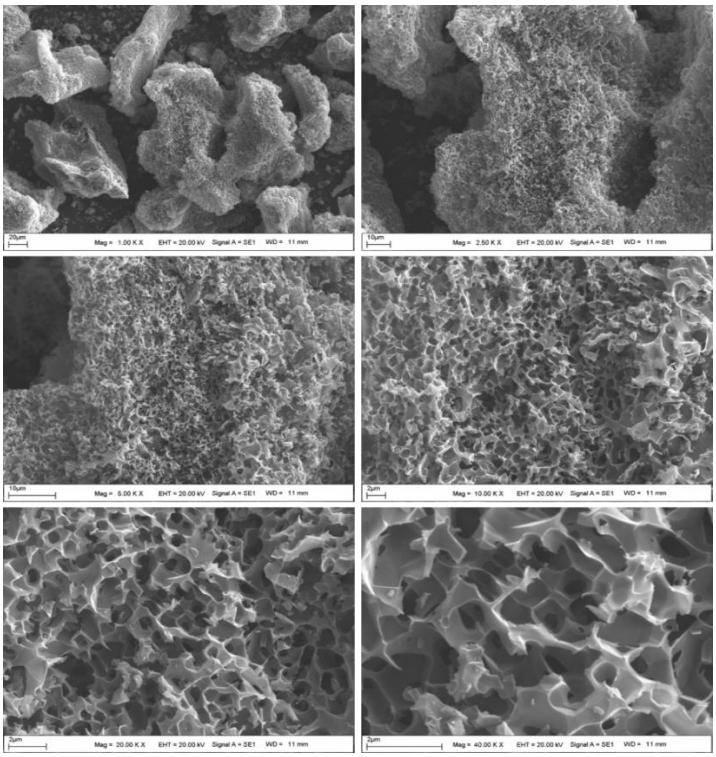
	MK	**AK-PK**
pH	5.30	6.72
pH_{pzc}	4.95	4.03

3.1.4.Taramalı Elektron Mikroskobu (SEM) Analizleri

Adsorbanların yüzey görüntüleri için çekilen SEM fotoğrafları Şekil 3. ve Şekil 4.'te gösterilmiştir. Görüntülere bakıldığında ilk olarak yüzey görüntüleri açısından üretilen aktif karbonun MK'dan farklı görüntülere ve özelliklere sahip olduğu görülmektedir. Şekil 3'de MK'nın 100–5000 kat arasında büyütülerek verilmiş 6 SEM görüntüsü incelendiğinde, yapıda pürüzlerin ve girinti-çıkıntıların olmasına rağmen herhangi bir gözeneklilik görünmemektedir. Ancak yüzeyin homojen bir yapıda olduğu, yüzeyde morfolojik yapıda gözeneklilik olmamakla birlikte iç kısımlarda farklı boyutlarda bir miktar gözeneklilik görülmektedir. Yapıya grafen benzeri selülozik birimler hakimdir. Bir sonraki parametrede Tablo 4'de de görüldüğü gibi MK'nın yüzey alanı çok düşük olup gözenekliliği de aynı şekilde oldukça düşüktür. Oysa Şekil 3.ve Şekil 4.'te SEM görüntüleri verilen aktif karbonun ise fiziksel olarak oldukça gözenekli yapılı olduğu görülmektedir.



Şekil 3. MK için SEM Görüntüleri (100–5000 kat büyütme)



Şekil 4. AK-PK için SEM Görüntüleri (1000–40000 kat büyütme)

Şekil 4'de verilen AK-PK kodlu aktif karbon için SEM fotoğraflarında yapının oldukça gözenekli olduğu ve bu gözeneklerin de oldukça küçük olduğu fiziksel olarak da görülmektedir. Zira bir sonraki parametrede verilen Tablo 4'e bakıldığında AK-PK'nın % 99,7 oranında mikro gözenek yapıda olduğu, yani gözenek boyutlarının 0–2 nm aralığında oldukça küçük olduğu görülmektedir. Potasyum karbonat ile aktivasyon işleminde yüzey morfolojisi oldukça gözenekli olmasına rağmen potasyum karbonat miktarının az olması sonucu yeterince derin gözenekler oluşmamıştır.

3.1.5. BET Yüzey Alanı ve Gözenek Boyutu Dağılımları

Tablo 4'te çalışma kapsamında üretilen aktif karbon ve orijinal mısır koçanı için BET yüzey alanı (S_{BET}), *t*-plot mikrogözenek alanı (S_{mikro}), mezogözenek alanı (S_{mezo}), toplam gözenek hacmi (V_{toplam}), mikrogözenek hacmi (V_{mikro}) ve ortalama gözenek çapı (D_p) sonuçlarını gösterilmektedir. Beklendiği gibi, orijinal mısır koçanının yüzey alanları çok küçüktür. MK herhangi bir karbonizasyona ve aktivasyona tabi tutulmadığından yapısında gözeneklerin oluşumu söz konusu değildir. Ancak burada dikkati çeken, AK-PK'nın neredeyse tamamen mikrogözenek yapıda (% 99.7) olduğudur. AK-PK çoğunlukla mikrogözenekli yapıda olduğundan mezogözenek hacimleri ölçülemeyecek kadar küçüktür.

Ortalama gözenek çaplarına bakıldığında da yine AK-PK'nın çoğunlukla 2 nm'den daha küçük çaplarda gözeneklere sahip olduğu görülmektedir. IUPAC, 2 nm altındaki gözenekleri mikrogözenek, 2–50 nm arasındakileri mezogözenek ve 50 nm'den büyük olanları da

makrogözenek olarak sınıflandırmaktadır (El-Shafey, 2000; Youssef vd., 2004; Duran vd., 2011)

Tablo 4. Adsorbanların BET Yüzey Alanları ve Gözenek Boyutu Dağılımları

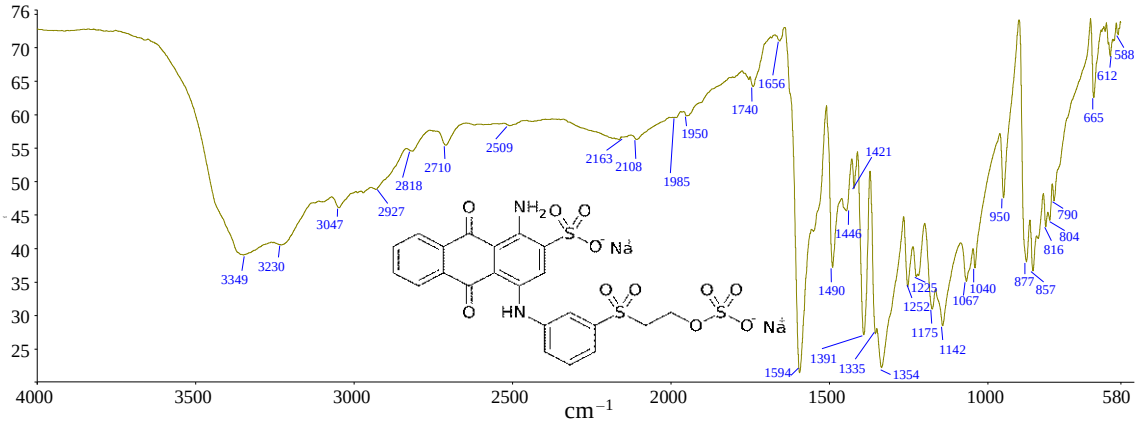
Adsorban	S_{BET} (m^2/g)	S_{mikro}		S_{mezo}		V_{toplam} (cm^3/g)	V_{mikro}		V_{mezo}		D_p[a]
		(m^2/g)	(%)	(m^2/g)	(%)		(cm^3/g)	(%)	(cm^3/g)	(%)	(nm)
MK	0.12	0.12	100.0	-	-	0.003	0.003	100.0	-	-	-
AK-PK	671.73	669.76	99.7	1.97	0.3	0.351	-	-	0.351	100.0	1.88

[a] $4V_{toplam}/S_{BET}S_{BET}$: BET yüzey alanıS_{mikro} : Mikro gözenek yüzey alanıS_{mezo} : Mezogözenek yüzey alanıV_{toplam}: Toplam gözenek hacmi
V_{mikro} : Mikro gözenek hacmiV_{mezo} : Mezogözenek hacmiD_p : Ortalama gözenek çapı: Belirlenemedi

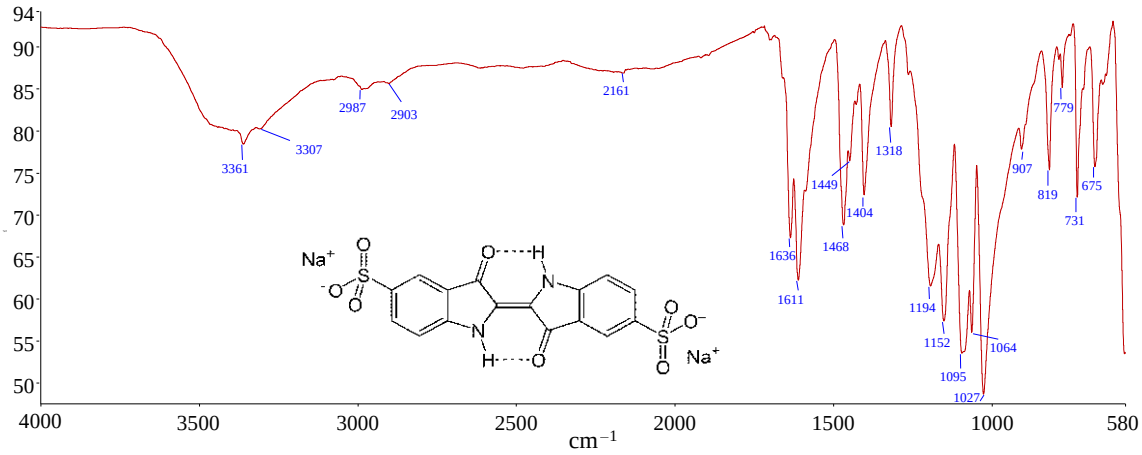
3.1.6. FT-IR Analizleri

Aktif karbonu ve diğer adsorbanları karakterize eden bir diğer parametre de IR analizidir. IR analizi ile yapıdaki olası fonksiyonel grupların kalitatif analizleri yapılabilir. Bu gruplar adsorpsiyondan asıl sorumlu olan gruplardır. Şekil 5. ve Şekil 6.'da adsorpsiyon testlerinde adsorbat molekülü olarak kullanılan RBB ve IC boyar maddelerinin IR spektrumları verilmiştir. Şekil 7'ye göre IR spektrumu incelendiğinde; 3329 cm^{-1}'de beliren hafif yayvan pik, numunenin içerdiği nemden ve/veya hidroksil (–OH) gruplarından kaynaklanmaktadır. 2920 ve 1371 cm^{-1}'de beliren pikler alifatik C–H bağlarına ait piklerdir. 1729 cm^{-1}'de beliren pik karbonil (C=O) gerilme pikidir. Yorumlanabilecek son pik ise C–O gruplarına işaret eden 1039 cm^{-1}'deki piktir.

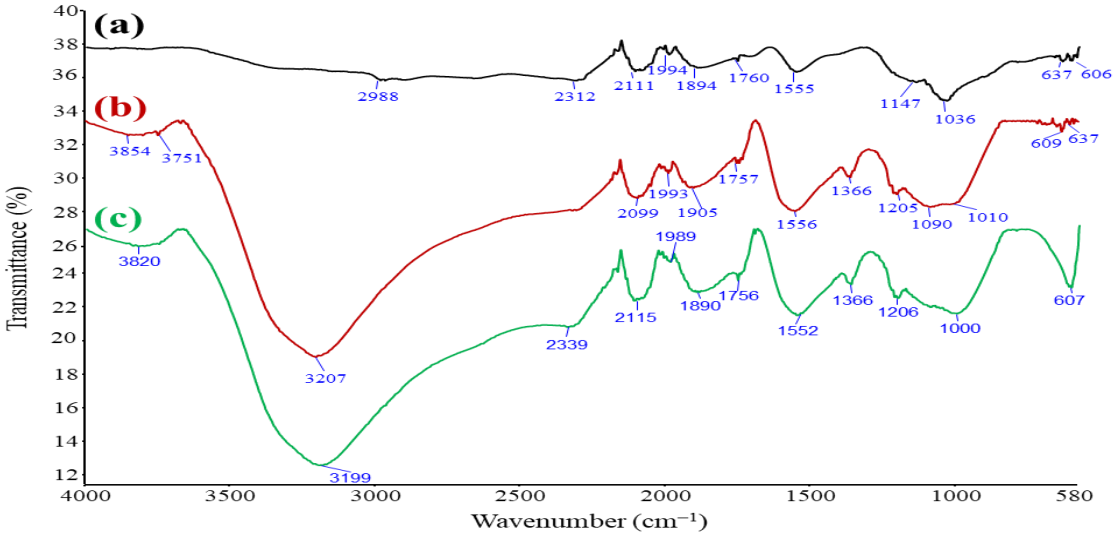
AK-PK için boya adsorpsiyonundan sonra çekilen IR spektrumlarında orijinal aktif karbonlara göre 3200 cm^{-1} civarlarında hidroksil gruplarından ibaret ekstra pikler görülmektedir. Orijinal aktif karbonlarda olmayan bu pikler adsorpsiyondan sonra boya yüklü adsorbanların genel olarak iyice kurutulmamasından kaynaklanmaktadır.



Şekil 5. Remazol Brilliant Blue için IR spektrumu



Şekil 6. Indigo Carmine için IR Spektrumu



Şekil 7. Adsorpsiyondan Sonra Boya Yüklü AK-PK: (a) Orijinal AK-PK, (b) IC yüklü AK-PK ve (b) RBB yüklü AK-PK

3.1.7. Boehm Titrasyonu

Yüzey fonksiyonel grupların belirlenmesi için uygulanan Boehm titrasyonları neticesinde elde edilen sonuçlar Tablo 5'de verilmektedir. Tablodan görüleceği gibi, üretilen aktif karbon yüzeyinde zengin asidik gruplara sahiptir.

Tablo 5. Adsorbanlar için Boehm Titrasyonu ile Yüzey Asidik Grupların Nicel Miktarları

Adsorban	**Asidik gruplar (mmol/g)**			
	Toplam asidik gruplar	**Karboksilik gruplar**	**Fenolik gruplar**	**Laktonik gruplar**
AK-PK	5.74	1.65	3.14	0.95
MK	2.43	1.75	0.35	0.32

3.1.8. MB ve İyot Sayısı Tayinleri

İyot (I_2), 0.56 nm boyutunda küçük bir moleküldür. İyot sayısının yüksekliği, ilgili adsorbanın küçük molekülleri (örneğin metal iyonları) adsorplama yeteneği hakkında bilgiler verir. Metilen mavisi (MB) sayısı ise, ilgili adsorbanın daha büyük molekülleri (organik moleküller) adsorplama yeteneğinin bir ölçüsüdür (Sun, 2010). Yüzey alanı, gözenekliliğin ve aktif grupların artması iyot ve MB adsorpsiyonunu artırıcı bir unsurdur. Adsorbanların iyot ve MB sayıları miktarı (mg/g) Tablo 6.'da verilmiştir.

Tabloya bakıldığında AK-PK'nın hem iyot sayısının hem de MB sayısının daha fazla olduğu tespit edilmiştir. Bu beklenen bir sonuçtur. Zira aktif karbonlar orijinal başlangıç maddelerine göre daha fazla mikro gözenek içerir. İyot sayısının yüksekliği, ilgili adsorbanın küçük molekülleri (örneğin metal iyonları) adsorplama yeteneğinin, Metilen mavisi (MB) sayısı ise, ilgili adsorbanın daha büyük molekülleri (organik moleküller) adsorplama yeteneğinin bir ölçüsüdür.

Tablo 3. Adsorbanların İyot ve MB Sayıları (mg/g)

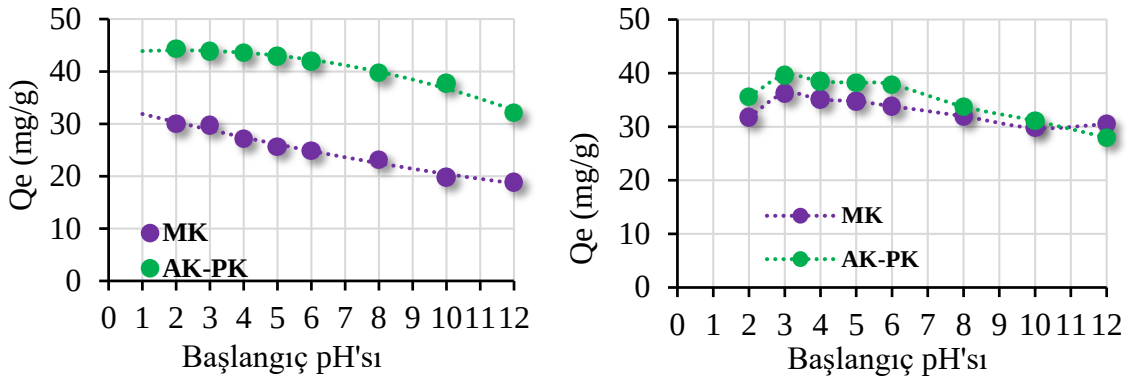
Adsorban	**İyot sayısı**	**MB sayısı**
MK	457.7	125.7
AK-PK	550.6	236.7

3.2. Denge, Kinetik ve Termodinamik Parametreler

3.2.1. Aktif Karbon Üzerinde Boyar Maddelerin Adsorpsiyonuna Başlangıç pH'sının Etkisi

pH'ları 2–12 arasına ayarlanmış 250 mg/L'lik bir seri boya çözeltisi hazırlandı ve 5.0 g/L adsorban ile 12 saat süre ile muamele edildi. Süzme işleminden sonra çözeltide adsorplanmadan

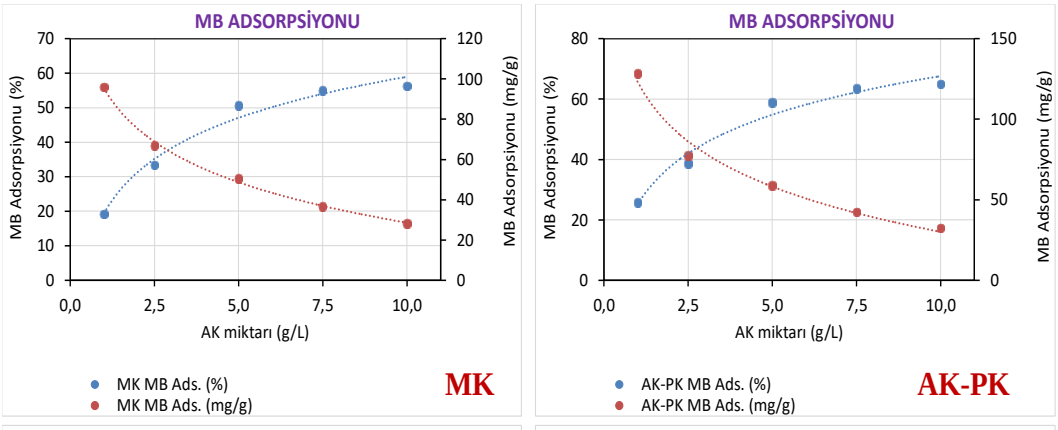
kalan boya derişimleri UV-GB spektrofotometre ile belirlendi. Şekil 8'e göre Özellikle IC adsorbsiyonu için geniş bir pH aralığında çalışılabilme ihtimalinin olduğu tespit edilmiştir. RBB için ise ne kadar asidik şartların uygun olduğu tespit edilse de pH 4-5' in daha uygun olacağı tespit edildi.



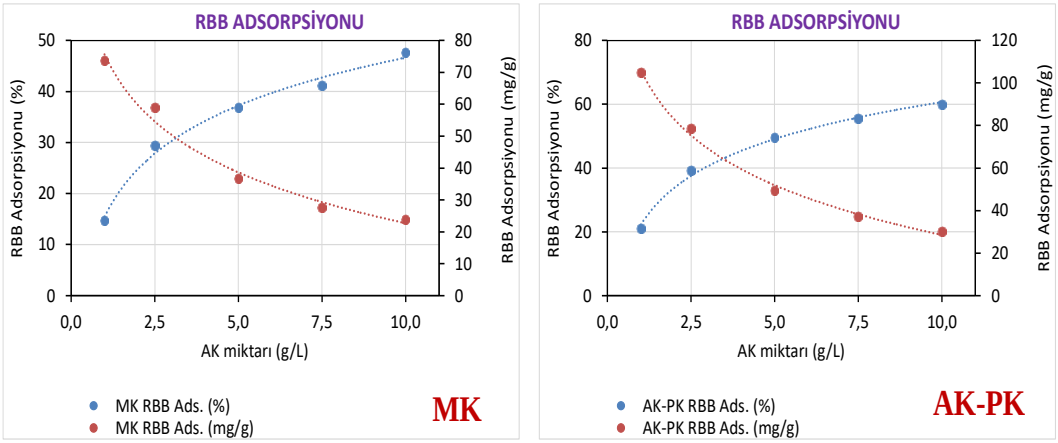
Şekil 8. a) RBB Adsorpsiyonu, **b)** IC Adsorpsiyonu (C_0: 250 mg/L, pH: 2–12, adsorban miktarı: 5.0 g/L, tanecik boyutu: ≤125µm, temas süresi: 12 saat, sıcaklık: 25 ^{o}C)

3.2.2. Boyar Maddelerin Adsorpsiyonuna Artan Adsorban Miktarının Etkisi

Boyar madde adsorpsiyonuna adsorban miktarının etkisini incelemek amacıyla, optimum şartlarda 500 mg/L boyar madde çözeltilerinin 10'ar ml'lik kısımları 10–100 mg arasında 5 farklı dozajdaki adsorbanlar (1.0–10.0 g/L süspansiyon) ile ayrı ayrı muamele edildi. Elde edilen sonuçlardan artan adsorban miktarına karşı boyar madde adsorpsiyon grafikleri çizildi (Şekil 9. – Şekil 10.)



Şekil 9. Sulu çözeltiden MB'nin adsorpsiyonuna adsorban miktarının etkisi
(Başlangıç MB kons.: 500 mg/L, başlangıç pH'sı 6.0; adsorban miktarları: 2.5; 5.0; 7.5 ve 10.0 mg/L, tanecik boyutu: ≤125 µm, çalkalama süresi 4.0 saat)

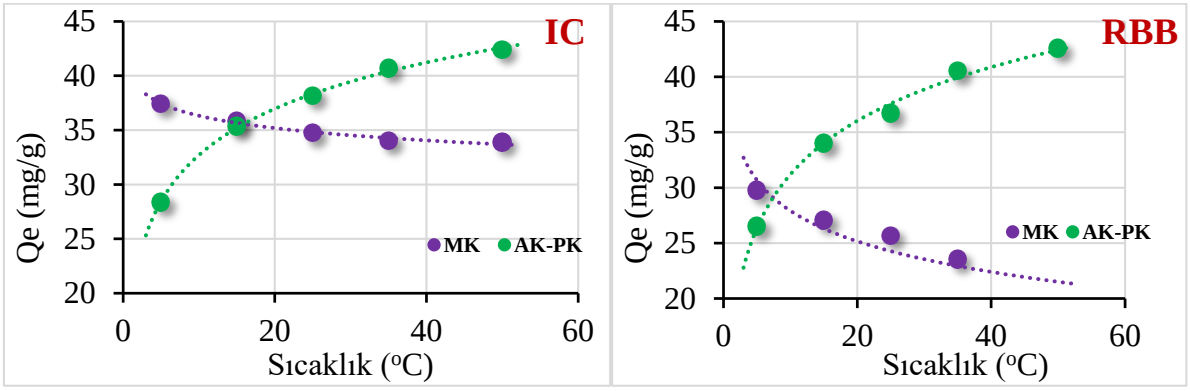


Şekil 10. Sulu çözeltiden IC'nin Adsorpsiyonuna Adsorban Miktarının Etkisi (Başlangıç IC kons.: 500 mg/L, başlangıç pH'sı 6.0; adsorban miktarları: 2.5; 5.0; 7.5 ve 10.0 mg/L, tanecik boyutu: ≤125 µm, çalkalama süresi 4.0 saat)

Şekillerden görüldüğü gibi, artan adsorban miktarıyla % boyar madde adsorpsiyonu artış gösterirken, gram adsorban başına adsorplanan boyar madde miktarında düşme gözlenmiştir.

3.2.3. Boyar Maddelerin Aktif Karbon Üzerindeki Adsorpsiyonuna Sıcaklık Etkisi ve Adsorpsiyon Termodinamiği

250 mg/L'lik boyar madde çözeltileri 5.0 g/L miktarda adsorbanlarla oda sıcaklığında 4 saat süre ile muamele edildi. Çözeltide adsorplanmadan kalan boyar madde derişimleri UV-GB spektrofotometre ile belirlendikten sonra ilgili formülasyonla birim adsorban üzerinde tutunan boyar madde miktarları (mg/g) hesaplandı. Elde edilen verilerle öncelikle sıcaklığa karşı Q_e grafikleri çizildi (Şekil 11). Termodinamik parametreler için termodinamik formüllerden hesaplanan değerler Tablo 7. ve Tablo 8'de verilmiştir. Tablolardaki sonuçlar incelendiğinde, tüm ΔG değerleri negatiftir. Yani adsorbanlar üzerinde boyar maddelerin adsorpsiyonu kendiliğinden istemli bir şekilde cereyan etmektedir.



Şekil 11. Boyar Maddelerin Aktif Karbon Üzerine Adsorpsiyonuna Ortam Sıcaklığının Etkisi (C_0: 250 mg/L, adsorban miktarı: 5.0 g/L, temas süresi: 4.0 saat, tanecik boyutu: ≤125 µm, sıcaklık:5–50 °C)

Şekil 11'de görüldüğü gibi boyar maddelerin ilgili adsorbanlar üzerinde adsorpsiyonu genelde sıcaklıkla doğru orantılı olarak artmaktadır. Ancak orijinal MK üzerinde adsorpsiyon sıcaklıkla ters orantılı olup adsorpsiyon davranışı ekzotermik, boyar maddelerin ise endotermik olduğu tespit edilmiştir.

Tablo 7. Aktif karbon üzerinde IC adsorpsiyonuna sıcaklığın etkisi: Termodinamik veriler

IC için Termodinamik veriler					
Adsorban	*T* (°C)	*K*d	ΔG° (kj/mol)	ΔS° (J/mol.K)	ΔH° (kj/mol)
MK	5	2,98	-2,52		
	15	2,53	-2,22		
	25	2,28	-2,04	-12,30	-5,82
	35	2,13	-1,94		
	50	2,10	-1,99		
AK-PK	5	1,31	-0,63		
	15	2,41	-2,11		
	25	3,23	-2,91	87,91	23,48
	35	4,36	-3,77		
	50	5,58	-4,62		

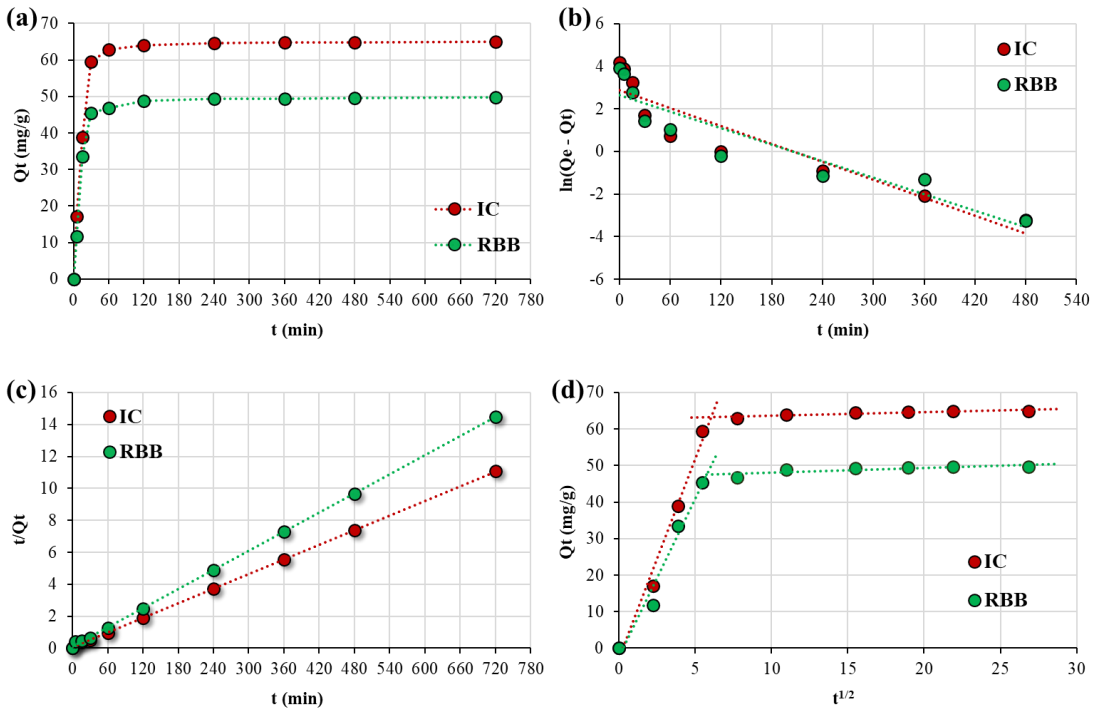
Tablo 8. Aktif Karbonda RBB Adsorpsiyonuna Sıcaklığın etkisi: Termodinamik Veriler

RBB için Termodinamik veriler					
Adsorban	*T* (°C)	*K*d	ΔG° (kj/mol)	ΔS° (J/mol.K)	ΔH° (kj/mol)
MK	5	1,47	-0,89		
	15	1,18	-0,39		
	25	1,05	-0,13	-43,79	-13,08
	35	0,89	0,30		
	50	0,65	1,16		
AK-PK	5	1,13	-0,28		
	15	2,13	-1,80		
	25	2,76	-2,51	97,52	26,56
	35	4,28	-3,72		
	50	5,72	-4,68		

3.2.4. Aktif Karbonlar Üzerinde Boyar Maddelerin Adsorpsiyonuna Temas Süresinin Etkisi ve Adsorpsiyon Kinetiği

Aktif karbon ve mısır koçanı üzerinde boyar madde adsorpsiyonu için denge süresinin tayini 0–12 saat aralığında çalışıldı. Bunun için pH'ları 4–6 arasında bulunan 500 mg/L konsantrasyonlarındaki bir seri boya çözeltisi, 5.0 g/L miktarındaki adsorbanlarla değişik zaman aralıklarında muamele edildi. Farklı zaman dilimlerinde alınan karışımlar süzüldükten sonra süzüntüde kalan boya konsantrasyonları uygun dalga boylarında (RBB 595 nm, IC 609

nm) UV-GB ile tayin edildi (Mafra, 2013). Şekil 12'te boyar madde adsorpsiyonunun zamana bağlı değişimi verilmiştir.



Şekil 12. Temas süresi ve kinetiğin etkisi: (a) Adsorpsiyonun zamana bağlı değişimi, (b) Yalancı birinci dereceden kinetik model için doğrusal grafik, (c) Yalancı ikinci dereceden kinetik model için doğrusal grafik, (d) Partikül içi difüzyon model grafiği

Tablo 9'da verilen kinetik model verilerine göre ilgili adsorbanlar üzerinde boyar maddelerin adsorpsiyon kinetiğinin ikinci mertebeden kinetik model ile oldukça uyum içerisinde olduğu R^2 değerlerinin yüksek oluşu ile Sonuçların da örtüştüğü tespit edilmiştir.

Tablo 9. Adsorbanlar Üzerinde Boyar Maddelerin Adsorpsiyonu için Kinetik Model Sabitleri

IC		Birinci mertebeden kinetik			İkinci mertebeden kinetik		
Adsorban	Q_e (den.) (mg/g)	Q_e (hes.) (mg/g)	k_1 (min^{-1})	R^2	Q_e(hes.) (mg/g)	k_2 (g/mg.min)	R^2
MK	58,94	14,24	$1,24\times10^{-2}$	0,8350	59,83	$2,19\times10^{-3}$	0,9995
AK-PK	64,93	17,70	$1,40\times10^{-2}$	0,8660	65,57	$2,84\times10^{-3}$	0,9997

RBB		Birinci mertebeden kinetik			İkinci mertebeden kinetik		
Adsorban	Q_e (den.) (mg/g)	Q_e (hes.) (mg/g)	k_1 (min^{-1})	R^2	Q_e (hes.) (mg/g)	k_2 (g/mg.min)	R^2
MK	36,84	5,67	$1,01\times10^{-2}$	0,6226	37,06	$7,03\times10^{-3}$	0,9997
AK-PK	49,67	13,98	$1,29\times10^{-2}$	0,8545	50,16	$3,58\times10^{-3}$	0,9997

SONUÇLAR VE ÖNERİLER

Yapılan çalışmalarda model çözelti vasıtasıyla RBB ve IC boya çözeltilerinde pH etkisi, sıcaklık ve zaman etkisi gibi etkenler için uygun koşullar belirlenerek atık sulardan boya giderimi gerçekleştirilmiştir. Potasyum karbonat aktivasyonu ile üretilen aktif karbonun performansı incelenerek çevreye atılan mısır koçanı atıklarının adsorpsiyon malzemesi olarak kullanılabileceği yapılan çalışmalarda tespit edilmiştir. Böylece çevreyi kirleten atık sular, bir başka atıkla temizlenerek biyoteknolojik bir yaklaşım oluşturulmuş mısır koçanı gibi ucuz bir adsorban olan atık maddeden üretilen aktif karbonun boyar maddeleri atık sularda giderme yöntemi olarak kullanımı hem rejenerasyon ihtiyacını ortadan kaldırmış hem de atık problemini bertaraf etmiştir.

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ERKİN MEKÂNSAL TEMSİLİ OLARAK İKONİK BİNALAR

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ÖZET

Yapılı çevrenin bir parçası olan ikonik binalar ortak bir kent kimliğinin oluşturulabilmesi için hem tarihsel hem de kültürel açıdan önemlidir. Mimari tasarımda "ikoniklik" binaların ve yapıların olduğu kadar tasarımcılarının ve meydana gelmesini sağlayan otoritenin sembolleşmesine de olanak sağlar. Toplum yaşamının bir parçası olan yönetim iradesi aynı zamanda yapılı çevrenin oluşumunu da etkilemektedir. Tarih boyunca yönetim iradesinin gücünü aldığı kavramlara baktığımızda "siyaset", "ekonomi" ve "din" kavramları karşımıza çıkmaktadır. Bu çalışmada, "Erk/siyasi güç ve mimarlık" ilişkisi bağlamında, otoritenin mekânsal temsiliyetinin bir göstergesi olan ikonik binaların, biçimsel ve işlevsel özellikleri, büyüklükleri, yenilikçi olmaları, malzeme ve yapım sistemleri ile günümüz mimarlığına ve kent kimliğine etkileri tartışılmaktadır. Simgesel özelliklere sahip ikonik binalar antik dönemden beri tasarım anlayışları, biçimlenişleri ve meydana geliş süreçleri ile farklı coğrafyalarda farklı etkiler göstermektedir. Günümüzde, özellikle küreselleşme sonrasında toplum yaşamının her alanında yaşanan değişim ve gelişim, ikonik binaların biçimlenmesini doğrudan etkilerken, onları birer ekonomik değer haline de getirmiştir. Bu çalışmada, erk simgesi olan ikonik binaların mimari dili ve gelecek tasarımları ne ölçüde etkilediği ile birlikte yapılı çevrenin oluşumuna katkılarının irdelenmesi amaçlanmıştır. Küreselleşme ile birlikte artan siyasal, ekonomik, kültürel ve teknolojik gelişmeler çalışma kapsamında incelenen ikonik bina örnekleri için belirleyici olmuştur. Örnekler 20. yüzyıl ve sonrasında inşa edilen binalardan seçilmiştir. Bu nedenle, çalışmada örnek olarak seçilen üç ikonik bina "yapım yılı, konum, tasarımcı, işlev ve üslup" özelliklerinin yanı sıra sahip oldukları "siluet, sadelik, simetri, metafor, malzeme, yaratıcılık, mühendislik, bağlam, öykü ve erk etkisi" gibi çalışma kapsamında belirlenen tasarım kriterleri üzerinden değerlendirilmiştir. Çalışma sonucunda, günümüzde sıradışı formları, özgünlükleri ve yenilikçi olmaları nedeniyle ilham verici olan ikonik binaların kent kimliğinin bir parçası haline geldiği tespit edilmiştir. Küreselleşme öncesinde bir ideolojiyi, bir erki temsil eden bu binaların küreselleşme sonrasında gelişen teknoloji, medya etkisi ve uluslararası rekabet nedeniyle kentlerin markalaşma aracına dönüştüğü görülmüştür. Tarihsel süreç içerisinde erkin dayanağı değişiklik gösteriyor olsa da mekân temsili olarak ikonik binalar her zaman kullanılmıştır. Bununla beraber bu binaların kentlerin gelişim aracı olmasını değiştirmediği sonucuna ulaşılmıştır.

Anahtar Kelimeler: ikonik mimari, erk, küreselleşme, mimari biçimlenme, kimlik

ICONIC BUILDINGS AS A SPATIAL REPRESENTATION OF POWER

ABSTRACT

Iconic buildings, which are part of the built environment, are important both historically and culturally in order to create a common urban identity. In architectural design, “iconicity" allows the symbolization of buildings and structures, as well as their designers and the authority that makes them happen. The will of management, which is a part of community life, also affects the formation of the built environment. When we look at the concepts from which the will of government has taken its power throughout history, the concepts of “politics”, “economy” and “religion” come across. In this study, in the context of the “power/ political power and architecture” relationship, the effects of iconic buildings, which are an indicator of the spatial representation of authority, on modern architecture and urban identity with their formal and functional properties, size, being innovative, material and construction systems are discussed.

Iconic buildings with iconic features have been showing different influences in different geographies with their design concepts, formation and formation processes since the ancient period. Today, especially after globalization, the changes and developments experienced in all areas of social life have directly influenced the formation of iconic buildings, while also making them an economic value. In this study, it is aimed to examine the extent to which the architectural language of iconic buildings, which are symbols of power, affects future designs and their contribution to the formation of the built environment. Increasing political, economic, cultural and technological developments with globalization have been decisive for the iconic building examples examined within the scope of the study. Examples are selected from buildings built in the 20th century and beyond. For this reason, the three iconic buildings selected as examples in the study, in addition to their "year of construction, location, designer, function and style" features, such as "silhouette, simplicity, symmetry, metaphor, material, creativity, engineering, context, narrative and power effect". evaluated over the design criteria determined within the scope of the study. As a result of the study, it has been determined that iconic buildings, which are inspiring today due to their unusual forms, originality and innovativeness, have become a part of the urban identity. It has been observed that these buildings, which represent an ideology and a power before globalization, have turned into a branding tool of cities due to the developing technology, media influence and international competition after globalization. It has been concluded that the change in the basis of power in the historical process did not change the use of iconic buildings as space representations and thus their mediation in the formation of cities.

Keywords: Iconic architecture, power, globalization, architectural formation, identity.

1. GİRİŞ

Tarih boyunca "mimarlık" erk göstergesi olarak kullanılmış olup, günümüzde de kullanılmaya devam etmektedir. Erk, toplum-mekân-kent arasında kurulan ilişkinin biçimlenmesinde doğrudan rol oynayan ve yapılı çevrenin fiziki oluşumunu önemli ölçüde etkileyen bir unsur olmuştur. Erk sahipleri ideolojilerini ve iktidarlarını meşrulaştırma, kendilerini gösterme, tarihte iz bırakmak gibi çeşitli amaçlarla kentsel alanlara müdahaleler gerçekleştirmişlerdir. Toplum içindeki düzenin sağlanması için gerekli olan yönetimsel irade dönem dönem farklılıklar göstermektedir. Bu farklılıklar dinsel, ekonomik, sosyal veya siyasal alanlarda tarihi süreç içerisinde karşımıza çıkmaktadır. İktidar anlayışının değişmesi ile birlikte mimari mekânların tasarım anlayışı, biçimlenişi ve meydana geliş süreçleri de değişmiştir. Bunun sonucu olarak mimari ve kentsel mekânların birer temsiliyet aracı olarak kullanıldığı görülmektedir.

Mimarlık tarihi boyunca toplumların değişen iktidar süreçleri etkisi altında inşa edilen pek çok yapı başarılı ya da başarısız bulunsa da, taşıdığı simgesellikle kent kimliğinin oluşmasına katkı sağlayıp toplumsal belleklerde yer edinmiştir. Küreselleşme sonrasında toplum yaşamında olduğu kadar mimari alanda da ortaya çıkan değişim ve gelişim hareketi ile birlikte tasarımcılar biçim ve malzemeyi kullanarak "ikonik binalar" inşa etmeye başlamıştır. Bu binalar taşıdıkları simgesel ve işlevsel önem açısından çağdaş mimarlığın en önemli unsuru olarak kabul edilmektedir. "Erk ve mimarlık" ilişkisi bağlamında ise mekânsal temsiliyetin mimari ve kentsel kimliğe yansıması açısından büyük öneme sahip olduğu ve özellikle tasarımcıları ile birlikte bulundukları kentlerin markalaşması açısından etkili bir araç olduğu düşünülmektedir.

2. KAVRAMSAL ÇERÇEVE

2.1 Erk ve İdeoloji

"Erk ve İdeoloji" kavramları toplumsal yaşam içerisinde siyasi, ekonomi, dini, psikoloji gibi pek çok alanda etkilidir ve farklı pek çok tanımlama ile karışımıza çıkmaktadır. Türk Dil Kurumu (TDK) Türkçe sözlüğünde "erk" kavramı en geniş anlamı ile "iş yapabilme gücü" ve "iktidar" olarak ifade edilmiştir. Toplum biliminde karşılığı ise "bir kişinin/toplumun başka bir kişi/toplum egemenliği, baskısı ve denetimi altına alma, hürriyetlerine karışma ve onları belli biçimlerde davranmaya zorlama yetkisi veya yeteneği" olarak tanımlanmıştır. Kısaca erk, "güç sahibi olmak", "sahip olduğu gücü kullanarak başka kişiler üzerinde disiplin kurmak" ve "otorite" şeklinde özetlenebilir. Bu çalışmada erk, bir kişinin/grubun, bir aktörün uygulatma gücü ile belirtilmiştir (TDK, 2011).

Britannica Ansiklopedisi'nde "ideoloji" kavramı "pratik unsurların teorik olanlar kadar öne çıktığı bir sosyal ya da siyasi felsefe biçimi" olarak tanımlamaktadır (Cranston, 2020). İdeoloji, tarihsel açıdan değerli pek çok farklı kavramı içinde barındıran, ancak kavramların hiçbiri birbiri ile bağdaşmayan bir metin olarak tanımlanmaktadır. Tek ve yeterli bir tanımlama yapılamayacak kadar anlam zenginliği bulunan bir terim olarak görülmektedir (Eagleton, 1996). İdeoloji kavramı Grekçe "eidos (idea)" ve "logos" kelimelerinin birleşimi ile meydana gelmiş yeni bir kavramdır. Türkçe'de ise "düşünceler bilimi" olarak tanımlanmaktadır. İlk defa 1796-1798 yılları arasında Fransız filozof Antonie Destutt de Tracy tarafından ortaya atılmıştır (Aksakal, 2018). İdeoloji, egemen iktidarla özleşleşmekten, ona karşı muhalif olmaya kadar olan tüm siyasi biçimleri kapsamaktadır. Bu nedenle ideoloji bir bireyin, toplumla olan ilişkilerinin bir temsili olduğu söylenebilmektedir (Eagleton, 1996).

2.2. İkonik Mimarlık

"İkonik mimarlık" en basit tanımı ile; simgesel anlam taşıyan ve kendine özgü bir mimari üslubu, sistemi ya da stili temsil eden yapı tasarımıdır. Bu tasarım dili mekânlara, binalara ve çoğu zaman da tasarımcılara şöhret kazandırmıştır. Tasarlanan yapılara simgesel anlam kazandırarak toplum kültürü içerisinde kendine yer edinebilmektedir. Bu nedenle ikonik mimarlık kendine has özellikleri ile birlikte mekân-toplum arasında ilişki kurarak mekân temsili de sağlamış olmaktadır.

İkonik mimarlık tarihsel süreç içerisinde incelendiğinde, küreselleşme öncesi (genel kabule göre 1960'lar öncesi) dönemlerdeki üretilen ve temsil edilen tasarımların esasen siyasal ve dini erk sahipleri tarafından yönlendirildiği bilinmektedir. Küreselleşme ile bu değişmiş ve ekonomik erk sahipleri mimarlık üretimi üzerinde etkili olmaya başlamıştır. Bu durum mimaride ikonikliğin anlam ve temsil yoluyla güç mücadelelerine bir kaynak olduğu savunulmaktadır (Sklair, 2006).

İkonik mimari uzun bir geçmişe sahip tasarım anlayışıdır. Eski çağlarda simge yapılar katedraller veya kent yönetim binalarıydı. Bu binalar, hristiyanlık gibi ortak anlamları temsil ederken aslında toplumsal kimliği ifade etmişlerdir. İkonik mimari, zaman içinde ortak bir anlama sahip anıtsal binalardan, dikkat çekmeyi amaçlayan ikonik binalara dönüşen tasarım anlayışına dönüşmüştür (Jencks, 2006).

2.3. İkonik Bina Kavramı

Geçmişten günümüze kadar olan süre boyunca biçim ve malzeme kullanılarak çeşitli simgesel binalar inşa edilmiştir. Tasarımcılar bu binaları inşa ederken kullandıkları teknoloji ve malzemenin yanı sıra kattıkları anlam ve değerler ile benzersiz tasarımlar üretmiş, böylelikle binaların "ikonikleşmesini" sağlamışlardır. Günümüzde ikonik binalar taşıdıkları simgesellik

nedeniyle toplum belleğinde önemli bir yer tutmaktadır. İkonik binalar hem mimari hem de kentsel mekânlarda yarattıkları etki ve kentlere kazandırdıkları popülerlik ile birlikte pek çok kentin simgesi haline gelmiştir.

Simge binalar oluşturmak günümüzde kentlerin markalaşması ve popülerliğini arttırması açısından önem teşkil etmektedir. Medya etkisi ile tasarımcılarına da popülerlik kazandırmış, aynı zamanda modern mimarlık terimi olan "yıldız mimar" (starchitect) kavramının da doğmasına neden olmuştur. İkonik binalar, geçmişte olduğu gibi bugün de bilim insanlarının ve eleştirmenlerin ilgisini çeken konulardan biridir. Küreselleşme etkisi ile kentler ekonomi ve turizm alanlarında canlanma yaşarken, oluşturulan kent imajı sayesinde markalaşma aracı haline gelmiştir. Aynı zamanda yapılı çevrenin sosyo-kültürel kalitesini arttırarak toplumsal yaşam memnuniyetini de sağlamaktadırlar.

İkonik bina kavramı, mimarlıkta bir kültür ve/veya bir zaman için sembolik özel bir anlam taşıyan ve bu anlamın estetik bileşeni olduğunu, bunun tersinin de bu özellikler arasında belirli bir akışkanlığı ima ettiği" şeklinde tanımlamaktadır (Sklair, 2017).

İkonik binaların en belirgin özelliği görsel olarak ziyaretçilerine bir nesneyi, bir kavramı ya da bir olguyu hatırlatmasıdır. Genel olarak ikonik binaların biçimlenişlerinde görsel benzerlikler ya da mecazlardan (metafor) yararlanılır. Bu nedenle mimarlık kuramcıları, tarihçiler ve eleştirmenler birçok ikonik binanın tasarımlarının yaratıcı metaforik analizini sunarlar (Jencks, 2005).

2.4. İkonik Binaların Tarihsel Evrimi

Mimarlık, ilkel toplumlarda en temel ihtiyaç olan "barınma" için mekân üretme ile başlamıştır. Çağlar boyunca insan topluluklarının geçirmiş olduğu değişim ve gelişim süreci ile birlikte farklı işlevlere sahip mekânların oluşturulması gerekliliği ortaya çıkmıştır. İnsan ve insan toplulukları farklı coğrafyalarda farklı yaşayış ve gereksinimlerle, çeşitli uygarlıkların ve kültürlerin doğmasına neden olmuştur. Bu nedenle tarih boyunca mimarlık uygarlıkların kültür belirtme yöntemi olarak kullanılmış, kültürel ve sosyal belleği haline gelmiştir (Roth, 2018).

Antik dönem öncesinde insan toplulukları üzerinde dinsel yönelimlerinin başlaması ilk kalıcı mimari ürünlerin ortaya konmasına ve böylelikle "anıtsal mimari"nin oluşmasına zemin hazırlamıştır. Anıtsal mimari, boyutları ile dikkat çeken çoğu zaman temsil ettiği gücün mekânsal ifadesi olarak çağlar boyunca ayakta kalmıştır (Sklair, 2006). Göbeklitepe ve Stonehedge dünya üzerinde ayakta kalabilen en eski iki anıtsal yapı olarak bilinmektedir.

Antik dönem siyasi yapılanma din erkine dayanmaktadır. Kralların siyasi meşruiyetlerini dinsel temellere dayandırması ve kendilerini tanrı-kral olarak görmesi mimarinin de bu birliktelik etrafında şekillenmesine neden olmuştur (Bolat ve Ayaz, 2021). Bu anlayış, Sümerlerden,

Mısır'a, Hitit'lerden Roma'ya kadar uzanmaktadır. Antik dönem uygarlıklarının anıtsal mimarisi genellikle tapınaklar, anıtsal mezarlar olarak karşımıza çıkmaktadır. Giza piramitleri, Parthenon ve Pantheon gibi yapılar büyüklükleri ve biçimlenişleri ile inşa edildikleri uygarlıkların hem anıtsal hem de kültürel simgesi haline gelmiştir.

Orta çağ, Antik ve Modern çağlar arasında geçiş sağlayan uzun süren bir dönemdir. Bu dönemde yaşanan Haçlı Seferleri, Veba salgını ve Roma İmparatorluğu'nun yıkılışı gibi süreçler Avrupa kıtasının siyasal, dinsel, ekonomik ve demografik açıdan yeniden şekillenmesine neden olmuştur (Roth, 2018). Bu dönemde kilise ve din adamları hem siyasal hem de ekonomik açıdan önemli bir güç elde etmiştir. Orta çağ mimarisi dinin gücünü mekâna yansıtıldığı, çoğunlukla büyük ve gösterişli katedraller ve savunma yapılarından oluşmaktadır (Güller ve Ünlü, 2016).

Rönesans dönemi özellikle Avrupa'nın bilim, teknoloji ve ekonomi etkisiyle siyasal, dinsel ve sosyal açıdan değişim ve gelişim gösterdiği "erken modern dönem" olarak kabul edilir. Antik dönem mimarisini temel alan Rönesans mimarlığı oran, simetri, perspektif kullanımı ve ışık/gölge etkisi ile farklı bir mimari dil oluşturmuştur (Roth, 2018). Dönemin sonlarında mimarlık da siyaset de egemen güçlerin çevresinde gerçekleşmeye başlamıştır. Rönesansın getirmiş olduğu hümanist ilkelerinin göreceli olarak geliştirildiği bir dönem olmuştur (Melvin, 2006).

Avrupa'da yaşanan Rönesans ve Reform hareketleri sonrasında siyasal, dinsel ve toplumsal açıdan bir aydınlanma süreci başlar. Özellikle bu dönemde yaşanan sanayi devrimi insan-fiziki çevre ilişkisinde köklü bir değişimin başlamasına neden olmuştur. Toplumun yaşadığı sosyokültürel değişimler ile farklı yapı tiplerinin üretilmesine ihtiyaç duyulmuştur (Roth, 2018). Aydınlanma döneminde rasyonel yaklaşım ve arkeolojik keşifler mimarlıkta geleneksel biçimlere bağlı olmaksızın kavramsal (eklektik ve revivalist) olarak yaklaşılasına yardım etmiştir. Böylece modernizmin temelleri atılmaya başlanmıştır (Melvin, 2006).

Sanayi devrimi sonrasında değişen teknoloji ile yeni malzeme ve yapım sistemleri geliştirilmiştir. Metal ve camın yapı malzemesi olarak kullanılmaya başlanmasıyla daha hafif binalar ve yeni iç mekân anlayışı geliştirilmiştir. Üretilen binalar geleneksel formlardan arınmış yalın ve çağdaş çizgilerden meydana gelmektedir (Birol, 2006). Sonrasında yaşanılan I. ve II. Dünya savaşları kentsel planlama ve mimarlığın siyasi bir araç haline gelmesine neden olmuştur. Geometrik biçimlenişler ve cephe kurgusunda devlet otoritesi yansıtılmaya çalışılmış, anıtsal ölçekli binalar inşa edilmiştir (Güller ve Ünlü, 2016).

Gelişen ve değişen dünya üzerinde ekonomik gücün belirleyiciliği üzerinden ekonomi, siyasi ve kültürel alanlarda yaşanan köklü değişimler küreselleşme sisteminin doğmasına neden

olmuştur. Küreselleşme ile birlikte ekonomik güç baskın hale gelmiş, yapılı çevrenin kentsel mega projelerle ve ikonik binalarla görününür kılınması sağlanmaya başlanmıştır (Sklair, 2017). İkonik binalar tasarımlarında kullanılan ileri teknoloji sayesinde estetik ve yenilikçi formlara sahip olmuştur. Yüksekliklerinin fazla olması ile de kent siluetinden ayrışarak çok daha farkedilir binalar haline gelmiştir.

DÖNEM	ZAMAN ARALIĞI	BASKIN GÜÇ	İKONİK BİNALAR	MİMARİ ÖZELLİKLER
Antik Öncesi	MÖ 3500- 3050	İnanç Doğa	Göbeklitepe, Stonehedge	Doğal Malzeme, Anıtsallık, Barınma ve inanç üzerinden bina üretimi
Antik	MÖ 3050- MS 330	Tanrı-Kral	Piramitler, Partheon, Pantheon	Büyüklük, Sağlamlık, Düzgün Geometri, Yapıda oran sistemi, Yeni malzemeler, Mimari Plan
Orta Çağ	330- 1400	Din	Ayasofya, Kurtuba Camii, Durham Katedrali, Notre Dame Katedrali	Geometride farklılaşma, Süsleme kullanımı, Mimari eleman kullanımı, Dini kimlik ve semboller, Büyük ve gösterişli binalar
Rönesans	1400-1600	Bilim	Santa Maria Del Fiore Bazilikası, Palazzo Te, Versay Sarayı, Katerina Sarayı	Perspektif, hacim, gölge/ışık etkisi, Aksiyal Simetri ve düzgün geometri, Abartılı süsleme/bezeme, kavisli geometri
Modern Öncesi	1600-1800	Ekonomik	Villa Rotonda, Sagrada Familia, Palais Garnier	Rasyonel geometri, yalın formlar, antik dönem üslupları, işlevsellik, simgesellik, eklektizm
Modern	1800- 1980	Siyasi	Chrysler Binası, Sidney Opera Binası, AT&T Binası	Karşıtlık, asimetri, heykelsi yapı, özgün biçimlenişler, işlevsellik, brütalizm, çelik-cam kullanımı, antik biçimlerin dekoratif öğe olarak kullanımı,
Çağdaş	1980- günümüz	Küresel Sermaye Siyasi	Pompidou Centre, Guggenheim Müzesi Bilbao, Swiss Re Binası, Haydar Aliyev Centre	Yükseklik, geniş açıklık, dekonstrüksiyon, yeni malzemeler, saydamlık, dijitalleşme, ikonlaşma

Şekil 1. İkonik Binaların Değişim ve Gelişim Kronolojisi. Kaynak: (Roth, 2018; Melvin, 2006) faydalanılarak hazırlanmıştır.

2.5. İkonik Binaların Erk ve Mimarlık İlişkisi

Yönetenler ve yönetilenler toplumsal yaşamı oluşturan ve birbirleri ile karşılıklı ilişkileri düzenleyen iki öğedir. Erk ve mimarlık ilişkisi toplumsal yapılanmayı kontrol eden gücün

ekseninde kurulmaktadır. Mimarlığın ortaya çıkışı toplumların sosyal ve ekonomik açıdan gelişmesi ile olmuştur. Çoğu kez erk sahiplerinin devamlılıklarını ve toplumsal taleplerin karşılanmasını sağlamak için mimarlık araç olarak kullanılmıştır. Tarih boyunca yöneten ve yönetilen arasında "sınıf, din, kültür, soy, ırk, servet, askeri güç ve eğitim" gibi konular üzerinden ilişkiler kurulmuştur. Bu durum toplumların yaşayışlarına göre değişmektedir. Örneğin dinsel inanışların baskın olduğu dönemlerde toplumları yönetme erki din adamlarının, mutlak siyasi ve askeri gücün baskın olduğu dönemlerde kralların, ekonomik gücün baskın olduğu dönemlerde ise soyluların ve üst sınıfı oluşturan kişilerin elinde bulunmaktadır.

İktidar sahipleri topluma mesaj vermek ve kudretlerini belirtmek adına mimari yapıları ve kentsel mekânları siyasi sembol olarak kullanmışlardır. Bu mekânlar tarihi ve siyasi alan olmanın yanı sıra iktidar sahibini veya devletin gücünü de sembolize etmektedirler. Bu mekânlar tarih boyunca değişim göstererek toplum tarafından yeniden üretilmişlerdir. Böylelikle siyasal ve sosyal ilişkilerin bir arada yürütülmesi sağlanmıştır (Lefevbre, 2014).

Tarih boyunca toplumsal yaşamda yaşanan değişimler erkin dayandığı iktidar anlayışının da değişmesine sebep olmuştur. Merkezine tanrı ya da dini alan iktidar anlayışı tarih öncesi çağlardan itibaren kurulan uygarlıklarda dahi siyasi yapılanma içinde önemli bir yer tutmuştur. Toplumsal yaşam içinde yönetenler siyasal iktidarlarını meşrulaştırmak için dini kullanmış ve güç kazanmışlardır (Wach, 1987). Kazanılan ilahi ve siyasi güç mimariye de yansımıştır. Tapınma ve ibadet etme amaçlı inşa edilen yapılar büyüklük, kütle ve sağlamlığa dayalı, sonsuz güvenlik ve yıkılmazlığın garantisi olarak toplumlar tarafından değer görmüştür.

Tarihsel süreç içerisinde ekonomik iktidarın mimariyi ne zamandan itibaren etkilediği hakkında net bir görüş bulunmamaktadır. Orta çağın sonlarında kentlerin gelişmesi ve bununla birlikte yeni sermaye sınıfı olan burjuvanın etkinliğinin artması sonucunda yeni kentsel mimarinin de ortaya çıktığı kabul edilmektedir (Sirel ve Sirel, 2021). Sanayi devrimi sonrasında ise kentler ekonomik getiri dayanağı olarak görülmüş, ticaret ve sanayi merkezi haline gelmiştir. Simgesel binalar da küreselleşme etkisi ile ekonomik kalkınma aracı olarak görülen kentlerin uluslararası pazarda dikkat çekmesi ve belleklerde bilinir kılınmasını sağlamak amacıyla ortaya çıkmıştır.

2.6. İkonik Binaların Kent Kimliğine Etkileri

İkonik binalar sahip oldukları farklı biçim, ölçek ve tasarım anlayışı ile bulundukları yeri hem kent hem de ülke ölçeğinde simgeleyen mimari öğelerdir. Kendilerine has tarihi ve kültürel değerlere sahip olmaları ve mekânsal temsil aracı olmalarından dolayı anıtlardan farklılaşırlar (Elhagla, Nassar, Ragheb, 2020). Bu bağlamda özellikle küreselleşme sonrasında uluslararası pazarda kentlerin markalaşması, daha görünür ve çekici hale gelerek imaj oluşturulması ancak ikonik binalar vasıtası ile olabilmektedir (Sklair, 2017).

Mimaride "ikoniklik" ya da "ikon olma" durumu küreselleşme ile farklı şekillerle ortaya çıkmıştır. Frank O. Gehry'nin tasarlamış olduğu "Guggenheim Müzesi Bilbao", bir kentin nasıl yeni bir görünüm kazandığını, kente gelen turist sayısının nasıl arttırdığını ve kent ekonomisinde nasıl gelişim ve istikrar sağladığını gösteren 20. yüzyılın çağdaş bir örneğidir. Bu ikonik bina kentsel dönüşüm, kalkınma ve rekabetçiliği başarılı bir şekilde ortaya koyarak kentsel ekonomiye olumlu katkılar sağlamıştır. Kente ve çevresine sağladığı bu etkiler için popüler bir tabir olan "Bilbao etkisi" ifadesinin doğmasına sebep olmuştur (Jencks, 2005).

Kentler günümüzde küreselleşmenin etkisiyle hem toplumun hem de siyasetin odak noktası haline gelmiştir. Kentlere bir kimlik kazandırmak ya da zayıflayan kent kimliklerini canlandırmak için çeşitli ölçeklerde (mega) projeler tasarlanmaktadır (Cerro Santamaria, 2019). Büyük ya da küçük ölçekli olsun hemen hemen tüm kentlerde bu durum popüler bir eylem haline gelmiştir.

3. İKONİK BİNALARIN TASARIM KRİTERLERİ

Bu çalışmada ikonik binalara ait tasarım kriterlerinden bahsedilirken, daha önce bu alanda çok sayıda çalışma yapan bilim insanlarının belirlemiş olduğu özelliklerden yararlanılmıştır. Bir binanın ikonik olması için sahip olması gereken özellikler farklı araştırmacılar tarafından farklı yönlere vurgu yapılarak kaleme alınsa da, temelde benzer nitelikler olduğu görülmüştür.

Leslie Sklair'a göre ikonik binaların iki belirleyici özelliği vardır. Birincisi "şöhret", ikincisi ise bir kültür ve/veya zaman içinde yüklenilen "simgesel anlam". Geçmişten günümüze inşa edilen ikonik binaların çoğunun anıtsal ölçekte olduğunu ifade etmiştir. Ayrıca bu binalar ile yaşanılan dönemin etkin gücü arasında bağlantı olduğunu ve küreselleşme ile birlikte geleneksel itici güçlerden ziyade sermayeye dayalı bir biçimde ikonik binaların meydana geldiğini savunmaktadır (Sklair, 2006).

Charles Jencks'e göre "alışılmışın dışında şaşırtıcı biçimlenişler, büyük olma isteği, yeni olan herşeyi kutsamak, belirsiz anlam ve kodlamalar" ile "şöhret faktörü" ikonik binaların diğer binalardan ayırt edici özellikleridir. İkonik binaların sahip olduğu biçimlenişler ve kazandıkları görsel benzerlikler (metafor) toplum üzerinde hayranlık uyandıran ve belleklerde yer edinen özellikler olmuştur (Jencks, 2005).

Cleo Broda'a göre ikonik binalar "büyük ölçekli, toplum tarafından bilinen/tanınan, belirli bir amaca yönelik, çoğunlukla büyük firmaların/şirketlerin yönetim binaları olarak tanınmış mimarlar tarafından tasarlanan, şaşırtıcı ve yenilikçi" tasarımlardır. İkonik binaların mimarisi için de, "bulunduğu çevrenin gelişimini temsil eden" araç olduğunu belirtmiştir (Broda, 2006 akt. Davarpanah, 2012)

Paul Keskeys'e göre ikonik binalar on farklı özelliğin bir arada olduğu eşsiz binalardır. Bu özellikler; "siluet, sadelik, simetri, metafor, malzeme, cesaret, mühendislik, bağlam, öykü ve ideal bir müşteri"dir. Özgünlük ve benzersiz vizyonun ikonik yapının anahtarı olduğunu düşünmektedir. İkon olarak kabul edilen binaların çığır açıcı etkisi sebebiyle, daha önce hiç görülmemiş ve yapılmamış tasarımlar olduğunu belirtmektedir (Keskeys, 2020).

Bu çalışmada, tasarım kriterleri yapılan araştırmalardan elde edilen tespitler ve çeşitli yazarların görüşlerinden faydalanılarak hazırlanmış olmakla birlikte, "Paul Keskeys" tarafından belirlenen başlıklar altında maddeler halinde sıralanmıştır.

- **Siluet:** İkonik binalarda büyüklük aslında erk ve çevre arasındaki ilişkinin belirlenmesine yönelik bir kavramdır. Çoğunlukla ikonik binaların erk temsiliyetine sahip olmasından dolayı çevresindeki diğer yapılardan daha fazla görünür ve belirgin olması gerekmektedir. Bu binalar görünürlükleriyle temsil ettiği gücün büyüklüğünü de yansıtır. Bu nedenle tasarımcılar ikonik binaların kendisinden önce inşa edilenlerden daha büyük olması gerektiğini düşündüğünden, her geçen gün daha büyük ölçekte bina tasarlamayı tercih etmektedirler (Jencks, 2005). Örneğin Eyfel Kulesi Paris'in her noktasından görünebilen bir kent simgesidir.
- **Sadelik:** İyi bir mimari tasarımın orijinal, sade ve özgün olması beklenir. İkonik binalarda sadelik kullanılan strüktür, form ve malzemenin karmaşıklıktan uzak, yalın ve basit bir şekilde ifade edilmesi ile ölçülmektedir. Çağlar boyunca temel geometrik biçimler ve doğal malzemeler kullanılarak oluşturulan pek çok ikonik bina, çeşitli mimari dil ve üslupların oluşmasını sağlamıştır. Bununla birlikte geçmişte pek çok dönemde de yalınlıktan uzak, tasarımlarda bol detayların ve süslemelerin olduğu ikonik binalar inşa edilmiştir. Paris Opera Binası gibi özellikle erk simgesi olan ikonik binaların mimarisi gösterişleri ve ihtişamları ile ön plana çıkmaktadır. En az malzeme ve ekonomiyle, en yalın ve işlevsel tasarımlar üretilmesi mimarlıkta temel unsur olarak kabul görmektedir (Roth, 2018). Örneğin New York'taki Guggenheim Müzesi sade ve yalın organik mimarisiyle ikonik olmayı başaran bir binadır.
- **Simetri:** Mimarlıkta simetri bir yapıdaki öğelerin yatay ya da düşey düzlem üzerinde belli bir aksa göre konumlandırılmasıdır. Geçmişte ikonik binalarda hem plan düzleminde hem de cephe düzeninde güçlü bir simetriden yararlanıldığı görülmektedir. Böylece binalar insanlar üzerinde kesin, kararlı ve anıtsal bir etki bırakmaktadır. Ancak değişen ve gelişen yapı teknolojisi ile birlikte serbest geometrik formların kullanılmaya başlanması, bina kompozisyonunda asimetrik biçimlenme de görülmesine neden olmuştur. Günümüzde inşa edilen ikonik binaların simetri algısının farklılaşması binaların daha dinamik ve ilgi çekici

algılanmasını sağlamakta ve tasarımlarda sıklıkla tercih edilmektedir. Örneğin Lotus Tapınağı güçlü simetrisi ile belleklerde iz bırakmaktadır.

- **Metafor:** Mimarlıkta form benzer kütle ve boşluğun, düzenli veya düzensiz olarak bir araya gelmesi ile oluşmaktadır. Tasarımcının kütle kompozisyonunu oluşturmadaki başarısı mimari biçimlenmeye anlam verir. Mimari biçimlenişler işlev kazandığında sosyal ve fiziki çevreyle bütünleşmektedir. İkonik binaların biçimlenişlerinde çoğunlukla görsel benzerlikler ya da mecazlar (metafor) kullanılmaktadır. Bu özellikle birlikte ziyaretçilerine bir nesneyi, bir kavramı ya da bir olguyu hatırlatır böylelikle ikonik bina alışılmadık bir görünüme sahip olur. Örneğin, Londra'nın merkezindeki Swiss Re Tower sahip olduğu birden fazla metafor ile izleyicide farklı kavramlar ve anlamların oluşmasını sağlamaktadır.
- **Malzeme:** Değişen ve gelişen toplumsal koşullar ve teknoloji çağlar boyunca mimari tasarımların da değişmesine neden olmuştur. Bu bağlamda toplumların sosyo-ekonomik ve kültürel yapısının yanı sıra yapım sistemi, malzeme ve hatta mimari düşünce sistemlerinin değişmesi yenilikçi mimari tasarımların üretilmesine neden olmaktadır. Yenilikçi koşullar mekân temsillerinin çeşitlenmesini ve böylelikle ikonik yapıların üretilmesine zemin oluşturmaktadır. Özellikle son yıllarda yeni yapı malzemeleri ve bilgisayar destekli tasarım sayesinde klasik biçimlenişlerden uzaklaşılıp sıradışı biçimlenişler kullanılmaya başlanmıştır. İkonik binalar ayrıca yenilikçi tasarımları ile içinde bulundukları yapılı çevreye yeni bir imaj kazandırıp, cazibe merkezi olmasını sağlamaktadırlar. Örneğin, Alman Parlamento binası yenilenen çelik strüktürlü cam kubbesi ile alışılmadık bir tasarım örneği olmuş ve Berlin kentinin simgesi haline gelmiştir.
- **Yaratıcılık (Cesaret):** Ünlü mimarlar inşa ettikleri binalarla erk sahibinin gücünü mimari tasarım yoluyla sembolize ederler. Bu binalar aynı zamanda toplumun siyasal, ekonomik ve kültürel alanlarda kimlik kazanan mekânlarını oluşturur. Daha önceleri kralların, soyluların hatta din adamlarının himayesinde mesleği icra etme "hamilik" yöntemiyle gerçekleşmekteydi. Günümüzde ise iktidar sahipleri tarafından önemli görevler verilerek cesaretlendirilen mimarlar, 1980'lerden sonra özellikle küreselleşme ve medya etkisi ile yıldızlaşmışlardır. Örneğin, Zaha Hadid formlarına mimarinin geleneksel çizgileri yerine kendi üslubuyla ve gelişen bilgisayar teknolojiyle (BIM) birlikte hayat veren dünyanın ilk kadın yıldız mimarıdır.
- **Mühendislik:** Geçmişte ikonik binalar tanımlı geometrik formlara ve basit işlevlere sahip binalardı. Günümüzde daha serbest geometrik formlar kullanılmaya başlanmış ve kullanıcı ihtiyaçları değişmiştir. Bu durum binaların plan kurgusunu da farklılaştırmıştır.

Konstrüksiyon, sanayi devrimine kadar bina tasarımının dayanağı olmuştur. Ancak sanayileşme ile beraber geleneksel yapım sistemleri hem malzeme hem de teknoloji değişiminden etkilenmiştir. Özellikle cam ve çeliğin inşaat malzemesi olarak kullanılmaya başlanması ile birlikte binalarda hafiflik, saydamlık, yükseklik ve geniş açıklık gibi özellikler görülmeye başlanmıştır. Örneğin, Haydar Aliyev Kültür Merkezi'nin dış kabuğundaki akışkan mimari iç mekânlarda da devam etmekte ve yapının strüktürünü oluşturmaktadır. Dış kabuktaki çelik, betonarme ve cam birlikteliğinden doğan organik tasarım aynı zamanda bir mühendislik ürünüdür.

- **Bağlam:** Binaların bulunduğu çevre ve insanlarla kurduğu ilişki kentsel sürdürülebilirliği sağlar. Geçmişten günümüze kentler çeşitli değişim ve gelişim hareketleri göstermektedir. Değişen koşullar nedeniyle pek çok tarihi yapı da eskiyip, işlevsizleşerek değer kaybına uğramaktadır. İkonik binalar ise içinde bulundukları yapılı çevrede kentsel imajlar yaratılmasına yardımcı olmaktadır. Bu nedenle özellikle tarihi doku içine inşa edilen veya eklenen ikonik binaların sahip olduğu biçim, doku, malzeme ve ölçek gibi faktörlerin yanısıra kent ve toplum ile ilişkilerinde uyumlu olması beklenmektedir. Günümüzde gelişen teknoloji ve çağdaş tasarım anlayışları nedeniyle ikonik binalar bulundukları çevre ile fiziksel ya da kültürel uygunluk göstermemektedir. Dolayısıyla her tasarımı kendine has bir bağlam içinde ele almak gerekmektedir. Örneğin, Berlin'deki Yahudi Müzesi'nin ana bina ve ek bina arasında form, mimari üslup ve malzeme bakımından uyumsuzluk bulunmaktadır. Ancak binanın sahip olduğu simgesellik ile toplumsal belleklerde yer edinen bir ikonik bina örneğidir.
- **Öykü:** Bir toplumun sahip olduğu kültürel birikim çeşitli koşullara göre şekillense de en temelde yaşanılan coğrafya ile birlikte sahip olunan sosyo-ekonomik değerler ile oluşmaktadır. Tarih boyunca toplumlar sahip oldukları ortak tarihi geçmiş ve kültürel değerleri mekânsal alanlara yansıtarak özgün mimari ve kentsel kimlikler meydana getirmişlerdir. İkonik binalar da bulundukları kentin imajı olarak kent kimliğinin daha akılda kalıcı olmasını ve kentin markalaşmasını sağlayan önemli kültürel kaynaklardır. Böylece sosyal ve ekonomik alanlarda da kentin kalkınmasını sağlayan araç haline gelmektedirler. Örneğin, Tac Mahal Şah Cihan'ın eşi Mümtaz Mahal'e duyduğu büyük sevgiyi simgelerken, Hint mimarisinin de en tanınmış anıtsal örneğidir.
- **Erk Etkisi (Yaptıran):** Mimari, tarihin her döneminde iktidarın ve sermayenin bir aracı olmuştur. İktidar kavramı ile ortaya çıkan güç, yaşanılan çağın etkisi ile değişip, dönüşerek farklı şekillerde ortaya çıksa da anıtsal/simgesel mimari her zaman iktidarın mekâna yansıması olarak görülmüştür. Geçmişte olduğu gibi günümüzde de pek çok mimar erk sahiplerine hizmet etmektedir. Mekân üretimi ile toplumlara ideolojilerin büyüklüğü, ünü, yarattığı güç somut bir

ifade ile aktarılmak istenmiştir. Bu sebeple inşa edilen simgesel binalar en temelde mekân oluştururken aynı zamanda bir ideolojiyi, bir gücü sembolize ederek ikonikleşmişlerdir. Örneğin, Pompidou Kültür Merkezi, Fransa eski cumhurbaşkanı Georges Pompidou'nun hayal ettiği gibi Paris'in merkezinde bulunduğu bölgeyi canlandıran ve adını bugünlere getiren ikonik bir binadır.

4. ALAN ÇALIŞMASININ AMACI VE YÖNTEMİ

Antik dönemlerden itibaren ikonik binalar erk sahiplerinin beğenisi ve istekleri üzerine inşa edilmişlerdir. İkonik binaların fiziki çevrenin oluşumuna doğrudan etki etmesi ve mekânsal temsiliyete sahip olması, "erk ve mimarlık" arasında bir bağ oluşturmaktadır. İkonik binalar yapıldıkları dönemin mimari üslubunu ile birlikte kendisinden sonraki inşa edilen binaların mimarisini de etkileyen simgesel yapılar olmasından dolayı insanların belleklerinde yer edinmişlerdir. Bu bağlamda çalışmada, erk simgesi olan ikonik binaların mimari biçimlenişleri ve kendinden sonraki dönemlerde toplum, mimarlık ve kent üzerinde yarattığı etkilerinin irdelenmesi amaçlanmıştır. Simgesel özelliklere sahip binaların "ikonik bina olma" özellikleri, Paul Keskeys tarafından belirlenen başlıklar altında ve yapılan literatür taramaları ile elde edilen veriler doğrultusunda açıklanmıştır.

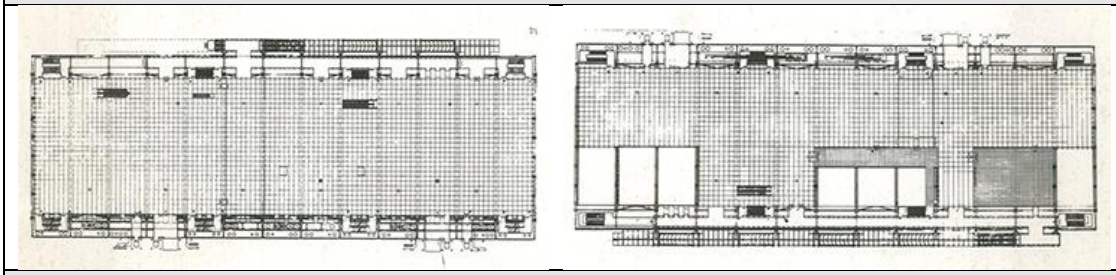
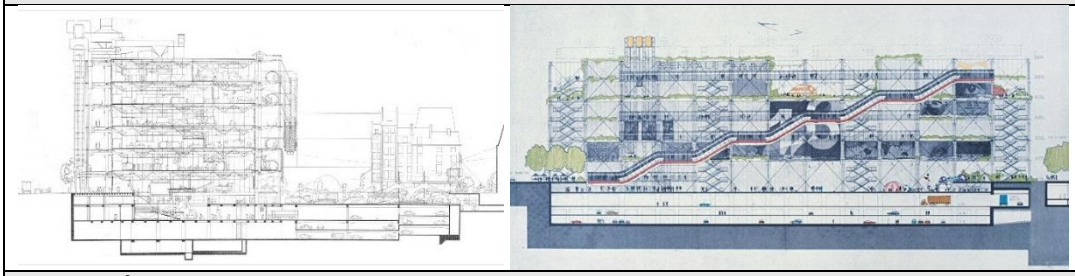
Alan çalışması kapsamında tarihsel süreç içerisinde erkin temsil aracı olan ikonik binaların mimari özellikleri, mimari tasarımlarına etki eden faktörler ile günümüz mimarlığına ve kent kimliğine etkileri araştırılmaktadır. Bu bağlamda 20. yüzyıl ve sonrasında inşa edilen üç farklı bina incelenmiştir. Örnekler farklı dönemlerde erk etkisi ile inşa edilen ve mimarlık, toplum ve kent üzerinde farklı etkileri olan ikonik binalardan seçilmiştir. Seçilen örnek binaların yapım yılı, konumu, tasarımcısı, işlev ve üslup özelliklerinin yanı sıra belirlenen on adet tasarım kriteri plan, kesit ve görünüşler üzerinden incelenmiştir. Araştırmada elde edilen veriler ise tablolarla analiz edilmiştir.

4.1. Çalışmanın Örneklem Binaları

4.1.1. Georges Pompidou Ulusal Sanat ve Kültür Merkezi

Fransa Cumhurbakanı Georges Pompidou etkin bir siyasetçi ve aynı zamanda modern sanatlara ilgi duyan bir devlet adamıdır. Cumhurbaşkanlığı görevi süresi boyunca Paris'in modernize edilmesine yönelik pek çok çalışmalarda bulunmuştur. Bu kapsamda "Beaubourg" mahallesinde daha önce başlatılan kentsel yenileme projesi ile birlikte Paris'in merkezi yerinde insanların sosyalleşebileceği, sürekli canlı ve yaşayan bir kültürel bir mekân yaratılmak istenmiştir. Böylelikle kentin görünürlüğünü artarak kente daha fazla turist çekebilecek bir merkez oluşturulacaktır. Aynı zamanda görevde kaldığı dönem (1969-1974) simgesel olarak

temsil edecektir. Pompidou Kültür Merkezi 1971 yılında Fransa Kültür Bakanlığı'nın düzenlemiş olduğu bir yarışma sonucunda tasarlanmıştır. 49 farklı ülkeden 681 mimarın katıldığı yarışmayı İtalyan mimar Renzo Piano ve İngiliz mimar Richard Rogers tarafından oluşturulan ekip kazanmıştır (Sirel ve Sirel, 2021).

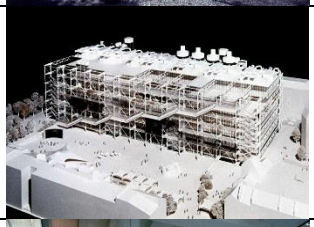
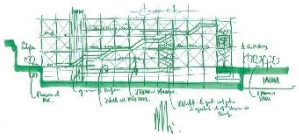
GEORGES POMPİDOU ULUSAL SANAT VE KÜLTÜR MERKEZİ	**KONUMU**	**GÖRSEL**
YAPIM YILI: 1971-1977		
BULUNDUĞU YER: Paris / FRANSA		
TASARIMCI: Piano + Rogers (Ove Arup & Partners)		
İŞLEV: Kültür Yapısı		
ÜSLUP: High-Tech / Çağdaş		
KAT PLANLARI		
		
CEPHELER		
		
KESİTLER		
		
İÇ MEKÂN		
		

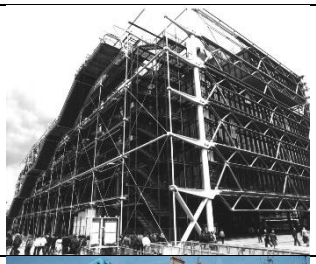
Şekil 2. Pompidou Kültür Merkezi İşlev Şeması. Konum (URL-1), Görsel (URL-2), Kat Planları (URL-3), Cepheler (URL-4), Kesitler (URL-5), İç Mekân (URL-6).

4.1.2. Georges Pompidou Ulusal Sanat ve Kültür Merkezi Tasarım Kriterleri

- **Siluet:** Tarihi Beaubourg bölgesinde yer alan bina, çevresindeki yapılarla hem boyutsal, hem yapısal anlamda zıtlık yaratarak odak noktası haline gelmiştir. Bölgedeki imara bağlı yapı yüksekliğini aşan bir yüksekliğe sahip olmasıyla da kent siluetinde çarpıcı ve yoğun bir etki bırakmakta ve görünür olmaktadır.
- **Sadelik:** Binanın dış kabuğunda bulunan renkli tesisat elemanları, çelik strüktür ve devasa yürüyen merdiven kütlede dinamik bir etki yaratmasına rağmen bina basit bir geometrik forma (dikdörtgen) sahip olup yapısal ve işlevsel olarak da sade bir özellik göstermektedir.
- **Simetri:** Binanın dikdörtgen kütlesi simetrik yapısal elemanlarla desteklenmiş olsa da, meydana bakan cephesinde bulunan zigzag merdiven binanın asimetrik kurgusunu oluşturmaktadır. Binanın her cephesinde farklı kompozisyonlar gözlemlenmektedir.
- **Metafor:** Binanın biçimlenişi sıradışı veya karmaşık değildir. Binanın görünüşü alışılmışın dışında bir tasarım anlayışına sahiptir. Archigram hareketinden etkilenilerek taşıyıcı sistem binanın dışına taşınmıştır. Bu da biçimlenişinden ziyade görünümünden kaynaklı toplumsal belleklerde yer edinmesini sağlamaktadır.
- **Malzeme:** Bina, çelik, beton ve cam malzeme gibi yenilikçi malzemeler kullanılmıştır. Dış kabuktaki renkli tesisat donatılarını açıkta bırakan yapısı da estetik bir görsellik sunmaktadır.
- **Yaratıcılık (Cesaret):** Güçlü bir siyasetçi ve sanatla ilgili olan Georges Pompidou, Paris'e çağdaş bir mimari sembolü armağan ederken, mimarlık dünyasına da iki önemli mimar kazandırmıştır. Henüz uluslararası tanınmışlıkları olmayan iki mimar Renzo Piano ve Richard Rogers, kazandıkları bu yarışma ile "sanata demokratik bir şekilde ulaşılabileceğini" iddia ederek cesur bir tasarım ortaya koymuştur. Farklı tasarım anlayışları, cesur çizgileri, high-tech ve brütalist üslupları Pompidou Merkezi'nde bir arada kullanmaları yarışmayı kazanmalarını sağlamıştır.
- **Mühendislik:** "High-tech" (yüksek teknoloji) tasarım anlayışına sahip binanın sirkülasyon ve tesisat elemanları dış kabuğa taşınmıştır. Böylece iç mekânda serbestlik ve esneklik kazanılmıştır. Cephede bulunan ve her biri farklı renkte boyanan tesisat elemanları ise işlevselliklerinin yanı sıra estetik bir anlayışla kütlenin bir parçası olmaktadır.
- **Bağlam:** Bina, Paris'in 4. Bölgesinde yer alan tarihi Beaubourg mahallesine inşa edilmiştir. Çağdaş tasarım anlayışı ve renkli cephesi ile çevresindeki binalarla uyumsuzdur. Zamanla bölgenin sosyal, kültürel ve ekonomik yönlerden kalkınmasına yardımcı olarak çekim ve cazibe merkezi haline gelmesini sağlamıştır.

- **Öykü:** Beaubourg mahallesi Paris eski valisi Georges Haussman zamanında başlatılan kentsel dönüşüm hareketinden etkilenen bir köhneleşmiş bir alandır. Pompidou Kültür Merkezi, kent merkezindeki bu bölgenin gelişimi için hazırlanan kültürel projeler kapsamında inşa edilmiş bir ikonik binadır.
- **Erk Etkisi (Yaptıran):** Bina, dönemin Fransa Cumhurbaşkanı olan Georges Pompidou tarafından Paris kentinin köhneleşmiş bölgesini geliştirmek, bölgeyi sosyo-kültürel ve ekonomik anlamda geliştirerek daha fazla turist çekebilmek amacıyla inşa edilmiştir. Ayrıca görevde bulunduğu dönemin (1969-1974) simgesel bir bina ile hatırlanmasını da istemektedir.

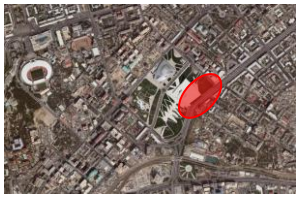
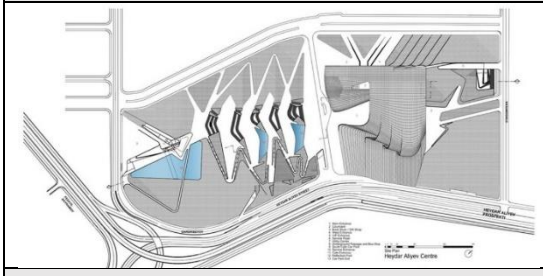
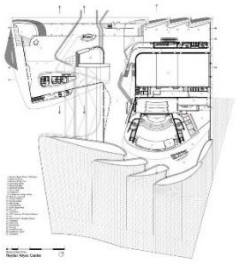
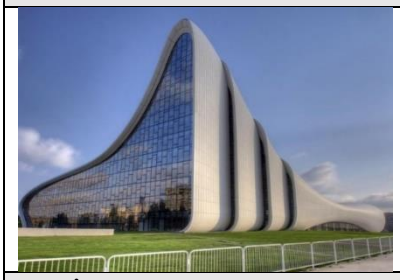
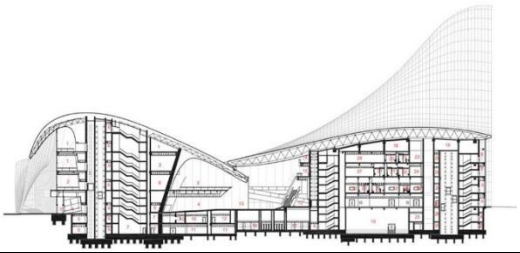
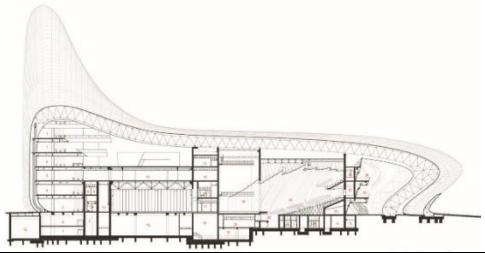
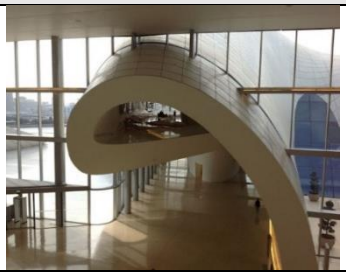
Georges Pompidou Ulusal Sanat ve Kültür Merkezi'nin İkonik Bina Olmasını Sağlayan Tasarım Kriterlerinin Değerlendirilmesi					
Tasarım Kriteri	**Açıklama**	**Binaya Ait Görsel**	**Değerlendirme**		
			■ Sağlıyor	◩ Kısmen	□ Sağlamıyor
Siluet	Zemin altında 3, üstünde 7 katı bulunan bina toplamda 42 m yükseklikte olup, bulunduğu kentte görünür durumdadır.		✓		
Sadelik	Bina basit bir kutu formundadır. Plan kurgusu ve strüktürü de karmaşık değildir.			✓	
Simetri	Meydana bakan cephede bulunan zigzag merdiven binanın simetrisini bozmaktadır.			✓	
Metafor	Binanın biçimlenişinde metafor bulunmamaktadır.			✓	
Malzeme	Binada çelik, beton ve cam malzemeler bir arada kullanılmıştır.		✓		
Yaratıcılık	Genç iki mimar, binanın statik, mekânik elemanlarını dış kabuğa taşıyıp mimari öğeler ile birlikte hem işlevsel hem de estetik elemanlara dönüştürmüştür.		✓		

Mühendislik	Devasa strüktür elemanları iç mekânda destek noktası istemeden geniş açıklıkları geçebilmekte ve kat planları farklı aktiviteler için kolaylıkla düzenlenmektedir.		✓		
Bağlam	Çağdaş tasarım anlayışı ile bulunduğu bölgedeki diğer binalarla uyumlu değildir.				✓
Öykü	Uzun yıllar boş olan alanın kültür-sanat ekinlikleri için kullanılacak bir bina ile işlevsel hale gelmesi istenmiştir.		✓		
Erk Etkisi	Eski cumhurbaşkanı Georges Pompidou Paris'in merkezinde adını ve dönemini sonraki nesillere aktaracak kültürel bir cazibe noktası yaratmak istemiştir.		✓		

Şekil 3. Pompidou Kültür Merkezi'nin Tasarım Kriterlerinin Değerlendirilmesi. Siluet (URL-7), Sadelik (URL-8), Simetri (URL-9), Metafor (URL-10), Malzeme (URL-11), Yaratıcılık (URL-12), Mühendislik (URL-13), Bağlam (URL-14), Öykü (URL-15), Erk Etkisi (URL- 16).

4.2.1. Haydar Aliyev Kültür Merkezi – Bakü

Haydar Aliyev, Azerbaycan siyaseti üzerinde etkisi henüz Sovyetler Birliği döneminde başlamış, güçlü bir siyasetçidir. Yıllar içinde kendine özgü yönetim anlayışıyla siyasi kariyerini güçlendirmiş ve Sovyetler Birliği'nin dağılmasından sonra kurulan Azerbaycan Cumhuriyeti'nin üçüncü cumhurbaşkanı olmuştur. Ülke çapında adını taşıyan pek çok anıt, bina, cadde bulunmaktadır (Eurasianet, 2003). Bu kapsamda Azerbaycan'ın ulusal simgesi olacak bir kültür merkezi projesi yapılmasına selefi aynı zamanda oğlu olan İlham Aliyev tarafından karar verilmiştir. Haydar Aliyev Kültür Merkezi 2007 yılında Azerbaycan devletinin düzenlemiş olduğu bir yarışma sonucuda tasarlanmıştır. Yarışmayı Iraklı İngiliz mimar Zaha Hadid, Alman mimar Patrick Schumacher ve Kıbrıslı Türk mimar Saffet Kaya Bekiroğlu tarafından oluşturulan ekip kazanmıştır (Özkul, 2021).

HAYDAR ALİYEV KÜLTÜR MERKEZİ	**KONUMU**	**GÖRSEL**
YAPIM YILI: 2007-2012		
BULUNDUĞU YER: Bakü / AZERBAYCAN		
TASARIMCI: Zaha Hadid, Patrik Schumacher, Saffet Kaya Bekiroğlu (DiA Holding)		
İŞLEV: Kültür Yapısı		
ÜSLUP: Dekonstrüktiv / Fütürist		
KAT PLANLARI		
 		
CEPHELER		
 		
KESİTLER		
 		
İÇ MEKÂN		
  		

Şekil 4. Haydar Aliyev Kültür Merkezi Fonksiyon Şeması. Konum (URL-17), Görsel (URL-18), Kat Planları (URL-19), Cepheler (URL-20), Kesitler (URL-21), İç Mekân (URL-22).

4.2.2. Haydar Aliyev Kültür Merkezi Tasarım Kriterleri

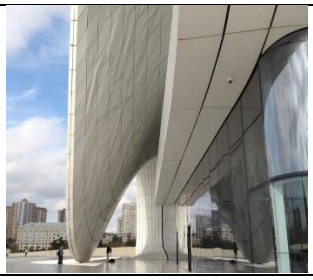
- **Siluet:** Bakü'nün ana arterlerinden biri olan Haydar Aliyev Bulvarı üzerinde yer alan bina, çevresindeki yapılardan biçimsel ve yapısal olarak farklılaşmaktadır. Diğer binalardan

çok yüksek olmamasına rağmen akışkan formu ve modern görünümüyle kent dokusunda kolaylıkla ayırt edilebilmektedir.

- **Sadelik:** Binanın tüm tasarımını oluşturan akışkan mimari, dış kabuğun hiperbolik parabol, paraboloid, düzlem ve tonozlardan oluşan karmaşık bir geometrik kurguya sahip olmasına neden olmaktadır.
- **Simetri:** Bina kütlesi amorf yapıdadır. Biçimsel ve mekânsal olarak asimetrik özellik göstermektedir. Binanın her cephesinde farklı kıvrılma, dalgalanma hareketleri gözlenmektedir.
- **Metafor:** Binanın biçimlenişi sıradışı veya karmaşıktır. Binanın görünüşü alışılmışın dışında bir tasarım anlayışına sahiptir. Dalgalı ve kıvrımlı formu Hazar Denizi'nin yükselişi, Aliyev'in doğduğu yerdeki bir dağ, köpekbalığı, Azeri halkının uyanışı vb. pekçok metafora dayanmaktadır.
- **Malzeme:** Bina cam elyaf güçlendirilmiş beton, uzay kafes sistemi ve camın birleşiminden oluşan modern bir binadır. Karmaşık geometriye sahip dış yüzeyler cam elyaf takviyeli polyester panellerler kaplanmıştır. Beyaz panel kaplama ve akışkan mimari binada heykelsi bir form algısı yaratmaktadır.
- **Yaratıcılık (Cesaret):** Doğadan ilham alarak ürettiği kavisli yapılarıyla adından söz ettiren mimar, farklı coğrafyalarda pek çok yapı tasarlamıştır. Haydar Aliyev Kültür Merkezi'ni tasarlama görevini almadan daha öncesinde Zaha Hadid, geliştirdiği tasarım anlayışı ve kendi vizyonu sayesinde uluslararası tanınmışlık elde etmiştir.
- **Mühendislik:** "Dekonstrüktiv" tasarım anlayışına sahip binanın çok eğrilikli dış kabuğu hem kütlenin konstrüksiyonunu oluşturup, hem de iç mekânda bölücü eleman görevi görmektedir. Tasarımın bütününe yayılan dalga ve kıvrım hareketleri çok işlevli olmasından dolayı binanın duvar, döşeme, tavan, çatı gibi yapı elemanları iç içe geçmiş durumdadır. Karmaşık geometrisi uzay kafes sistem ile çözülmüş ve böylece iç mekânda strüktüre ihtiyacı azaltmıştır.
- **Bağlam:** Bina, Bakü'nün ana arterlerinden biri olan Haydar Aliyev Bulvarı üzerinde Nerimanov bölgesinde inşa edilmiştir. Çağdaş tasarım anlayışı ve akışkan formu ile çevresindeki binalarla uyumsuzdur. Sonraki yıllarda yakın çevresine inşa edilen kongre merkezi ile birlikte bölgenin sosyo-kültürel yapısının değişmesine yardımcı olmuş ve ülkenin kültür-sanat noktası olmasını sağlamıştır.
- **Öykü:** 1991 yılında Azerbaycan'ın bağımsızlığını kazanması ile başlayan ülkedeki yapılanma politikaları gereği başkent Bakü hızlı bir yenilenme sürecine girmiştir. Sanayi ve kültür merkezi konumuna gelen kent, eski Sovyet döneminden kalan kent kimliğinden

uzaklaşarak modern bir kimlikle tanınırlığı arttırılmak istenmektedir. Modern bir kent kimliği ve kentsel imaj geliştirmek için kent genelinde birçok simgesel bina inşa edilmiştir. Haydar Aliyev Kültür Merkezi de bu kapsamda inşa edilen ikonik binalardan biridir.

- **Erk Etkisi (Yaptıran):** Bina, dönemin Azerbaycan Cumhurbaşkanı olan İlham Aliyev tarafından Bakü kentinde hakim olan anıtsal Sovyet mimarisinden modern bir simge yapıyla uzaklaşıp, kent imajı oluşturmak amacıyla inşa edilmiştir. Kentin ve özellikle ülkenin tanınırlığını arttırmak ve modern bir imaj yaratmak adına Bakü'de inşa edilen birçok binadan biridir.

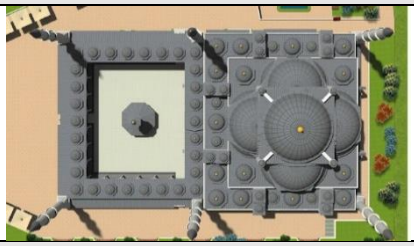
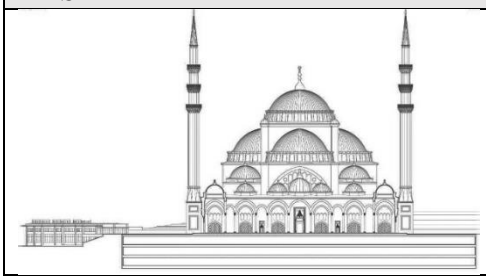
Haydar Aliyev Kültür Merkezi'nin İkonik Bina Olmasını Sağlayan Tasarım Kriterlerinin Değerlendirilmesi					
Tasarım Kriteri	**Açıklama**	**Binaya Ait Görsel**	**Değerlendirme**		
			■ Sağlıyor	◩ Kısmen	□ Sağlamıyor
Siluet	Binanın tepe noktası 74 m yüksekliktedir. Bulunduğu bölgedeki binalardan farklılaşan sivrilen bir özellik göstermemektedir.		✓		
Sadelik	Bina formu dalga ve kıvrımlardan oluşmaktadır.			✓	
Simetri	Binanın hiçbir noktasında simetriye rastlanmamaktadır.				✓
Metafor	Binanın formu Aliyev'in doğduğu yerdeki dağ, Hazar Denizi'nin dalgaları, Sovyet rejiminden ayrılma, yükselme gibi metaforlara dayandırılmaktadır.		✓		
Malzeme	Binada çelik, beton ve cam malzemeler bir arada kullanılmıştır. Dış kabuk farklı ebatlardaki kompozit panellerle kaplanmıştır.		✓		

Yaratıcılık	Kent ölçeğinden bakıldığında kıvrımlı form topoğrafyanın bir devamı gibi düşünülmektedir.		✓		
Mühendislik	Dış kabuğun BIM çizimleri ile oluşturulan çift eğrilikli hiperbolik paraboloid formu için uzay kafes ve pnömatik sistemler kullanılmıştır.		✓		
Bağlam	Bina boyut ve görünüm olarak bulunduğu bölgedeki diğer yapılarla uyumlu değildir.				✓
Öykü	Binanın yapılacağı alandaki mevcut yapılar kamulaştırılmıştır.		✓		
Erk Etkisi	Azerbaycan eski cumhurbaşkanının adını yaşatacak, ideolojisini devam ettirecek ve ülkenin yeni sembolü olacak bir bina inşa edilmek istenmiştir.		✓		

Şekil 5. Haydar Aliyev Kültür Merkezi'nin Tasarım Kriterlerinin Değerlendirilmesi. Siluet (URL-23), Sadelik (URL-24), Simetri (URL-25), Metafor (URL-26), Malzeme (URL-27), Yaratıcılık (URL-28), Mühendislik (URL-29), Bağlam (URL-30), Öykü (URL-31), Erk Etkisi (URL- 32).

4.3.1. Büyük Çamlıca Camii – İstanbul

Büyük Çamlıca Camii, dönemin başbakanı Recep Tayyip Erdoğan'ın isteği üzerine 2013-2019 yılları arasında inşa edilmiştir. İstanbul'da daha önceki iktidar sahiplerinin yaptırmış olduğu gibi Erdoğan da görevi süresince simgesel binalar yaptırmak istemiştir. Bu sürecin kentsel, siyasal ve toplumsal tartışmaların odağı haline gelmesi nedeniyle, kent ve kamu yararına çalışan ve anayasal bir meslek kuruluşu olan TMMOB Mimarlar Odası tarafından konuyla ilgili bir basın açıklaması yayımlamıştır. Açıklamaya göre binanın tarihi, kültürel ve doğal değerleri olumsuz yönde etkileyeceği öngörülmüştür. Kentin her yerinden görülebilecek büyüklükte yeni bir simge oluşturulmak istenmiş ve 2013 yılında açılan sınırlı bir yarışma sonucunda Çamlıca Camii tasarlanmıştır. 62 projenin katılım gösterdiği ulusal yarışmada birinciliğe layık görülen bir proje olmamış, ikinciliği ise iki proje paylaşmıştır. Bu iki projeden Hayriye Gül Totu ve Bahar Mızrak tarafından klasik üslupta ortaklaşa tasarlanan proje inşa edilmiştir (Sağır ve Sağır, 2021).

BÜYÜK ÇAMLICA CAMİİ	KONUMU	GÖRSEL
YAPIM YILI: 2013-2019		
BULUNDUĞU YER: İstanbul / TÜRKİYE		
TASARIMCI: Hayriye Gül Totu, Bahar Mızrak, Mehmet Güner		
İŞLEV: Dini Yapı		
ÜSLUP: İslam / Klasik Osmanlı		
KAT PLANLARI		
		
CEPHELER		
 		
KESİTLER		
		
İÇ MEKÂN		
  		

Şekil 6. Büyük Çamlıca Camii Fonksiyon Şeması Konum (URL-33), Görsel (URL-34), Kat Planları (URL-35), Cepheler (URL-36), Kesitler (URL-37), İç Mekân (URL-38).

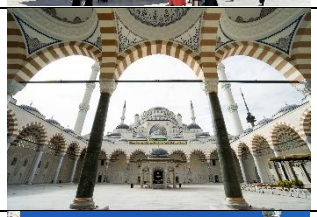
4.3.2. Büyük Çamlıca Camii Tasarım Kriterleri

- **Siluet:** Çamlıca Camii'nin bulunduğu bölge tarihi ve doğal sit alanı olan, İstanbul'un simgesel alanlarından biridir. İnşaatın başlamasından önce kamusal alan olan yer, tasarım yarışması açılmadan önce "Büyük Çamlıca özel proje alanı" adı altında yapılaşmaya açılmıştır.

Kentin en yüksek noktasına inşa edilen cami hem konumu hem de devasa boyutu bakımından kent siluetinde kolaylıkla görülmektedir.

- **Sadelik:** Örtü sistemini oluşturan kubbelerin farklı kademelenmesi, cephedeki kütle hareketleri binada dinamik bir etki yaratmaktadır.
- **Simetri:** Binanın kütle kompozisyonu, plan şeması klasik Osmanlı cami mimarisi ile uyumludur. Bu üslubun plan ve mekân anlayışında simetri ön plandadır. Ayrıca yapı elemanlarının biçimlenişlerinde düzgün geometrik formlar kullanılmıştır.
- **Metafor:** Binanın görünüşü alışılmışın dışında bir tasarım anlayışına sahip değildir. Binanın formu herhangi bir metafora dayanmamaktadır. Ancak tasarımcılar yapı elemanlarının matematiksel ölçüleri ile sayısal göndermeler yaptıklarını ifade etmiştir (Merdim, 2012).
- **Malzeme:** Binada beton, cam, kurşun ve taş kaplamalar kullanılmıştır. Formu, plan kurgusu, iç ve dış mekân süslemeleri ile klasik Osmanlı cami mimarisini yansıtmaktadır. Konstürksiyon ve yapım sistemi farklılıkları ile bu üslubun günümüz uyarlamasıdır.
- **Yaratıcılık (Cesaret):** Tasarımcılar cami mimarisi anlayışlarının klasik Türk-İslam üslubu olduğunu bu nedenle Çamlıca Camii'sinin tasarımında bu çizgileri tercih ettiklerini belirtmişlerdir (Merdim, 2012). Klasik tasarım anlayışları ve geçmişte inşa edilen iyi örneklerden fazlasıyla ilham almaları yarışmayı kazanmalarını sağlamıştır. Günümüz çağdaş mimarisinden uzak bir mimari sergilemektedir.
- **Mühendislik:** Klasik osmanli cami mimarisine bağlı tasarım anlayışa sahip binanın inşa sürecinde en zorlayıcı kısmı ana kubbenin ve mimarelerin yapımı olmuştur. Günümüz teknolojisi ile bu betonarme yapı elemanlarının inşası kolaylıkla çözülmektedir.
- **Bağlam:** Bina, İstanbul'un kent siluetinin önemli bir parçası olan doğal ve tarihi bir bölgeye inşa edilmiştir. Devasa kütlesi ile bulunduğu bölgenin imar durumuyla uyumlu değildir. Cami, geniş çevre düzenlemesi ve proje kapsamında gerçekleştirilen kentsel dönüşüm hareketi ile birlikte bulunduğu bölgenin topoğrafik, sosyal, kültürel ve ekonomik anlamda değişmesine neden olmuştur.
- **Öykü:** 1980'li yıllardan itibaren iktidara gelen hükümetler İstanbul için siyasal ve ekonomik bir çerçevede kentsel politikalar üretmeye başlamış ve bu anlamda bir takım uygulama yapılmıştır. Bir çok ülkede örneğine rastlanılan kentsel mekanlara müdahalelerle yaşanan dönüşümler, 2002 yılı ve sonrasında iktidara gelen hükümetin de bu alanda politikalar üretmesine neden olmuştur. Çamlıca Camii de bu kapsamda inşa edilen simgesel binalardan biridir.

- **Erk Etkisi (Yaptıran):** Bina, dönemin başbakanı tarafından İstanbul'a yeni bir kent simgesi kazandırmak amacıyla inşa edilmiştir. Siyaseti ve ideolojisi üzerine yaşanan tartışmalara karşı geliştirilen bu proje aynı zamanda iktidarın gücünü de temsil etmektedir (Tarhan, 2022).
-

Büyük Çamlıca Camii'nin İkonik Bina Olmasını Sağlayan Tasarım Kriterlerinin Değerlendirilmesi					
Tasarım Kriteri	**Açıklama**	**Binaya Ait Görsel**	**Değerlendirme**		
			■ Sağlıyor	◩ Kısmen	□ Sağlamıyor
Siluet	Binanın ana kubbesi 72 m, minarelerinin dördü 107,1 m ve ikisi 90 m yüksekliktedir. Kentin en yüksek noktasına konumlanan cami kent siluetini önemli ölçüde etkilemektedir.		✓		
Sadelik	Cephe kurgusu yatayda ve düşeyde oluşturulan kademelenmelerden dolayı dinamik bir etki göstermektedir.				✓
Simetri	Binanın formunda klasik osmanlı mimarisinde kullanılan geometrik ve simetrik biçimlerden yararlanılmıştır.		✓		
Metafor	Binanın biçimlenişinde metafor bulunmamaktadır.				✓
Malzeme	Betonarme ağırlıklı binada beton ve cam malzemeler bir arada kullanılmıştır. Dış cephe, revak sütunları ve iç mekânda taş kaplamalar kullanılmıştır.			✓	
Yaratıcılık	Klasik osmanlı cami mimarisi örnek alınmıştır.				✓

Mühendislik	Binanın 72 m yükseklikte ve 34 m çapında olan ana kubbesi ile ortalama 100 m yükseklikte ve 4,2 çapındaki minareleri zorlayıcı kısımlardır.			✓	
Bağlam	Sahip olduğu yükseklik ve geniş çevre düzenlemesi ile konumundan ve çevresinden soyutlanmıştır.				✓
Öykü	Binanın yapılacağı alandaki mevcut yapılar kamulaştırılmıştır.			✓	
Erk Etkisi	Siyasal erkin ideolojisini yansıtmak, siyasal ve kentsel politikalarını görünür kılmak adına yapılmıştır.		✓		

Şekil 5. Büyük Çamlıca Camii'nin Tasarım Kriterlerinin Değerlendirilmesi. Siluet (URL-39), Sadelik (40), Simetri (URL-41), Metafor (42), Malzeme (43), Yaratıcılık (URL-44), Mühendislik (URL-45), Bağlam (URL-46), Öykü (URL-47), Erk Etkisi (URL- 48).

5. BULGULAR

Bir binanın ikonikleşmesini sağlayan en önemli unsurlardan biri mekânsal temsiliyettir. Bu çalışmada, ikonik binaların mekânsal temsiliyetlerinin önemine dikkat çekilmiş ve tasarımlarını etkileyen faktörler sorgulanmıştır. Yapılan literatür araştırmaları neticesinde on adet "ikonik binaların tasarım kriteri" belirlenmiş ve örnek analizleri için kulanılmıştır.

Georges Pompidou Kültür Merkezi, Haydar Aliyev Kültür Merkezi ve Büyük Çamlıca Camii bu kriterler üzerinden incelenmiş ve değerlendirmeler aşağıda sırasıyla açıklanmıştır. Bu üç ikonik binanın tasarım kriterlerine ait tüm değerlendirme verileri de Şekil-6'da gösterilmiştir.

- İkonik binalar çevrelerine göre yüksek olma eğilimindedirler. Erki temsil eden yapılar oldukları için kent siluetinde belirgin bir şekilde fark edilirler. Bu binalar büyüklükleri ile temsil ettikleri gücün de büyüklüğünü yansıtmaktadır.
- İkonik binaların tasarımlarında yalın çizgiler yerine karmaşıklığa daha çok rastlanmaktadır. Gelişen teknoloji ile birlikte kullanılan malzeme ve yapım sistemleri de gelişmiştir. Bu bağlamda bina üretiminde yalınlıktan uzaklaşılarak karmaşık geometriler tercih edilmeye başlanmıştır.

- İkonik binaların tasarımlarında değişen ve gelişen yapı teknolojisinin etkisiyle serbest geometrik formlar ve asimetrik biçimlenişler tercih edilmektedir.
- İkonik binaların biçimlenişleri, sahip olduğu benzerlikler ve yapmış olduğu göndermelerle toplumsal belleklerde yer edinmektedir. Klasik formlardan ziyade çoğunlukla çağdaş formlarda metaforlara rastlanmaktadır.
- İkonik binalarda çağdaş tasarım anlayışı ve gelişen teknoloji sayesinde farklı ölçeklerde ve özelliklerde malzemeler bir arada kullanılabilmektedir. Bu da tasarımların serbest ve özgün olmasını sağlamaktadır.
- İkonik binalar çoğunlukla yarışmalar sonucunda yıldız mimarlar tarafından tasarlanmaktadır. Bu mimarların kendilerine özgü tasarımları ile biçimlenen binalar sadece işlevleriyle değil görsellikleriye de kent ekonomisine katkı sunmaktadır.
- İkonik binalarda kullanılan form, malzeme ve tasarım anlayışı sanayileşme ile birlikte değişmiştir. Tasarımlarda geleneksel yapım sistemlerinin yerine çağdaş yapım sistemlerinin tercih edilmesi bilgisayar destekli programlarla (BIM) birlikte özel mühendislik çözümleri de gerektirmiştir.
- İkonik binalar bulundukları çevre ile büyüklük, malzeme ve tasarım anlayışı bakımından kontrast yaratırlar. Kent dokusundan ayrılarak çevreden kopuk bir bağlam içinde görülmekle beraber zaman içinde uyumlu hale gelmektedirler.
- İkonik binalar kentlerin markalaşması açısından bir imaj oluşturarak kentlerin sosyal, kültürel ve ekonomik alanlarda değer kazanmasını sağlamaktadır.
- İkonik binalar, özellikle siyasal erk sahiplerinin ideolojilerini ve iktidarlarını mekâna yansıtan bir araç olmuştur. Ekonomik erk sahiplerinin bir prestij yapısı olarak kentsel mekânlarda yerini almakta olduğu görülmektedir.

Tasarım Kriterleri	***Pompidou Kültür Merkezi***	***H. Aliyev Kültür Merkezi***	***Büyük Çamlıca Camii***
Siluet	■	■	■
Sadelik	◩	◩	□
Simetri	◩	□	■
Metafor	◩	■	□
Malzeme	■	■	◩
Yaratıcılık	■	■	□
Mühendislik	■	■	◩
Bağlam	□	□	□
Öykü	■	■	◩
Erk Etkisi	■	■	■

Not: □ Sağlamıyor ■ Sağlıyor ◩ Kısmen

Şekil 6. Örnek İkonik Binaların Tasarım Kriterlerinin Değerlendirilmesi

6. SONUÇ

Bu çalışmada, erkin mekânsal temsiliyetinin bir göstergesi olan ikonik binaların mimari dili ve gelecek tasarımları ne ölçüde etkilediği ile birlikte yapılı çevrenin oluşumuna katkıları irdelenmiştir. İkonik binaların ortaya çıkış nedenleri ve tasarımlarını etkileyen faktörlerin neler olduğu örnekler üzerinden değerlendirilmiştir. Çalışma kapsamında, sahip oldukları farklı özellikler nedeniyle bulundukları kentlerde simgesel anlam ve mekânsal temsiliyet taşıyan üç ikonik bina incelenmiştir. Yapılan örnek incelemeleri sonucunda, özellikle siyasal erk sahiplerinin kentlerin fiziki alanlarına simgesel anlam taşıyan binalar vasıtası ile müdahalelerde bulunduğu görülmüştür. Bu müdahaleler bazen kentlere uluslararası bir prestij kazandırıp, kent ekonomisine katkı sağlamayı amaçlarken diğer taraftan toplum üzerindeki iktidar gücünün toplumun soyo-kültürel açıdan değişmesine ve gelişmesine neden olmuştur. İncelenen örneklerden Pompidou Kültür Merkezi ve Haydar Aliyev Kültür Merkezi bulundukları bölgeleri canlandırarak kültürel ve ekonomik anlamda gelişmesine katkı sağlamış, çevresi ile bütünleşmiştir. Her iki bina da özgün ve benzersiz mimarileriyle çığır açıcı etkiye sahiptir. Büyük Çamlıca Camii ise devasa büyüklüğü nedeniyle çevresiyle bütünleşemeyen, bağlamından kopuk bir yapı sergilemektedir. Mimari anlamda klasik Osmanlı mimarisinin günümüz uyarlaması olduğundan özgün değildir. İkonik binalar erk temsiliyetine sahip olmaları nedeniyle kent siluetinde daha çok görünür olan binalardır. Bu sebeple silüet etkileri ve farklı tasarım anlayışları, bulundukları çevreden kopuk bir bağlam içinde görülmesin rağmen zaman içinde çevre ile bütünleşmektedirler. Günümüzün değişen ve gelişen teknolojisi sayesinde çağdaş malzeme ve yapım sistemi kulanımı ikonik binaların tasarım anlayışlarını farklılaştırmaktadır. Genellikle yarışmalar ile ünlü mimarlar tarafından tasarlanan bu binaların her birinin arka planda bir öyküsü bulunduğu da görülmüştür.

İkonik binaların tarihsel oluşumuna bakıldığında, ideolojilerinin yansıtılacağı mekânlar olarak erk sahipleri için vazgeçilmez bir unsur olduğu söylenebilir. Erk sahiplerinin istekleri doğrultusunda tasarlanan bu binalar yapılı çevreyi değiştirirken aynı zamanda toplumu da değiştirmişlerdir. 1980'lerden itibaren küreselleşme ile birlikte bu değişim ekonomik, siyasal, sosyal ve kültürel alanların hepsinde hissedilmeye başlanmıştır. Bu dönemle birlikte neoliberal politikalar yapılı çevrenin değişimini daha fazla etkilemektedir. Küreselleşme öncesinde ikonik binalar bir erki, bir ideolojiyi temsil ederken, küreselleşme sonrasında ise kent kimliğinin bir parçası haline gelmiştir. İkonik binalar gelişen teknoloji, medya etkisi ve kentler arası rekabet nedeniyle kentlerin markası olmuştur. Özellikle sıradışı formları, özgünlükleri ve pek çok farklılıklarıyla ilham verici olan bu binalar günümüzde pek çok ülkede uygulanmaktadır. Kentlerin gelişim aracı olarak yapılmaya devam edilmektedir. Günümüzde küreselleşme ile

birlikte ekonomi en önemli güç kaynağı haline gelmiştir. Küresel ekonomiye hakim olan erk sahipleri de ikonik binaların yapılmasında belirleyici unsur olmuşlardır. Tarihsel süreç içerisinde erkin dayanağının siyasal, dini veya ekonomik olarak değişkenlik gösterse de ikonik binaların mimarlık ve kent planlaması üzerinde genellikle olumlu yönlerde etkilerinin olduğu görülmüştür. Özellikle uluslararası yarışmalarla yapılan ikonik binaların olumlu etkilerinin daha fazla olduğu söylenebilir.

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ENDÜSTRİ 4.0 SÜRECİNDE REKABET YOĞUNLUĞU FAKTÖRÜ

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ÖZET
Rekabet yoğunluğu, endüstride meydana gelen rekabetin derecesi ve tahmin edilebilirlik oranıdır. İşletmeler yoğun rekabet koşulları altında rekabet avantajlarını koruyabilmek için rakiplerinin hamlelerini önceden tahmin edebilmeli ve kaynaklarını etkin, verimli ve müşteri beklentilerine uygun şekilde piyasaya arz etmelidir. Günümüzde firmaların bunu gerçekleştirebilmesi için ise ancak Endüstri 4.0'a geçiş yapması gerekmektedir. Bu çalışma kapsamında yoğun rekabet ve yüksek belirsizlik koşullarında firmaların atması gereken adımlar ile Endüstri 4.0 uygulamalarının nasıl etkiler ortaya koyacağı araştırılmaktadır. Çalışma iki aşamadan oluşan bir yöntem ile gerçekleştirilmiştir. İlk aşamada 2015-2022 yılları arasında SSCI endeksli dergilerde rekabet yoğunluğu konusunu incelemiş çalışmalar meta analizi yöntemi ile araştırılmıştır. İkinci aşamada ise Endüstri 4.0'ın başarıyla uygulanması sürecinde ortaya çıkacak risklerin tespit edilerek atılması gereken stratejik adımların belirlenmesi amacıyla odak grup çalışması gerçekleştirilmiştir.

Anahtar Kelimeler: Rekabet Yoğunluğu, Meta Analizi, Odak Grup Çalışması, Endüstri 4.0.

COMPETITIVE INTENSITY FACTOR IN THE INDUSTRY 4.0 PROCESS

ABSTRACT
Competition intensity is the degree of competition occurring in the industry and the rate of predictability. In order to maintain their competitive advantages under intense competition conditions, businesses should be able to predict the moves of their competitors and supply their resources to the market effectively, efficiently and in accordance with customer expectations. Today, companies only need to transition to Industry 4.0 in order to achieve this. Within the scope of this study, the steps to be taken by companies in conditions of intense competition and high uncertainty and the effects of Industry 4.0 applications are investigated. The study was carried out with a method consisting of two stages. In the first stage, the studies that examined the subject of competition intensity in SSCI indexed journals between the years 2015-2022 were investigated by meta-analysis method. In the second stage, a focus group study was carried out in order to identify the risks that will arise during the successful implementation of Industry 4.0 and to determine the strategic steps to be taken.

Keywords: Competition Intensity, Meta Analysis, Focus Group Study, Industry 4.0.

1. GİRİŞ

İçerisinde bulunduğumuz teknoloji ve bilgi çağında insan ihtiyaç ve beklentilerinin bir sonucu olarak Pazar dinamikleri tahmin edilmesi zor bir hızla değişmektedir. Özellikle 20'nci yüzyılın ikinci yarısından itibaren artan küreselleşme sonucunda ekonomik sınırlar ortadan kalkmış, tüm dünya tek bir pazar haline gelmiş ve ülkeler arası rekabet ortamı oluşmuştur. Bölgesel rekabetin yerini küresel rekabetin alması ile artan değişim rüzgârı, mevcut ürün ve hizmetlerin hızlı bir şekilde dönüşümüne neden olmuştur (Turulja ve Bajgoric, 2018). İşletmenin dış çevresinde meydana gelen bu değişimlerin hızı ve tahmin edilemezliği literatürde çevresel türbülans olarak tanımlanmaktadır (Staniec, 2018; Wong, 2014; Tsai ve Yang, 2014). İşletmeler maruz kaldıkları çevresel türbülans koşullarında hem rekabet avantajlarını koruyabilmek hem de varlıklarını devam ettirebilmek için öncelikle belirsizlik faktörlerini azaltmalı sonrasında ise kaynaklarını etkin, verimli, üretim hataları azaltılmış ve müşteri beklentilerine uygun şekilde piyasaya arz etmelidir (Ocak ve Gök, 2022)

Ülkemizin mevcut dijital olgunluk seviyesi, TÜBİTAK (2016) tarafından yapılan çalışmaya göre Endüstri 2.0 ile 3.0 arasındadır. Kısa vadede ülkemizin 2023 hedeflerinin gerçekleştirilebilmesi, orta-uzun vadede ise ülkemizin gelişmiş ekonomiler içerisinde hızla yer alabilmesi için işletmelerin verimli, etkin ve tüketici beklentilerine anlık cevap verebilen bir üretim modeline kavuşması gerekmektedir. Ayrıca ileri teknoloji sektörlerinin güçlendirilmesi ve üretim tekniklerinin dijitalleşerek verimliliğin en üst seviyeye çıkarken maliyetlerin minimum seviyeye çekilmesi için Endüstri 4.0 uygulamalarına ağırlık verilmesi günümüz bir gerekliliği haline gelmiştir.

Endüstri 4.0 ya da bilinen diğer adı ile Dördüncü Sanayi Devrimi, ilk kez 2011 yılında Almanya Hannover Bilim Fuarı'nda Alman Ulusal Bilim ve Mühendislik Akademisi (Acatech) Başkanı Henning Kagermann tarafından ifade edilmiştir (Koçak ve Diyadin, 2018). Endüstri 4.0, insan gücünden bağımsız bir şekilde internet ortamında bir araya gelen bulut veri, bulut bilişim, yapay zeka, robotik ve nesnelerin interneti gibi tekniklerin üretim süreçlerine entegre edilmesidir. Endüstri 4.0, tedarikçinin tedarikçisinden başlayarak nihai tüketiciye kadar olan üretim sürecinde insan faktörünün en aza indirilerek tüm süreçlerin otomatik olarak yönetilmesini ifade etmektedir (Fuchs, 2018; Hermenn vd., 2015).

Gerek tüketici beklentilerindeki gerekse de üretim teknolojilerindeki değişim rüzgârının, firmaya rekabet avantajı sağlayabilmesi için firmanın arkasından esmesi gerekmektedir. Bu değişimlere ek olarak girdi maliyetlerinin azaltılarak etkin ve verimli üretim süreçlerinin ön plana çıkartılabilmesi içinse de çevresel belirsizliklerin, en başta da rekabet yoğunluğu

seviyesinin, en aza indirilmiş olması gerekmektedir. Firmaların bunu başarabilmesi için ise Endüstri 4.0 uygulamalarına geçmesi gerekmektedir.

Endüstri 4.0'ın kavramsal çerçevesi, yarattığı fırsatlar ve etkileri ile ilgili literatürde çalışmalar bulunuyorsa da (Kagermann vd., 2013; Schwab, 2017; Fusch, 2018; Stock ve Seliger, 2016) çevresel türbülans ve alt başlıklarından biri olan rekabet yoğunluğu özelinde herhangi bir çalışma yapılmadığı gözlemlenmiştir. Bu çalışma kapsamında, firmaların pazardaki rekabet belirsizliği ve öngörülemezliği durumunda hangi adımları atması gerektiği ve bu adımların Endüstri 4.0 başarı kriterleri ile olan uyumluluğunun incelenmesi hedeflenmiştir.

2. TEORİK ARKA PLAN

Çevresel türbülans müşteri istek ve arzularındaki değişimler, teknolojideki ilerlemeler ve firmalar arasındaki rekabetin hızla ve tahmin edilemez ölçüde değişimini ifade etmektedir (Staniec, 2018; Wong, 2014; Tsai ve Yang, 2014). Literatürde çevresel türbülansın tanımına yönelik fikir birliği yoktur. Ancak araştırmacıların yapmış olduğu tanımların ortak özelliklerinin: ürün yaşam ömürlerinin kısalması, mevcut ürünlerin hızla eskimesi, ürün ve hizmetlere yönelik taleplerin hızla artması ve teknoloji ile bilginin hızlı şekilde değişmesi yönünde olduğunu söyleyebiliriz (Heckmann vd., 2016).

Çevresel türbülans literatürde pazar türbülansı, teknolojik türbülans ve rekabet yoğunluğu olmak üzere üç alt başlığa ayrılmıştır (Kohli ve Jaworski, 1990; Ottesen ve Gronhaug, 2004). ***Pazar Türbülansı***, müşterilerin tercihlerindeki değişim (Kohli ve Jaworski, 1990); ***Teknolojik Türbülans*** sektördeki teknolojilerin ilerleme oranı (Jaworski ve Kohli, 1993); ***Rekabet Yoğunluğu*** ise pazar içerisindeki rekabetin derecesini ve rekabetin öngörülebilirlik oranını ifade etmektedir (Jaworski ve Kohli, 1993; Chan vd., 2012; Tsai ve Yang, 2013). Zhao (2021) çalışmasında teknolojik türbülansı çevresel türbülans faktörleri içindeki en önemli etmen olarak tanımlamış olsa da çevresel belirsizliğe genellikle yoğun rekabet ve teknolojik ilerlemelerdeki belirsizliklerin tetiklediği ifade edilmektedir (Kafetzopoulos, 2020). Çünkü sektör içerisinde değişen müşteri, üretim teknolojileri ve rakiplerin rekabet hamleleri firmaları daha hızlı yanıt vermeye zorlar. Bu durum da firmaların sürdürülebilir rekabet avantajını koruyabilmek için daha fazla çaba harcamaya sevk eder (Dagnachew ve Hon, 2020).

Yoğun rekabet genellikle firmalar arasındaki şiddetli fiyat savaşı ve yoğun reklam ile ilişkilendirilmektedir. Örneğin son dönemde elektronik ve bilgi teknolojileri gibi teknoloji yoğun sektörlerdeki firmalar, daha hızlı teknolojik değişimler yaşamakta ve daha fazla belirsizlik ile daha yoğun bir rekabet içerisinde yer almaktadır (Chen vd., 2015). Yaşanan bu

değişimlerle birlikte tüketici tercihleri de daha çeşitli ve hızla değişir hale gelmektedir. Müşterilerde yaşanan bu zevk ve tercih değişimlerini karşılamak için ise firmalar düzenli olarak yeni ürün ve hizmetleri piyasaya sunmalıdır (Wong vd., 2011; Zhou vd., 2014;Wu, 2012; Wang vd., 2015a).

İşletmeler, dış çevrelerinde meydana gelen değişimleri kontrol altında tutabilme gücüne sahip değildir. Türbülansın beraberinde getirmiş olduğu zorlukları aşmak isteyen işletmeler dış çevresi hakkında sürekli bilgi toplamalı, olası durum ve şartlar için alternatif planlar hazırlamalıdır. Öte yandan işletmelerin, çevresel unsurların sürekli değiştiği bir ortamda gelenekselleşmiş yöntem ve yapıları kullanılarak değişimlerin yönetilmesi de mümkün değildir. Bu nedenle dış çevrede yaşanan çevresel türbülans ve faktörleri sürekli takip edilmeli ve olası değişimlere karşı alternatif stratejik planlar hazırlanmalıdır. Bunu gerçekleştirebilen firmalar günümüzde varlıklarını devam ettirebilecektir. Dolayısıyla bu riskleri görebilen firmalar için yoğun rekabet bir avantaj iken bu değişimleri fark edemeyecek işletmeler için ise yoğun rekabet tamamen olumsuz bir kavram olarak karşımıza çıkmaktadır (Chen vd., 2015; Lo ve Shiah, 2016).

Yoğun rekabet müşteri beklentileri ile sektör içindeki teknolojilerde değişimleri tetikler ve bu da yeni iş fırsatlarının doğmasına neden olur. Bu durumları önceden fark edebilen, önceden stratejik hamlelerini planlayan, risk alan ve girişimci odaklı adımlar atabilen firmalar yeni fırsatları rakiplerinden çok daha önce görecektir (Zahra, 1993). Dolayısıyla bu firmalar, istikrarlı bir pazarda elde edeceğinden daha fazla imkan ve fırsata sahip olacaktır (Engelen vd., 2015). Firmalar bu sayede yeni ürün/hizmet geliştirebilir, yeni pazarlar keşfedebilir, yeni rekabet yolları arar ve rakipleri karşısında farklılaşma elde edebilir (Zahra, 1993).

Yoğun rekabet ve yüksek çevresel belirsizlik durumlarını avantaja çevirebilmek firmalar için kolay değildir. Firmaların bu avantajın farkında olarak temel bilgi kaynaklarını ve mevcut yetkinliklerini geliştirerek çok çeşitli hale getirmesi, organizasyon yapısını çevik ve dinamik bir hale büründürmesi gerekmektedir (Huang vd., 2020). Bu dönemlerde firmaların en önemli rekabet kaynağı ise bilgidir (Kezsey, 2018). Firmalar yüksek çevresel türbülans ve rekabet yoğunluğu durumlarında mevcut bilgi kaynakları ile mücadele edemeyecektir. Zira firmanın sahip olduğu mevcut bilgiler hızla yanlış ve modası geçmiş hale gelmiş olabilir (Kezsey, 2018). Bu nedenle firmaların değişen koşullara uyum sağlayarak rekabet avantajlarını koruması gerekmektedir (Barney vd., 2011).

Literatürdeki çalışmalar incelendiğinde yüksek çevresel türbülans altında bulunan firmaların esnek yapılı, dinamik ve yenilikçi olması gerektiği sıklıkla ifade edilmiştir (Tsai ve Yang, 2013; Jaworski ve Kohli, 1993; Abbas ve Hassan, 2017; Staniec, 2018). Ali ve Varoğlu (2021) çalışmasında dış çevrenin stabil olduğu durumlarda işletmelerin inovasyona daha az ihtiyaç duyduğunu; dinamik çevreye sahip olan işletmelerin ise daha yüksek seviyede farklılaşmaya ihtiyaç duyduklarını tespit etmiştir. Literatürdeki bu çalışmaların ortaya koymuş olduğu sonuçlar üzere, belirsizliğin ve rekabetin yoğun olduğu ortamlarda faaliyet gösteren firmaların varlıklarını devam ettirebilmesi için daha yenilik odaklı olmaları gerektiği açıktır (Chen vd., 2015). Öte yandan Zulu-Chisanga vd. (2016) çalışmasında çevresel türbülans seviyesinin yüksek olduğu durumlarda firmaların bu belirsizlikleri aşmak için daha çok kaynak ayırması gerektiğini ifade etmiştir.

Değişen teknoloji, müşteri ihtiyaçları ve yoğun rekabet göz önüne alındığında firmaların sürdürülebilir rekabet avantajı elde etmesi için değişim trendlerini önceden görebiliyor olması gerekmektedir. Değişim trendlerine uygun olarak üretim altyapısının hızla değişimlere uyarlayan firmaların, aynı zamanda, oluşacak girdi maliyetlerini de en alt seviyeye çekmelidir. Bu nedenle Endüstri 4.0, firmalar için önemli bir parametre olarak karşımıza çıkmaktadır.

Endüstri 4.0, insan zekası ile makinelerin hatasız, hızlı ve maksimum verimle çalışabilme özelliklerinin bir arada kullanılmasına olanak tanıyan sistemdir (Özkan vd., 2018). Tedarikçinin tedarikçisinden başlayıp nihai tüketiciye kadar giden süreçlerin izlenebilir olması sayesinde herhangi bir eksiklik, aksaklık ya da hata erkenden tespit edilebilmektedir. Bu sayede üretim maliyetlerinin en alt seviyeye çekilmesi mümkün olmaktadır (Koçak ve Diyadin, 2018). Öte yandan Endüstri 4.0, esnek yapısı sayesinde tüketicilerin özel ve hızla değişen ihtiyaçlarına da anlık olarak cevap verme olanağı tanımakta, çalışanların rutin işlerini azaltarak nitelikli faaliyetlere yoğunlaşmasına imkan vermekte, maliyet düşüşleri sayesinde de firmaların inovasyon hızı ve başarısına imkan sağlamaktadır (Kagermann vd., 2013; Bartodziej, 2017). Tüm bu faktörler temelde, yüksek rekabet yoğunluğu ve belirsizliği ile karşı karşıya kalan firmaların başarılarının ve performanslarının artmasına imkan tanıyacak birer adım olarak karşımıza çıkmaktadır. Yani firmaların rekabet yoğunluğu durumlarında ya da rekabet yoğunluğunun beraberinde getirdiği belirsizliklerin öngörülebilir olmasında Endüstri 4.0 faktörlerinin başarı sağlayacağı öngörülmektedir.

Bu çalışma kapsamında firmaların Endüstri 4.0 uygulamaları süresince, dış çevrelerinde meydana gelen yüksek rekabet yoğunluğu durumunda belirsizlik unsurlarının azaltılması adına atılması gereken adımlar araştırılmıştır. Çalışma iki aşamadan oluşmaktadır. İlk aşamada 2015-

2022 yılları arasında SSCI endeksli dergilerde yayınlanmış, rekabet yoğunluğu konusunu odak çalışma alanı belirlemiş ampirik çalışmalar meta analizi yöntemi ile incelenmiştir. Çalışmanın ikinci aşamasında Endüstri 4.0 için kritik başarı faktörlerinin neler olduğu literatür incelemesi ile belirlenmiş ve meta analizi bulguları ile karşılaştırılmıştır. Bu karşılaştırma sonucunda Endüstri 4.0'ın başarıyla uygulanması sürecinde ortaya çıkacak riskler tespit edilerek atılması gereken adımların belirlenmesi için odak grup çalışması gerçekleştirilmiştir. Odak grup çalışması, Gebze Organize Sanayi Bölgesi Teknoloji Geliştirme Bölgesi (GOSB Teknopark A.Ş.) bünyesinde yer alan ve firmaların Endüstri 4.0 ile dijitalleşme süreçlerinde çözüm ortaklığı yapan 30 Ar-Ge ve Teknoloji tabanlı firmanın yöneticisi ile gerçekleştirilmiştir.

3. METODOLOJİ

3.1. Meta Analizi Araştırması

Meta analizi, bir konu üzerinde birbirinden bağımsız ve farklı pek çok çalışma sonuçlarının birleştirilerek genelleştirilmesine ve karşılaştırmasına olanak tanıyan analiz yöntemidir. Bu yöntem sayesinde farklı çalışma sonuçları özetlenmekte ve sonuçların bütüncül bakış açısıyla birleştirilmesi sayesinde genel kanı konulabilmektedir (Akgöz vd., 2004). Meta analizin sahip olduğu bu özellikten yararlanmak adına Emerald, Proquest, Sciene Direct ve Scopus veri tabanlarında yer alan çalışmalar incelenmiştir.

Literatürde "Rekabet Yoğunluğu" anahtar kelimesi ile inceleme yapıldığında hem çevresel türbülansa hem de Porter'ın "Rekabet Avantajı" konusuna dayalı çalışmalar sıralanmaktadır. Bu durumun engellenmesi ve araştırma bulgularını geniş tutulması adına (1) Environmental Turbulence, (2) Turbulence, (3) Turbulence Management, (4) Uncertainly, (5) Market Turbulence, (6) Technological Turbulence, (7) Competitive Intensity anahtar kelimeleri kullanılmıştır. Çalışma kapsamına dahil edilecek yayınların tespit edilmesi amacıyla 4 aşamadan oluşan bir filtreleme sistemi kullanılmıştır. Filtreleme süreçleri boyunca ulaşılan çalışmalara dair bilgiler Tablo 1'de sunulmuştur.

Tablo 1: Çalışmaya Dahil Edilecek Yayınların Filtrelenme Süreçleri ve Çalışma Sayıları

VERİTABANI	AŞAMA I	AŞAMA II	AŞAMA III	AŞAMA IV
Emerald	54	54	22	0
Proquest	108	105	30	1
Science Direct	14	14	4	1
Scopus	72	72	29	1
TOPLAM	**248**	**245**	**85**	**3**

İlk aşamada ilgili veri tabanlarında "Tarih", Yayın Dili" ve "Araştırma Sınırı" filtrelemesi yapılarak aratılmıştır. Tarih Aralığı: ***"01.01.2015 – 31.12.2021"***, Yayın Dili: ***"İngilizce"*** ve Araştırma Sınırı: ***"Sadece Bilimsel Makalelerde Ara"*** seçenekleri kullanılmıştır. Bu tarih aralığının bir sınır olarak belirlenmesinin en önemli nedeni Endüstri 4.0 kavramının ilk kez 2011 yılında kullanılmaya başlanmasıdır. İlk kez 2011'de kullanılan bu kavramın araştırmacılar tarafından incelenmesi, araştırmalarda kullanılması ve inceleme sonuçlarının net bir şekilde ortaya konulmasının en azından 1-2 yıl gerektirdiği öngörülmüştür. Öte yandan bir akademik çalışmanın veri toplama, araştırma, inceleme ve yayınlama süreçlerinin de 1 ila 2 yıl arasında sürdüğü bilinmektedir. Bu nedenle araştırma tarihi ile 01.01.2015 yılı itibariyle yayınlanan çalışmaları incelemenin daha net sonuçlar vereceği düşünülmüştür.

İlk aşamada yapılan filtreleme sonuçları detaylıca incelenmiş ve türbülans kavramının kullanıldığı bir diğer bilim dalı olan havacılık ile Porter'ın Jenerik Stratejileri olarak bilinen çalışmalar kapsam dışında tutulmuştur. Ayrıca editöryal, ön yazı, kongre çalışmalar ile bildiriler gibi, filtre yapmamıza rağmen arama sonuçlarında yer alan sonuçlar da kapsam dışında tutulmuştur. Bu aşama sonucunda 248 adet çalışma elde edilmiştir.

Bir akademik yayın birden fazla veri tabanında yayınlanabildiği için farklı veri tabanlarından aynı çalışmaların incelenme ihtimali bulunmaktadır. Bu nedenle ikinci aşamada, ilk aşama sonucunda elde edilen 248 çalışma kendi arasında karşılaştırılmıştır. Nitekim 3 adet çalışmanın eş olduğu tespit edilerek araştırma kapsamından çıkartılmıştır.

Tablo 2: Araştırma Kapsamında İncelenen Yayınlara İlişkin Bilgiler

	YAYIN 1	**YAYIN 2**	**YAYIN 3**
VERİ TABANI	Proquest	Scopus	Science Direct
ENDEKS	SSCI	SSCI	SSCI
DERGİ İSMİ	Supply Chain Management: An International Journal	Innovation: Organization and Management	Information and Management
ÇALIŞMA ADI	Associating The Motivation With The Practices of Firms Going Green: The Moderator Role Of Environmental Uncertainty	The Intensity of Market Competition and The Innovative Performance of Firms	IT Capabilities and Product Innovation Performance: The Roles of Corporate Entrepreneurship and Competitive Intensity
YAZAR(LAR)	Sonia M. Lo, Yu Anne Shiah	Tomasz Brodzicki	Yang Chen, Yi Wang, Saggi Nevo, Jose Benitez-Amado, Gang Kou
ANAHTAR KELİME	Environmental, Uncertainty, Green Supply Chains, Green Practices.	Innovation, Intensity of Competition, Market Structure, Negative Binomial Model, Firm-Level Poland	IT Capabilities, Corporate Entrepreneurship, IT Business Value, Competitive Intensity, Product Innovation Performance, Matched Survey Sample.
YIL	2016	2019	2015
ÜLKE	Tayvan	Polonya	Çin
DOI	10.1108/SCM-05-2015-0184	10.1080/14479338.2018.1532296	10.1016/j.im.2015.05.003

Üçüncü aşamada ise SSCI veri tabanlarında yayınlanan ve çevresel türbülans değişkenlerinden sadece Rekabet Yoğunluğu değişkeninin incelendiği çalışmalar araştırma kapsamına dahil edilmiştir. Bu filtrelemenin yapılmasının en önemli sebebi, hiç şüphesiz ki, başarılı ve tartışmaya kapalı sonuçları bünyesinde barındıran bulgular üzerinden meta analizinin gerçekleştirilme gerekliliğidir. Nitekim akademik anlamda güçlü, literatür tarafından kabul görmüş ve sonuçları tartışmaya en kapalı olan yayınlar SSCI endeksli dergilerde yayınlanan çalışmalardır. Bu nedenle bir önceki aşama sonucunda elde edilmiş 245 çalışmanın endeksleri

https://mjl.clarivate.com internet sitesi üzerinden incelenmiş; SSCI endekslerde taranmayan 160 çalışma kapsam dışında tutulmuştur.

Dördüncü ve son aşamada ise, bir önceki aşamada elde edilen 85 çalışma detaylıca incelenmiştir. İlk aşamada herhangi bir çalışmanın göz ardı edilmemesi için araştırma sınırı geniş tutulmuştu. Bu durum hali ile rekabet yoğunluğu konusu dışında diğer faktörleri inceleyen çalışmalarında elde edilmesine neden olmuştur. Bu nedenle çevresel türbülansın alt değişkenlerinden olan pazar ve teknolojik türbülans konularını işleyen tüm çalışmalar da kapsam dışında tutularak sadece rekabet yoğunluğunu inceleyen çalışmalar nihai araştırma kapsamına dahil edilmiştir. Bu aşama sonucunda 3 adet makale elde edilmiştir. Çalışma kapsamına dahil edilen çalışmalar Tablo 2'de sunulmuştur.

3.2. Odak Grup Çalışması

Meta analizi yöntemi ile rekabet yoğunluğu literatürü incelendikten sonra ikinci aşamada kantitatif araştırma yöntemlerinden biri olan odak grup çalışmasından yararlanılmıştır. Özellikle sosyal bilimlerde sıklıkla kullanılan bir yöntem olan odak grup çalışmasında, önceden belirlenmiş araştırma soruları moderatör önderliğinden planlı bir şekilde odak grup katılımcılarına sorulmaktadır (Kamberelis ve Dimitriadis, 2005). Katılımcıların uzmanlık ve deneyimlerinden faydalanılarak yöneltilen sorular ışığında bilgi edinilmesini amaçlayan odak grup çalışması sayesinde hem çok kısa bir sürede fazla bilgiye erişilebilir hem de katılımcılar birbirlerinin cevaplarından yola çıkarak kendi görüşlerini yapılandırabilmesi ve grup etkileşimi ile sorulara verilen cevapların niteliklerinin artıyor olması çalışmanın da başarısını artmaktadır (Işık ve Semerci, 2019).

Odak grup sorularının belirlenmesi için öncelikle 2011-2021 yılları arasında Prequest, Science Direct ve Emerald veri tabanlarındaki çalışmalar incelenerek Endüstri 4.0 için önemli olan başarı faktörleri belirlenmiştir. Bu faktörler şunlardır (Koçak ve Diyadin, 2018; Kagermann vd., 2013): *Akıllı Fabrikalar, Büyük Veri Yönetimi, Nitelikli İş Gücü, Siber Güvenlik, Siber Fiziksel Sistemler ile Enformasyon Sistem ve Teknolojileri.*

Meta analizi yöntemi ile rekabet yoğunluğuna yönelik çalışmalar incelendiğinde ise araştırmacıların; (1) Risk, (2) Yeşil Ürün, (3) Girişimcilik Yönelimi, (4) İnovasyon ve (5) Bilgi Teknolojileri konularını ortak olarak incelediği tespit edilmiştir. Odak grup çalışmasında sorulacak sorular bu tespitler kapsamında ve meta analizi çıktılarını ölçebilecek yapıda hazırlanmıştır.

Elde edilen başarı faktörleri özelinde hazırlanan sorular GOSB Teknopark A.Ş. bünyesinde yer alan ve büyük ölçekli sanayi firmalarının dijital dönüşüm süreçlerine çözümler üreten 30 firma odak grup çalışmasına davet edilmiştir. Odak grup örneklem kümesinin GOSB Teknopark A.Ş. bünyesinde yer alan firmalardan seçilmesinin iki önemli nedeni vardır. Bu nedenlerden ilki Gebze Organize Sanayi Bölgesi (GOSB)'un Türkiye'nin ilk sanayi teknoparkına ev sahipliği yapıyor olmasıdır. İkinci neden ise Ticaret Bakanlığı uhdesinde ve GOSB Teknopark A.Ş.'nin yürütücülüğünde Robotik ve Otomasyon Kümelenmesi devam etmektedir. Bu iki unsur GOSB Teknopark A.Ş.'nin ve seçilen 30 firmanın hem rekabet yoğunluğu hem de Endüstri 4.0 ilkelerine hâkim olduğunu net bir şekilde ortaya koymaktadır.

Odak grup çalışması tek seferde, Covid-19 pandemisi nedeniyle online olarak gerçekleştirilmiştir. Odak grup çalışmasının moderatörlüğü çalışma yazarları tarafından yürütülmüştür. Odak grup çalışması süresince katılımcıların her bir soruya cevap verebilmesi için 5'er dakika süre tanınmıştır. Odak grup çalışması kapsamında sorulan sorular ve kaynakları Tablo 3'de sunulmuştur.

Tablo 3: Odak Grup Çalışma Soruları

#	ÇALIŞMA SORULARI	KAYNAK
1	Üretim sektörünün mevcut durumu ve yaşanan yüksek rekabet yoğunluğu göz önüne alındığında Dijital Dönüşüm/Endüstri 4.0 uygulamaları bir çözüm müdür? Dijital Dönüşüm/Endüstri 4.0 için atılması gereken adımlar sizce nelerdir?	(Çakmak, 2018)
2	Endüstri 4.0 ya da Dijital dönüşümün gerçekleşmesiyle birlikte sanayinizi/firmanızı ne gibi riskler beklemektedir?	(Kamber ve Bolatan, 2019)
3	Sizce Endüstri 4.0 sürecinin başarılı bir şekilde uygulanmasında önemli olan adımlar, süreçler ya da gereksinimler neler olabilir? Hükümet tarafından dijital dönüşüme ne gibi destekler sağlanmalıdır?	(Çakmak, 2018) (Metin, 2019)
4	Dijital gelişimi yavaşlatan unsurlar neler olabilir? (Strateji eksikliği, veri güvenliği, yol haritasının olmaması, yetkinlik sorunu vb.)	(TÜSİAD,2017)
5	Dijitalleşme ile birlikte ülkemizde en çok neler değişecek? Bu değişimler rakipler arasındaki rekabet belirsizliğini ne şekilde etkileyecektir?	(Çakmak, 2018)

4. BULGULAR

4.1. Meta Analiz Bulguları

Çalışma kapsamında 2015 - 2021 yılları arasında SSCI endeksli dergilerde yayınlanan ve rekabet yoğunluğu (Competitive Intensity) değişkenini ana araştırma odağı olarak belirlemiş 3 adet çalışma meta analizi yöntemi ile incelenmiştir. Veri tabanlarında yapılan ön inceleme ve sonrasında gerçekleştirilen meta analizi yöntemi sırasında elde edilen ilk bulgu, şüphesiz ki,

rekabet yoğunluğu özelinde çok az çalışma yapılmış olmasıdır. Aynı filtreleme sistemi ile *Pazar Türbülansı* araştırıldığında 22, *Teknolojik Türbülans* anahtar kelimesi araştırıldığında ise 15 adet çalışma ortaya çıkmaktayken bu rakamlar *Rekabet Yoğunluğu* için 3 seviyesinde kalmıştır.

Elde edilen ve araştırmaya dahil edilen 3 çalışma Tayvan, Polonya ve Çin verileri ile incelenmiştir. Gelişmekte olan ülkelerde rekabet yoğunluğu konusunun dikkat çekmesi şaşırtıcı değildir. Ancak gelişmiş ülkelerde bu konuya yeterince eğilmediği de bir gerçektir.

İncelemeler neticesinde yüksek rekabet yoğunluğunun yüksek risk anlamı taşıdığı ve çoğunlukla firmaların bu riski göze alamadığı tespit edilmiştir. Bu durum da aslında şaşırtıcı değildir. Zira rakipler arasındaki rekabetin ve pazar dinamiklerinin yüksek belirsiz olduğu koşullarda firmalar ne yapacaklarını bilemeyeceği için sabit durmayı tercih edecektir. Nitekim Lo ve Shiah (2016) çalışmasında yüksek rekabet altında kalan firmaların, rakiplerin rekabet hamlelerini tahmin edemediği için yeni stratejileri çok riskli bulduğunu ifade etmiştir. Bu nedenle de genelde firmalar kendi içlerinde ve kendi dinamiklerine uygun sürdürülebilir yapılar kurmaya odaklanacaktır. Lo ve Shiah (2016) çalışmasında, bu tür koşullar altında yeşil uygulamaların firma başarısına ve performansına önemli katkılar sağlayacağını ifade etmiştir.

Çevresel türbülans ya da belirsizlik odaklı çalışmalarda firmaların, belirsizlik durumlarında atması gereken ilk ve öncelikli adımın inovasyon olduğu görülmektedir. Literatürdeki genel kanı, türbülans şartlarında firmanın inovasyon performansının artacağı yönündedir (Sung ve Choi, 2019; Wang vd., 2015b; Taheri vd., 2019; Taherparvar vd, 2014). Ancak Brodzicki (2019) çalışmasında rekabet yoğunluğu ile inovasyon arasında "ters u" şeklinde bir ilişki olduğunu tespit etmiştir. Yani rekabet yoğunluğu, belli bir belirsizlik seviyesine kadar firmalar için önemli avantajlar sağlarken bir seviyeden sonra avantaj dezavantaja dönmektedir. Nitekim bu bulgu Anghion vd. (2005) ve Crowley ve Jordan (2017) çalışmasıyla da uyumludur. Bu durumun ortaya çıkmasındaki temel neden ise yüksek belirsizliğin beraberinde getirdiği öngörülemezlik ve tahmin edilemezlik unsurudur. Firmalar belli bir rekabet yoğunluğu sonrasında artık ne yapacaklarını bilemedikleri için yürütülen inovatif çalışmaların müşteri beklentilerine uygun olup olmadığı, kabul görüp görmeyeceği, rakiplerin karşı hamlelerini karşılayıp karşılamayacağına ya da aynı anda birden fazla yürütülen inovatif çalışmalardan kaynaklı yüksek girdi maliyeti nedeniyle satış fiyatlarının çok yüksek olması gibi durumlar yaşayacaktır. Kısaca yüksek rekabet yoğunluğu seviyesi arttıkça firmanın büyüme oranı da etkilenmektedir (Brodzicki, 2019).

Rekabet yoğunluğunun seviyesinden etkilenmediği tespit edilen ilk ilişki *Girişimcilik-İnovasyon* arasındaki ilişkidir. Chen vd. (2015) çalışmasında rekabet yoğunluğunun seviyesine bağlı kalmaksızın bu ilişkinin sabit kaldığını ve değişmediğini ifade etmiştir. Bu çalışmanın ortaya koyduğu bir diğer parametre ise *Bilgi Teknolojileri – Girişimcilik* ilişkisine rekabet yoğunluğunun tam aracılık etkisi gösterdiğidir. Elde edilen sonuçlara göre rekabet yoğunluğunun yaşandığı sektörlerde girişimcilik yönelimlerinin desteklenmesinde bilgi teknolojileri altyapısı önemli bir parametredir. Kısacası yoğun bir rekabet ortamı girişimcilik faaliyetlerini teşvik edebilir, ancak aynı zamanda firmaların girişimcilik ve inovasyondan fayda sağlama olasılığını da azaltabilir.

Tüm bu sonuçlar bir arada değerlendirildiğinde yüksek rekabet yoğunluğu yaşanan sektörlerde inovasyon ve girişim odaklı uygulamaların başarı sağlayacağı, bu başarıların ise güçlü BT altyapıları ile daha da geliştirileceği ifade edilebilir.

4.2. Odak Grup Çalışma Bulguları

Odak grup çalışması kapsamında, meta analizi sonucunda elde edilen bulgular ile Endüstri 4.0 süreci için önem arz eden kritik başarı faktörlerinin uyumluluğu ve yüksek rekabet yoğunluğu durumunda atılması gereken adımların belirlenebilmesi hedeflenmiştir. Bu anlamda katılımcılara öncelikle **"Üretim sektörünün mevcut durumu ve yaşanan yüksek rekabet yoğunluğu göz önüne alındığında Dijital Dönüşüm/Endüstri 4.0 uygulamaları bir çözüm müdür? Dijital Dönüşüm/Endüstri 4.0 için atılması gereken adımlar sizce nelerdir?"** sorusu yöneltilmiştir. Katılımcılar yüksek belirsizlik ve rakipler arasındaki yüksek rekabet farklılıklarının firmaları çok fazla zorladığını ve bu nedenle belirsizliği giderici adımlara yönelik her firmanın farklı çözümler ürettiğini ifade etmiştir. Bu çözümlerin daha somut ve yaşanan sorunları giderici şekilde hayat bulması için ise katılımcılar dijital dönüşüm kültürünün kurumlar bazında incelenerek yaygınlaştırılması ve strateji geliştirilmesi gerektiğini ifade etmişlerdir. Her firmanın motivasyonları, bulundukları sektörler ve teknoloji düzeyleri bazında farklılık gösterdiklerini ve bu nedenle bu farklılar göz önünde bulundurularak stratejilerin geliştirilmesi gerektiği önerilmiştir. Bu yaklaşımın gerek devlet düzeyinde gerek işletme tarafından da benimsenmesi ve uygulanması gerektiği belirtilerek; işletme karar süreçlerine çalışanların da katılmalarının süreçte karşılaşılan en önemli sorun olan "direnç" faktörünü de ortadan kaldıracağı düşünülmektedir.

Katılımcılara yöneltilen **"Endüstri 4.0 ya da Dijital Dönüşümün gerçekleşmesiyle birlikte sanayinizi/firmanızı ne gibi riskler beklemektedir?"** sorusuna verilen ortak cevap öncelikli olarak Siber Güvenlik olmuştur. Dönüşüm süreci ve dijitalleşmeyle birlikte veri kaybı ve siber

güvenlik sorunlarının işletmeler açısından büyük risk oluşturduğu ifade edilmiştir. Öyle ki güvenlik ihlalinin işletme faaliyetlerini durduracak kadar ileri bir boyuta gelebileceği ve bu nedenle riski minimum seviyede tutacak güvenlik tedbirlerinin alınması gerektiği çalışmada vurgulanmıştır. 3 ve 7 numaralı katılımcılar, siber saldırılarla birlikte üretimlerin durduğunu, saldırı sonrası veri depolamaktan kaçındıklarını belirtmişlerdir. Bunun önüne geçmek için de tüm katılıcımlar, veri tarafında çalışan personellerin belirli bir bilinç düzeyinde, yeterli bilgi ve yetkinliğe sahip olması gerektiğini ve bilgi teknolojileri altyapısının güçlü olması gerektiğini vurgulamışlardır. Endüstri 4.0'ın tedarik sürecinden son kullanıcıya ulaştırılmasına değin geçen bir süreç olduğu dolayısıyla sürecin etkin işleyebilmesi ve anlık iletişime açık olması için gelişmiş teknolojilerin kullanılması ve altyapının güçlü olması gerektiği belirtilmektedir.

Katılımcılara yöneltilen **"Sizce Endüstri 4.0 sürecinin başarılı bir şekilde uygulanmasında önemli olan adımlar, süreçler ya da gereksinimler neler olabilir? Hükümet tarafından dijital dönüşüme ne gibi destekler sağlanmalıdır?"** sorusuna katılımcılar genellikle işletme yöneticileri ile çalışanların bir araya gelerek bir karar mekanizması oluşturma kültürünün yaygınlaşması gerekliliği ifade etmiştir. Bu noktada yol gösterici konumda devletin olması gerektiği vurgulanmıştır. Teknolojinin yönünün belirlenmesi, teşvik mekanizmalarıyla dijital dönüşüm ve değişen teknolojiye ayak uyduran nitelikli girişimlerin desteklenmesi ve sayısı ve niteliğinin artırılmasına yönelik çalışmalar yapılması gerektiği belirtilmiştir. Atılacak bu adımlar ile piyasada yaşanan belirsizliğin nispeten azaltılacağı, yol haritalarının netleşmesiyle birlikte de girişimcilik odaklı çalışmaların hızlanacağı ifade edilmiştir.

Oturuma katılan üyelere yöneltilen **"Dijital gelişimi yavaşlatan unsurlar neler olabilir?"** sorusuna katılımcılar gerek kendi firmalarından gerekse de dijitalleşme sürecinde çözüm sağladıkları firmalardaki değişimi gözlemleyerek cevap vermişlerdir. Firmaların artık veri üretmeye ve verileri değerlendirmeye başladıklarını belirtmişlerdir. Dijital dönüşümün en fırsat noktasının da verilerin değerlendirmeye başlanması ile olduğunu da ayrıca eklemişlerdir. Üretimde verimliliğin artmaya başladığını ve teknoloji firmalarında istihdamın arttığını dolayısıyla nitelikli personel sayısının da artış gösterdiğini gözlemlemişlerdir. Ancak globalleşmenin bu denli hızlı olmasının özellikle imalat sektöründe belirsizlik yarattığını ifade etmişlerdir. Hızla değişen teknolojinin ve artan rekabet seviyesinin karar mekanizmalarında da belirsizlik yarattığını ve firmaların hareket edebilirliğini azalttığını belirtmişlerdir. Daha hızlı ve efektif dönüşüm için; sektörlerdeki ana amiral gemilerinin akademiyi de içerisine alarak globalde farklı habitatlar yaratmasının dönüşüm sürecinde ve rekabet edilebilirliğin artırılmasında önemli olduğu tüm katılımcılar tarafından dile getirilmiştir.

Katılımcılara yöneltilen ve odak grup çalışmasının son sorusu olan **"Dijitalleşme ile birlikte ülkemizde en çok neler değişecek? Bu değişimler rakipler arasındaki rekabet belirsizliğini ne şekilde ve ne ölçüde etkileyecektir?"** sorusuna katılımcılar hibe ve destek mekanizmaları ile firmaların, müşteri istek ve ihtiyaçlarını Ar-Ge odaklı faaliyetler ile sunabildiklerini ifade etmiştir. Bu destekler sayesinde müşteri ile çözüm ortağı arasında pull-push etkisinin yaratılması ise daha başarılı iş fırsatlarını gün yüzüne çıkartmaktadır. Katılımcılar, bu tarz desteklerin sanayi-sanayi iş birliğini güçlendirdiğini ve Ar-Ge/inovasyon çıktılarının ticarileşme potansiyelini artırdığını ifade etmişlerdir. Girişimcilik faaliyetlerindeki artışın dijital dönüşümde ihtiyaç duyulan pazar fırsatlarını yakalayabilmede önemli bir etken olduğu da ayrıca vurgulanmıştır.

Gerçekleştirilen odak grup çalışması neticesinde, üretim süreçlerinde yaşanan gelişmeler ve teknoloji hızına bakıldığında rekabet ortamında geride kalmak istemeyen ülkelerin Endüstri 4.0 uyum sağlamaları gerekliliği vurgulanmıştır. Endüstri 4.0'ın başarılı bir şekilde uygulanabilmesi için öncelikle güçlü bir BT altyapısına sahip olunması gerekliliği vurgulanmış ve teknoloji ve inovasyonun yönünün devlet otoritesince belirlenerek firmaların yaşadığı belirsizlik probleminin önüne geçilmesi gerekliliği ifade edilmiştir. Belirsizliği en aza indirerek Ar-Ge ve inovasyon temelli yeni girişimlerin doğmasına zemin hazırlamanın önemli olduğu anlaşılmaktadır. Atılacak bu adımlar sayesinde firmaların yaşadığı rekabet belirsizlikleri azalabilecek ve daha girişim odaklı çalışmalar yürütülebilecektir.

5. TARTIŞMA VE SONUÇ

Ülkemiz sahip olduğu jeopolitik konum gereği; üretim merkezlerine, hammadde kaynaklarına, ucuz iş ve kaliteli iş gücü ile Avrupa, Asya ve Afrika gibi önemli ticaret merkezlerine komşu durumdadır. Transit taşımacılığa uygunluğuna ek olarak ülkemizin kara-hava-deniz taşımacılık sektörlerinin de merkezi bir konumda sahip olması ülkemizi tam anlamıyla bir cazibe merkezi yapmaktadır. Bu gücümüzü tam olarak kullanabilmek ve ürünlerimizi hem ulusal hem de uluslararası arenada markalaştırabilmek için stratejik planların eksiksiz şekilde uygulanması gerekmektedir. Ancak tüm dünyada olduğu gibi ülkemizde çevresel belirsizlikler karşısında zaman zaman avantajlı konumumuzu kaybetmekte, verimliliğimiz düşmektedir. Küresel anlamda sarsılmaz ve sürdürülebilir başarılı bir çalışma dinamiğinin kurgulanabilmesi için fiziki gereklilikler kadar firmaları belirsizliğe sürükleyen unsurlarında en az seviyeye indirilmesi gerekmektedir.

Çevresel türbülansın alt başlıklarından biri olan Rekabet Yoğunluğu değişkeni temelde, firmaların pazar içerisindeki rekabetin derecesini ifade etmektedir (Jaworski ve Kohli, 1993). Yüksek rekabet yoğunluğuna sahip olan sektörlerde yaşanan yüksek risk firmaları, rakibinin bir sonraki adımını tahmin edememeye sevk etmektedir. Bu tür koşullar altında varlıklarını devam ettirmeye çalışan firmalar ise orta-uzun vade de ekonomik sürdürülebilirliklerini kaybetmekte ve varlıkları son bulmaktadır. Yoğun rekabet ve yüksek belirsizlik koşullarında firmaların atması gereken adımlar ile Endüstri 4.0 uygulamalarının nasıl etkiler yaratabileceğini araştırmak üzere bu çalışma yürütülmüştür. Çalışma kapsamında öncelikle 2015-2022 yılları arasında SSCI endeksli dergilerde Rekabet Yoğunluğu değişkenini ana çalışma konusu olarak almış 3 ampirik çalışma incelenmiş ve rekabet yoğunluğu üzerinde etkisi olan değişkenler meta analizi yöntemi ile tespit edilmiştir. Çalışmanın ikinci bölümünde ise Endüstri 4.0 uygulamalarında kritik öneme sahip adımlar belirlenmiş ve meta analizi ile tespit edilen değişkenler birlikte değerlendirilerek rekabet yoğunluğu durumlarında Endüstri 4.0 uygulamalarının olası etkilerini anlamak üzere odak grup çalışması yürütülmüştür.

Rekabet yoğunluğu özelinde yapılan çalışmaların meta analizi yöntemi ile incelenmesi sonucunda araştırmacılar, firmaların girişimci odaklı, inovatif, aşırı yüksek risk olmamak kaydı ile risk alabilir ve güçlü BT altyapısına sahip olunmasını önermiştir. Bu sonuçlar, günümüz sanayi türü olan Endüstri 4.0 uygulamalarını hayata geçirmekte kaçınılmaz bırakmaktadır.

Endüstri 4.0 temelde akıllı fabrikaların ortaya çıkmasına neden olmaktadır (Schwab, 2017). Akıllı fabrikalar ise siber fiziksel sistemler, yani insan faktörleri olmadan internet ortamındaki makinelerin birbirleri ile iletişim sağlaması, sayesinde makineler, depolama sistemleri ve üretim tesislerinin birbirleriyle iletişime geçmesi ve birbirini kontrol edebilmesini sağlamaktadır (Ocak ve Gök, 2022; Kagermann vd., 2013). Yani gerçek zamandan alınan anlık büyük veriler toplanıp, analiz edilmektedir. Analiz edilen veriler makinelerin kendi aralarında haberleşmesine olanak sağlamakta ve bu sayede optimal verim-üretim dengesi kurulmaktadır (Lee vd., 2015). Tedarikçiden başlayıp müşteri geri bilgilendirmesi ile devam eden veri akışı sayesinde firmalar müşteri istek, beklenti, arzu ve değişimleri yakından takip edebilmekte ve pazara yön verebilmektedir.

Endüstri 4.0 uygulamaları sonucunda pazar dinamikleri yakından takip edilebileceği ve elde edilen bilgilerin birer veriye çevrilebilmesi sayesinde firmalar girdi maliyetleri azaltabilecektir. Girdi maliyetleri azalan firmalar ise bu maliyetleri Ar-Ge ve inovatif çalışmalara yönlendirmeleri halinde daha başarılı olabilecek ve kendi kendisini besleyen bir başarı döngüsüne sahip olabilecektir. Bu süreçlerin başarıyla yürütülmesi, Endüstri 4.0

uygulamalarının yüksek rekabet yoğun koşullarında başarılarının daim olabilmesi için ise dikkat edilmesi gereken hususlar olduğu, çalışma kapsamında yapılan odak grup çalışması ile tespit edilmiştir.

GOSB Teknopark A.Ş. bünyesinde yer alan ve Endüstri 4.0/Dijital Dönüşüm süreçlerinde firmalara çözüm ortaklığı sunan 30 firmanın yöneticisi ile yapılan odak grup çalışması sonucunda öncelikle hem rekabet yoğunluğu hem de Endüstri 4.0'ın beraberinde getirdiği güvenlik, yönetim ve teknik alanlardaki belirsizliklerin giderilebilmesi için üniversite-sanayi iş birliklerinin en üst seviyede tutulması gerektiği ifade edilmiştir. Zira Endüstri 4.0, diğer endüstri süreçlerinin aksine teknolojiyi temele alan, insan emeğinin en alt seviyeye çeken uygulamalardır. Bu nedenle sağladığı avantajlara ek olarak pek çok da belirsizliği ve yüksek güvenliği beraberinde getirmektedir. Dolayısıyla Endüstri 4.0'a geçişle beraber pazar belirsizliği çözülmekte ancak bu seferde Endüstri 4.0'ın beraberinde getirdiği teknolojik ve güvenlik riskleri ortaya çıkmaktadır.

Odak grup çalışmasında değinilen ikinci konu ise devlet desteklerinin genelden daha ziyade özelleştirilmesi ve teknolojik desteklere ek olarak kurum kültürünün geliştirilmesi, süreç yol haritalarının hazırlanması, kalite sistemlerinin geliştirilmesi gibi pazar odaklı desteklerin özelleştirilmesi gerekliliği ortaya çıkmıştır. Bu anlamda yaşanacak gelişmeler sayesinde firmalar daha girişim odaklı olabilecek ve yeni pazarlara erişmede daha önemli adımlar atabilecektir.

Her çalışmada olduğu gibi bu çalışmanın da bazı kısıtları bulunmaktadır. Bu kısıtlardan ilki ise rekabet yoğunluğu özelinde yapılan çalışmaların azlığı gelmektedir. Pazar türbülansı ve teknolojik türbülans başta olmak üzere çevresel türbülans değişkeni üzerinden pek çok çalışma yapılmış olsa da rekabet yoğunluğunu ana odak noktasın almış sadece 3 çalışma olduğu görülmüştür. Bu anlamda araştırmacıların daha çok yüksek rekabet yoğunluğu özelinde atılacak adımların neler olabileceğine yönelik çalışmalar yapması önerilmektedir.

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SUSTAINABILTY AND PUBLIC RELATIONS PRACTICES

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ÖZET
As awareness of sustainability increases at the social level; investors, customers and governments are raising expectations from businesses in this regard. Corporate Sustainability is the product of a social responsibility approach that combines the environmental, economic and social obligations of the institution with production, sales and marketing strategies. We also see the importance of this concept especially in Public Relations applications. Public relations is a management function that regulates the communication of an institution with all internal and external target groups, and public relations is at an extremely important point in issues such as explaining the sustainability approach to the management and employees of the institution properly, ensuring volunteerism and auditing the compliance of sustainability reports with international standards. Based on this approach, sustainability communication efforts used to establish, implement and ensure the continuity of corporate sustainability activities constitute the focus of the study. Considering the view that theoretical and practical approaches are the two main elements that complement each other in the production of scientific knowledge, the theoretical framework of sustainability communication will be discussed first, and the Public Relations practices that can be used at this point will be drawn attention and a study will be put forward in this direction. In the study, the concept of Sustainability and the importance of public relations practices in this direction will be emphasized.

Keywords: Sustainability, Public Relations, Social Responsibility

ENTRY

Today, every organization has to carry out new projects for corporate development as well as doing their daily work efficiently in order to move forward. Therefore, it is a matter of determining the status of the plans in practice, seeing the performance and moving on to the next solutions accordingly. In such an environment, it is necessary to create a working environment open to innovations in order to adopt sustainable public relations strategies and to make the plans made in this regard feasible. The results obtained from sustainable public relations activities should be checked continuously and regularly and the data provided to the enterprise with feedback should be accumulated and evaluated in databases.

Sustainable public relations, like marketing, is the use of social media as a positive message channel by acting in line with the strategies of businesses to include social media in integrated marketing communication, which enables them to communicate easily with consumers, to determine strategies for their long-term goals as well as their short-term goals

Sustainability and Corporate Sustainability

The concept of sustainability is undoubtedly one of the most frequently used concepts of the 21st century. The concept of sustainability is a participatory process that ensures the prudent use of all social, cultural, scientific, natural and human resources of society and creates a social view on the basis of respect for it (Gladwin et al. 1995: 877).

The concept of sustainability was first proposed in 1987 as a solution against the human ambition to consume that will bring the end of the world, and over time, it has taken its place in corporate governance processes as an approach that institutions should internalize. This strategy, called corporate sustainability, needs social cooperation both to meet common social expectations and to ensure its own continuity. The only element of ensuring social cooperation is sustainability communication practices that are integrated into corporate sustainability strategies.

In order to meet these expectations, it is observed that since 1989, an increasing number of public enterprises in the world have started to report their policies and impacts on the environment, society and sustainability (Kolk, 2004: 51-64), except for the financial reports they publish periodically.

Wilson, on the other hand, defines corporate sustainability as a new and evolving corporate governance paradigm. Noting that corporate sustainability is important for the growth and profitability of the company, Wilson also states that it has been demonstrated that the company should pursue goals related to sustainable development, such as environmental protection, economic development, social rights and justice. Studies on the subject reveal that the concept

of corporate sustainability benefits from 4 more established and widespread concepts; sustainable development, corporate social responsibility, stakeholder theory and corporate accountability theory (Wilson 2003: 1).

What makes institutions and organizations valuable and makes them different is no longer only the quality of the goods they produce or the service offered, but also the value they add to society. Success in terms of institutions and organizations is possible by fulfilling their duties, duties and responsibilities towards the society they are in, protecting the interests of employees, society and their institutions and establishing a healthy balance between them.

The contributions of sustainability to businesses are:

• Rising brand value,
• Increased corporate reputation,
• Savings in operating expenses in the medium and long term,
• Attracting qualified labor force,
• New business opportunities,
• Easy access to investors and creditors,
• Innovative product and service development,
• Increased operational life.

Public Relations

Public relations in terms of businesses; It is the whole of planned and continuous studies carried out to ensure mutual communication, understanding and cooperation between the enterprise and its environment (customers, potential customers, employees, dealers, suppliers, investors, professional chambers, non-governmental organizations, financial institutions, relevant public institutions, etc.). Today, businesses continue their activities in a dynamic environment. Different characteristics of enterprises are important for different masses that make up their environment and these features need to be communicated with appropriate communication tools and correct expressions

Public relations is a continuous and organized management function that a business, institution or organization performs in order to obtain and maintain the understanding, sympathy and support of those with whom it has established or may establish contacts. At its basis lie the concepts of persuasion and perception.

The public relations activities of a business can be listed as follows:

• To explain the business and its products by producing messages in the form of news,
• To create the corporate identity of the enterprise,
• As a result of studies aimed at adoption and opinion formation in the eyes of consumers

to increase the competitiveness of the enterprise by ensuring the branding of products,

• To create a positive perception towards the business on the target groups through activities such as corporate social responsibility campaigns, event management, sponsorship,

• Employees are interested in the current situation of the enterprise, plans for the future, etc. inform

• To carry out activities to increase the motivation of dealers,

• To constantly inform the shareholders about the activities of the enterprise,

• To establish and maintain relations with all public institutions related to the business of the enterprise,

• To ensure communication with local administrations and relevant professional chambers,

• To be prepared for possible crises or to minimize the negative effects of the crisis period.

Public Relations and Sustainability

In order for a company to cope with the competitive conditions in terms of sustainability approach, it must have one or more features that are not present in its competitors in the market, in other words, it must make a difference. Although the cost and price differences in similar products are considered as the main differences that companies can create, the quality of products or services, innovation and customer orientation can also make companies stand out from their competitors. In order to reveal these differences, companies have to create, implement and integrate hundreds of activities from the design of the product or products to the delivery to the customer. Most of these activities are carried out with marketing and public relations units/departments.

Especially in the light of environmental changes that may threaten the existence of human beings on earth, it will not be possible for enterprises to achieve long-term success, compete and even continue their activities by displaying an insensitive attitude in their activities.

The fact that the person who will manage the sustainability approach in an organization has mastered the processes within the discipline of public relations and can communicate correctly with various target groups will facilitate the achievement of the sustainability goals of the institution.

In their study, Signitzer and Prexl developed four concepts that Wilson addresses in the foundations of corporate sustainability, introducing corporate sustainability as an umbrella term for corporate social responsibility, corporate citizenship, corporate social performance, corporate accountability/triple profit stream, corporate governance, stakeholder approach, and corporate communication (Signitzer and Prexl 2008: 2-3).

At the corporate level, implementing sustainability requires networking of several other corporate systems, such as legal, research and development, quality management, human resources and communications management, and long-term success (Signitzer and Prexl, 2007, p.5)

International companies implement their corporate sustainability strategies in the environmental, social and economic sphere. While these companies carry out their social responsibility activities by producing solutions and responding to needs and expectations, they also align their corporate sustainability goals with these studies. They strengthen their sustainability visions with social responsibility projects (Engin and Aköz, 2013, p.93).

The structure of communication in sustainability is transparent, open and dialogue-based, and as a common discourse, it is based on social learning and citizenship (Petts, 2000, p.272)

Sustainability is one of the foundations of survival, which is also a prerequisite for profitability. This process needs to be a careful planning phase. Public relations departments/departments are also affected by the various data collected, making processes are becoming increasingly difficult. The vision and long-term goals shared by the top management should then be transformed into shorter-term, measurable and achievable goals by departments such as public relations, and the full potential of the company should be used to achieve these goals. Issues such as the success of the campaigns, the promotion of the product to make a sound, the adoption of the advertisements by the target audience depend on the decisions to be made by the public relations unit / department as well as the conditions of the society and the trends of the day. Two companies producing similar products can organize the same type of advertising campaigns to the same target audience; but one company may succeed and another may not. For these reasons, companies need to make their analyzes properly and know the society they are in and their target groups well. It is important for success that the public relations plans developed by the company are as flexible as possible and able to respond to the change of situation.

Corporate Social Responsibility

Social responsibility refers to the fact that an enterprise pursues a working strategy and policy in accordance with the economic and legal conditions, business ethics, expectations of people and institutions in and around the enterprise, and makes people happy and satisfied (Eren 2000: 99).

In every project and campaign they produce and take part in, institutions have come to think about their stance and reputation in the eyes of society before the basis of profitability. For this reason, it is seen that institutions that act with the awareness of responsibility towards society

take part in corporate social responsibility projects within the framework of sustainability. The World Business Council for Sustainable Development considers corporate social responsibility as "the obligation of businesses to contribute to sustainable economic development by working with employees, their families, the local community and society at large to improve the quality of life" (www.wbcsd.org).

Panapanaan et al. examined the relationship between sustainability and social responsibility from a hierarchical perspective and considered enterprise social responsibility as an intermediate goal while evaluating enterprise sustainability as the ultimate goal (Panapanaan et al. 2003: 146).

It is possible to list the reasons for the competitive advantage of public relations in sustainability communication as follows (Signitzer and Prexil, 2007, p.14-15):

Target Group Analysis and Segmentation: For years, public relations theorists have been interested in developing detailed methods of stakeholder analysis and segmentation.

Education and experience: Public relations practitioners tend to gain competence in communicating complex issues differently to different stakeholders due to their education and experience. It is also likely that they will be able to devote more time to sustainability studies than sustainability managers, whose main function is to effectively lead the organization to more sustainable behavior.

Expertise in in-house communication: Many public relations professionals have expertise in communicating with internal stakeholders, which is one of the key elements of sustainability management.

Consensus in response to conflicts: Public relations is used as a tool to improve mutual understanding between an institution and its target audiences. The idea-oriented concept utilizes (potential) conflict management between companies and stakeholders using dialogue between mutual understanding, trust and equal rights for all participants.

Possibility of accepting public issues: Public relations professionals can contribute to more sustainable behaviour among stakeholders for the fulfilment of social purpose.

In fact, in all their corporate social responsibility activities, institutions produce solutions to an economic, social and environmental problem that is part of sustainable development. In addition, it provides social and cultural benefits. In this context, all of the small or large comprehensive studies actually serve sustainable development. It is seen here that corporate social responsibility is an indispensable part of today's business world and corporate sustainability is a part of a whole.

Considering that corporations can no longer exist by fulfilling only their economic responsibilities, it is clear that corporate social responsibility is an indispensable part of today's business world and corporate sustainability.

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SERVET VERGİSİNİN GSYH İÇİNDEKİ PAYI: TÜRKİYE VE AB ÜYE ÜLKELERİ KARŞILAŞTIRMALI İNCELEMESİ

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ÖZET
Vergi sistemleri içinde gelir ve harcama vergilerinin en genel tanımında ekonomik amaçlar gütmesi beklenmektedir. Fakat servet vergilerinde bu durum finansman sağlamanın yanı sıra hatta daha fazla sosyal hedefleri uygulamaya geçirmeye yöneliktir. Hükümete finansal fonksiyonlarda kazanç elde etmenin yanında, servet vergileri, toplumun ekonomideki düzensizliğini onarma, vergilemede adalet ve eşitliği kurma, servet verimliliğini artırma, gelir ve harcama vergilerinden verim elde etme ve ekonomide verimi gerçekleştirmek özellikleri sıralanabilir. Bu çalışmada servet vergisinin tanımı, türleri, Ülkemize nasıl geldiği ve nasıl uygulandığı hakkında genel bir bilgilendirme yapılmıştır. Vergilemede eşitlik ve adalet kavramları değerlendirilmiş ve AB üye ülkeleri ve Türkiye'de servet vergilerinin GSYH içindeki payı dikkate alınarak bir karşılaştırma yapılmış ve sonuçları kısaca değerlendirilmiştir.

GİRİŞ

Vergi insanlık tarihinden bu yana hükümetlerin uygulamalarını devam ettirebilmeleri açısından oldukça önem atfeden bir konumdadır. Yaşadığımız dönemde verginin, hükümetin gelir gereksinimini (mali fonksiyon) karşılamadan hariç pek çok işlevi vardır. Bu işlevlerden temel ekonomik amaçlara erişmek ve gelir dağılımında adaleti gerçekleştirmek bulunmaktadır. Hükümetler mükellefleri vergilendirirken bazı unsurları dikkate almaları gerekmektedir. Bu unsurların başında mali güç-ödeme gücü- gelmektedir. Mali güce göre vergilendirilmek, ödeme güçlerini göz önünde bulundurmak demektir. Bu ödeme gücünü temsilen ellerinde bulunan servet ve yapılan harcamalar esas alınmaktadır. Hükümetlerin servet, harcama ve gelir üzerinden aldıkları vergiler buradan gelmektedir.

Bu tür mal varlığına dair vergilendirmelerde toplumların, sırf fakirlerin zenginlerden fazla olduğu bir demokrasiye sahip oldukları için ya da eşitsizliğin yüksek olduğu için vergilendirilmemektedir. Yani bu vergilendirme altında başka bir sebep olduğu da akla gelmektedir. İnsanlar devletin zenginlere ayrıcalık tanıdığına inandıklarında toplumlar zenginleri vergilendirir ve bu nedenle zenginlerin diğerlerinden daha fazla vergilendirilmesini talep edilir. Yani bu zenginlerin vergilendirilmesi bu fakir halkın öfkesini bastırmak veya herhangi bir ayaklanmayı önlemek için atılan bir adım olarak görülebilir (Scheve ve Stasavage, 2017: 4). Bu çalışmada servet vergisinin tanımı, türleri, Ülkemize nasıl geldiği ve nasıl uygulandığı hakkında genel bir bilgilendirme yapılmıştır. Vergilemede eşitlik ve adalet kavramları değerlendirilmiş ve AB üye ülkeleri ve Türkiye'de servet vergilerinin GSYH içindeki payı dikkate alınarak bir karşılaştırma yapılmış ve sonuçları kısaca değerlendirilmiştir.

1.SERVET VERGİSİ NASIL GELDİ? VARLIK VERGİSİNDEN İTİBAREN KISA BİR BAKIŞ

1939 İkinci Dünya Savaşı'nın Avrupa'da başlaması ile birlikte yalnızca savaşa katılan ülkeler değil katılmayan ülkeler de dış politikada ekonomik ve siyasi sıkıntılara maruz kalmıştır. Savaş ekonomisi adı altında Türkiye de bütçesinin büyük kısmını savunma giderlerine ayırmak zorunda kalmıştır. Hatta diğer kalemlerden de savunma harcamalarına kesintiler yapılarak güvenliği sağlamada artış hedeflenmiştir (Deringil, 2003: 30 akt. Aksanyar ve Biçer). Ayrıca genç nüfusunun neredeyse hepsi silahaltına alınmıştır. Durum böyle olunca kıtlık ve hızla yükselen fiyatlara çözüm olarak 18 Ocak 1940'da Millî Korunma Kanunu (M.K.K.) TBMM'de görüşülerek 3780 sayılı yasa ile kabul edildi. M.K.K.'nın devlete olağandışı durumlarda geniş yetkiler tanımasıyla ekonominin bu şartlarında- savaş zamanı zenginlerinin vergilendirilerek

haksız kazançların önüne geçilmesi hedeflenmiştir. Varlık Vergisi Kanunu, bu kanuna bağlı olarak 11.11.1942 tarihinde çıkarılmıştır. Burada amaç aşırı kazanç sağlayanları cezalandırmak olup bir defa alınarak on altı ay yürürlükte kalmıştır (Aksanyar ve Biçer, 2008: 379).

Savaşın hararetinde üreticilerin mahsullerini değerinin altında devlete satması da halkı zor duruma sokmuştur. Öyle ki üretim azaldığından toplam talep artarken toplam arz artışa yanıt verememiştir. İşte bu durumda stokçuluk yaparak karaborsa pazarında "savaş zenginleri" adı verilen kişiler ortaya çıkmıştır (Yalçın, 2004: 329).

Devletin bu olağanüstü harcamalarını bütçesi açık vermeden, enflasyona neden olmadan finanse etmesi gerekmekteydi. Bu finansmanın gerçekleşmesinde toplumsal adaletin sağlanması için savaş ekonomisinin koşullarından yara alan değil, faydalanan kesimden yani savaş zenginlerinin servet birikimlerinden sağlanması uygun görülüyordu. Başbakan Saraçoğlu döneminde çıkan Varlık Vergisi, kamuoyu tarafından eleştiriye maruz kalmaması adına, dönem başbakanı tarafından uygulamaya geçilmeden önce basın ile toplantı yapılarak verginin uygulama amaçları açıklanmıştır (Güvenir, 1991: 101).

Varlık Vergisi Kanunu (VVK) tasarısı başbakanlık tarafından 9/11/1942tarihi ve 6/4067 sayı ile TBMM'ne sunulmuştur. Kanunun gerekçesinde ise "Vergi, kazanç ve gelir sahiplerini ve daha ziyade iktisadi şartların darlığından doğan güçlükleri istismar ederek, yüksek kazançlar elde ettikleri halde, kazançları ve kudretleriyle mütenasip bir derecede, iştirak ettirmek maksadını gütmektir" (TBMM, 11.11.1942; Koçak, 1981: 481).

Kanuna eleştiri ise vergi sisteminin eksikliği, yetersizliği, gayrimüslimlerden alınan daha yüksek vergilerin olması, borcunu ödeyemeyenlerin çalışma kamplarına gönderilmesi sebebiyle gelmiştir (Aksanyar ve Biçer, 2008: 387). Varlık Vergisi'nin esasen Müslüman olmayan azınlıktan daha fazla alınması olduğunun düşünülmesi konusunda aşağıdaki tabloya bakmak faydalı olabilir.

Tablo1. Varlık Vergisi Mükelleflerinin İstanbul'da Kökenlerine Göre Dağılımı

Mükellefin Kökeni	**Mükellef**	**%**	**Tahakkuk**	**%**
Müslüman M	4.195	%7	25.600.409	%7
Gayrimüslimler G	54.377	%87	289.656.246	%83
Diğer G-M-E(Ecnebiler)	4.003	%6	34.226.764	%10
TOPLAM	**62.575**	**%100**	**849.483.419**	**%100**

Kaynak: Akar, 1999: 87.

900 bin nüfusu olan o zaman İstanbul'unda Gayrimüslimler toplam Varlık Vergisi mükellefinin % 87'sidir. Bu kesimden verginin % 83'ü tahakkuk ettirilmiştir. Tüm bunların yanı sıra vergiyi ödeyemeyen kesimin mallarının haczedilerek satılması ile Varlık Vergisi'nin kaldırılması konusu gündeme gelmeye başlamıştır. İlk yasal öneri ise 28 Aralık 1943'de Celal Bayar'ın önerisi olmuştur (Aksanyar ve Biçer, 2008: 391). En nihayetinde tam anlamıyla kaldırılması 15 Mart 1944 tarihinde yani yürürlüğe girmesinden on altı ay sonra 4305 sayılı "Varlık Vergisi Bakayasının Terkinine Dair
Kanun" gereğince sadeleştirilmiştir. Söz konusu kanunla alınamayan vergiler daha sonrasında silinmiştir (Yel, 2009: 169).

Varlık vergisi genel olarak, esasında gerekçesi silahlı yansızlık politikasının dayandığı devlet giderlerini, savaştan elde edilen kazançları vergilendirerek karşılamaktı. Karaborsacılık sonucu devlet, aşırı stok yapan ticaret erbabının fazla kazançlarını vergilendirerek, Merkez Bankasına borçların ödenmesi ile dolaşımdaki para hacmini daraltmaktı. Fakat Varlık Vergilerinin adil olmadığı yönünde çok fazla görüş ve durum mevcuttur. Verginin dağıtma vergisi anlayışıyla alınması, bazı kişilerin vergi yükünü hafifletmek için bazılarının vergileri aşırı artma ile sonuçlanmıştır. Ayrıca vergiyi vaktinde ödemeyenler kısa sürede çalışma kamplarına gönderilmiştir (Özyüksel, 1985: 65).

2.SERVET VERGİLERİ VE VERGİ SİSTEMİ İÇİNDEKİ YERİ

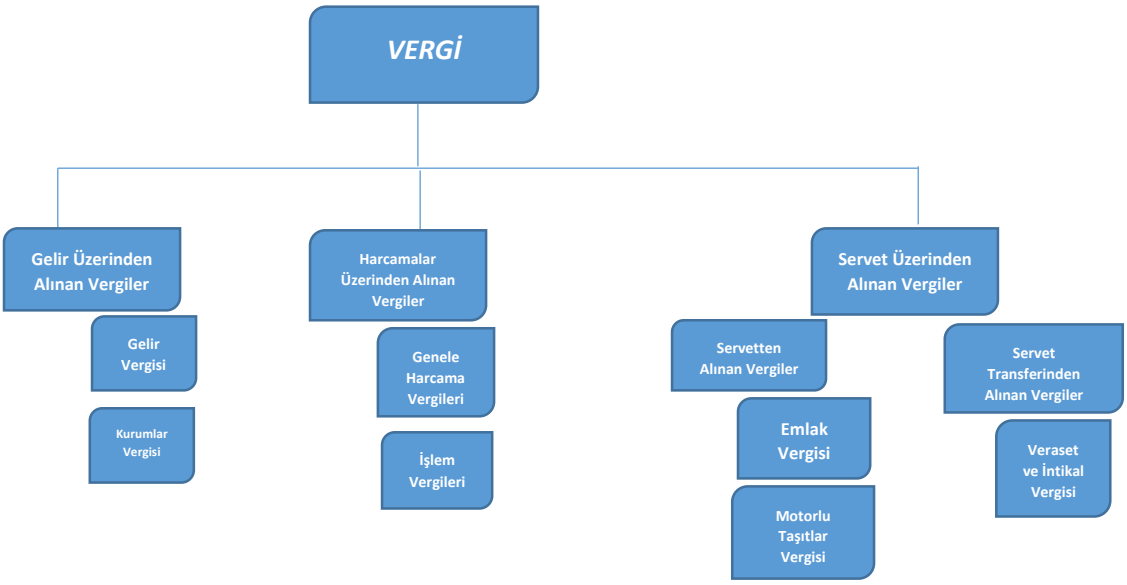
Servet vergisi, vatandaşın servetin tanımına giren her türlü mallar –menkul ve gayrimenkul-, para, alacaklar üstünden hesaplanıp alınan vergilerdir (Turhan, 1998: 170). Servet vergileri yıl içinde tahsil edilir yani yıllıktır. Devletin finansal ihtiyaçları karşılaması amaçlanmasının yanı sıra sosyal adaletin de temin edilmesi amaçlanır. Çünkü adil bir dağılımın gerçekleşmesi sosyal devlet anlayışının temelini oluşturmaktadır (Akdoğan, 2009: 263-264).

Yalnızca günümüzde değil geçmiş yıllarda vergiyi uygulayan ülkelerin vergi sistemleri içinde oldukça önem taşımıştır. Fakat toplam vergi gelirleri içindeki payı düşük kalmaktadır. Modern vergi sistemleri içinde, esas olarak servet vergileri, harcama ve gelir üzerinden alınan vergiler kadar yer tutmamış, popüler olmamıştır (Pehlivan, 2015: 124). Vergi gelirlerinin temelini oluşturan gelir harcamalar ve gelirlerden alınan vergiler hemen hemen her ülke için servet vergilerinin oldukça ilerisindedir (Chatalova ve Evans, 2013: 434-435).

Servet vergileri uygulandığı ülkeye göre değişiklik göstermektedir. Fakat nerede uygulanırsa uygulansın taşınan benzer özellik servet üzerinden alınmasıdır yani mevcut ekonomik durumu değil, çeşitli ekonomik faaliyetlere sahip olma durumuna göre değerlendirme yapılır. Şöyle ki

yaşam standardı yalnızca yıllık gelire bağlı değildir. Bulunan varlıkların değeri de dikkate alınmalıdır(Öz vd., 2014: 87).

Şekil 1. Türk Vergi Sistemini Oluşturan Vergiler



Şekilde vergilerin kaynakları olan gelir, servet ve harcamalar kategorileri verilmiştir (Öz vd., 2014: 90). Vergi ödeme gücünün bir göstergesi olan servete tabi kazanılan vergilerse günümüzde Veraset ve İntikal Vergisi, Motorlu Taşıtlar Vergisi, Emlak Vergisidir. Burada Gelir idaresi verileri incelendiğinde bu üçü arasında en düşük oranın servet vergileri olduğu görülecektir. Fakat her ne kadar aralarında en düşük yüzdeye sahip olsa da vergide adalet sağlama bakımından oldukça büyük öneme sahiptir.

2.1.Veraset ve İntikal Vergisi

Veraset ve intikal vergileri, servet dağılımını iyileştirmenin bir seçeneği de vergi sistemleri içinde ya veraset ile ya da bir kişinin ölümü sonucu başka bir kişiye giden mallar(menkul, gayrimenkul) üzerinden uygulanır. Bu hadise kişiler arası karşılıksızdır (Gönül, 2008: 25). Ülkemizde servet vergileri içerisinde veraset ve intikal vergisinin payı düşüktür. Yıllar içinde ortalama oran %1 - %3 civarındadır. Bu denli az yer kaplasa da bu tür bir verginin alınması ödeme gücü ilkesi ile açıklanmaktadır. Yani kişilerin bedel ödemeden karşılığa sahip olmaları mal varlıklarında yükselişe sebebiyet verecektir. Bu da ödeme gücünü artıracaktır. Bu nedenle devlet bu artıştan doğan karışıklığın vergilendirilmesini isteyecektir (Öncel vd., 2010: 371).

Bu vergi türüne eleştiri ise getirisinin düşük olması, işlem maliyetinin artması gibi sebeplerle, aslında az verim sebebiyle gelmektedir. Her ne kadar haklı olarak görünse de bu durum gelir

ve servet dağılımını düzeltmedeki az sayıdaki gereçlerden bir tanesini yok etmeyi gerektirmemektedir (Kılıçaslan, 2011: 341).

Veraset ve intikal vergisinin dünya üzerindeki faaliyetleri incelendiğinde iki türde işlem gördüğü bilinmektedir. İlk olarak; yaşamını yitiren bir vatandaştan geriye kalan servetin hepsi üzerinden hesaplanmaktadır. Bu vergileme şekline tereke vergisi adı da verilmekte olup, mirasçıların ölen vatandaşla akrabalık dereceleri, kişisel ve ailevi durumları gibi herhangi bir bağı olup olmadığı dikkate alınmamaktadır. Bu sebeple tereke vergisi genel itibariyle tek oranlı ve objektif şekliyle bir servet vergisidir. Diğer türde ise vergi; mirasçılara intikal eden oranlar üzerinden alınmaktadır. Miras oranı vergisinin çoğunlukla subjektif olduğu düşünülebilir. Çünkü tereke vergisinin tersine, mirasa sahip olanın kendi mal varlığı durumu, ölen kişi ile olan yakınlık seviyesi ve miras oranının miktarı gibi etkenler dikkate alınmakta ve artan oranlılık uygulanmaktadır (Turhan,
1998: 184-185). Buna bağlı olarak iki ülke karşılaştırması yapmak yerinde olacaktır.

Tablo 2. Veraset ve İntikal Vergisinde Vergi Tarifesi (2021 Yılı İçin)

Matrah			Verginin Oranı (%)	
			Veraset Yoluyla İntikallerde	İvazsız İntikallerde
İlk	500.000	TL için	1	10
Sonra gelen	1.200.000	TL için	3	15
Sonra gelen	2.500.000	TL için	5	20
Sonra gelen	4.900.000	TL için	7	25
Matrahın	9.100.000	TL'yi aşan bölümü için	10	30

Kaynak: 53 Seri No'lu Veraset ve İntikal Vergisi Kanunu Genel Tebliği, Resmi Gazete No: 31696 (16.05.2022)

Tablo 1'e bakıldığında veraset yoluyla intikallerde matrah dilimlerinden alınacak vergi oranları, %1, %3, %5, %7 ve %10, veraset dışındaki karşılıksız intikallerde %10, %15, %20, %25 ve %30'dur. Nitekim tüm bunların dışında bir vatandaşa anne, baba, eş ve çocuklarından karşılıksız olarak mal intikali olduğunda ise vergi, karşılıksız intikallere ait tarifedeki oranların yarısı uygulanıp alınmaktadır. Bu anlamda iki ülke değerlendirmesi bağlamında Almanya'da Türkiye'deki vergi tarifesine benzer bir tarife bulunmaktadır. Yani, bu vergiye tabi olanlar Almanya'da da çifte artan oranlı bir vergi uygulamasıyla karşılaşmaktadır. Fakat Türkiye'deki durumdan önemli bir farkı bulunmaktadır ki bu da, ölen kişiye yakınlık derecesine bağlı olmasıdır, çifte artan oranlılığın intikalin veraset veya başka yollarla olması ile değil. Aşağıdaki Tablo 3'de Almanya'da uygulanan 2021 yılı veraset ve intikal vergisi tarifesi verilmiştir.

Tablo 3: Almanya'da Veraset ve İntikal Vergisi Tarifesi (2021)

INHERITANCE TAX

TAX BASE, €	CLASS I	CLASS II	CLASS III
Up to €75,000	7%	15%	30%
€75,000 – €300,000	11%	20%	30%
€300,000 - €600,000	15%	25%	30%
€600,000 - €6,000,000	19%	30%	30%
€6,000,000 - €13,000,000	23%	35%	50%
€13,000,000 - €26,000,000	27%	40%	50%
Over €26,000,000	30%	43%	50%

Source: Global Property Guide

Kaynak:http://www.globalpropertyguide.com/Europe/germany/Inheritance (15.05.2022).

Almanya'da devam etmekte olan veraset ve intikal vergisi Türkiye'ye göre daha geniş tutulmuştur. Yani tarifesine bakıldığında intikal eden servet miktarına ilişkin tarife basamakları daha geniş tutulmuştur. Ve ayrıca dilimler arası vergi oranlarının artış seyri de Türkiye'de uygulanan oranların artış seyrinden daha fazladır. Tablo 2 ve tablo
3'e bakıldığında Türkiye'de uygulanan en düşük veraset yoluyla intikal oranı %1, Almanya'da ise bu oranın %7 olarak yer almaktadır. Ve Almanya'da ölen kişi ile mirası elde edenin akrabalık derecesi azaldıkça vergi yükü artmakta ve %50'ye kadar çıkabilmektedir. Türkiye'de ise bu oran %30 ile kaldığı görülmektedir. Matrah dilimlerine bakıldığında Türkiye'de 5 matrah dilimi olduğu Almanya'da ise 7 matrah dilimi olduğu görülmektedir. Tablo 2 ve 3'deki veriler göz önüne alındığında alınan vergi miktarı bakımından Türkiye'nin Almanya'dan daha az vergi aldığı anlaşılmaktadır. Örneğin; ilk dilim için Türkiye (190.000*%1) 1.900 TL vergi alırken Almanya TL cinsinden (€75.000 * 3.02 * %7) 15.855TL vergi alınmaktadır. Yani Almanya ile Türkiye'nin aldıkları vergi miktarı değerlendirildiğinde %8,3 bir fark görülmektedir.

Bütçe içi kurumlarda vergi gelirleri 885.366.906,7 tl olan kalemin veraset ve intikal vergisi 1.298.171,9 TL'sini oluşturmaktadır (muhasebat.hmb.gov.tr).

2.2.Motorlu Taşıtlar Vergisi

Motorlu Taşıtlar Vergisi, servet üzerinden alınan ikinci vergi türüdür. Bu vergi, veraset ve intikal vergisi gibi değil, bu mal varlığına giren motorlu taşıtları yükümlendirmektedir (Öncel ve diğerleri, 2010: 391). Ayrıca sürekli, olağan ve özel servet vergilerinin bir alt kategorisi olarak da yer almaktadır (Kabakçı, 2011: 10). Fakat anayasaya aykırı gelen, çevreye zarar vermesi ile birkaç özellik sebebiyle bu verginin dikkate alınması, tekrar gözden geçirilmesi gerekli görülmektedir. Bunların sonucunda ise hem çevreyi koruyucu kararlar alınnmalı hem de malî güç ilkesi de dikkatlerden kaçırılmamalıdır. Bu bakımdan yalnızca çevrenin veya yalnızca malî gücün göz önünde bulundurulması yeterli olmayacaktır (Öz vd., 2014: 96).

2.3.Emlak Vergisi

Emlak Vergisinin en temel sorunu taşınmazların vergiye esas rayiç bedelinin tanımlanmasıdır. Pek tabidir ki taşınmazın bedeli, şehirden şehre, ilçeden ilçeye, hatta köyden köye dahi farklılık arz etmektedir. Üstelik yine aynı şehrin bazı ilçelerinde, semtlerinde düşerken, bazılarında artmaktadır. Öte yandan taşınmazların vergiye bağlı bedelinin bulunması esnasında bütün binanın tüm unsurları ya da her arsanın konumsal özellikleri dikkate alınmamaktadır. Bu nedenle Türkiye'de güncel mevzuat ışığında vergiye tabi taşınmazla ilgili kıymetlerin belirlenmesinde meydana gelen problemler hem taşınmaza dair vergi ve harçların yetkinliğini düşürmekte hem de vergilemede düzenin bozulmasını etkileyen sonuçlar doğurmaktadır (Hacıköylü ve Heper, 2010: 2).

3.SERVET VERGİLERİNE ADALET VE EŞİTLİK PENCERESİNDEN BAKIŞ

Vergilemede adalet iyi bir vergi sisteminin en temel özelliklerinden birisidir. Adil vergi sistemleri, vergi yükümlülerinin vergide uyum yakalamasını kolaylaştırır ve sosyal düzenin sağlanmasına katkıda bulunur. Adalet kavramının vergi açısından incelendiğinde sadece adalet kelimesi gibi tarafsız ve soyut bir kavramdır. Bu özelliğinden dolayı farklı birey ve toplumlarda farklı şekilde ortaya çıkacaktır. Eşitlik ise adalet kavramına göre daha somuttur. Çünkü vergilemede eşitlik, vergilemede bireylere benzer veya eşit muamele edilmesidir. Adalet, vergilemede eşitlik kavramını da kapsayacak kadar geniştir. Bu anlamda çoğu yerde aynı anlamda kullandığımız bu iki kelime vergilendirme olgusunda aslında birbirinden farklıdır (Güran, 2004: 245).

Bir ülkede şahsi gelirde denkliğin oluşturulması durumunda aşağıdaki menfaatlerin sağlanacağı varsayılır;

- Kişisel gelir dağılımında adalet, sosyal barışı sağlar.
- Kişisel gelir dağılımında adalet, toplam refahı arttırır.

- Kişisel gelir dağılımında adalet, fırsat eşitliğini arttırır.
- Kişisel gelir dağılımında adalet, ekonomik istikrarı sağlamada yardımcı olur (Tayyar, 2011: 6).
-

4.AB ÜYE ÜLKELER VE TÜRKİYE SERVET VERGİLERİ KARŞILAŞTIRMASI

Servet üzerinden alınan vergilerin ülkeye kazanç sağlamaktan ziyade vatandaşlar arasındaki ekonomik adaletsizlikleri onarmak, vergilemede adalet ve eşitliği sağlamak, gelir ve harcama vergilerini tamamlamak gibi fonksiyonları yer almaktadır (Öz vd., 2014: 2). Servet üzerinden alınan vergilerin, vatandaşlar arasında gelir ve servet paylaşımındaki adaletsizliklerin daha fazla büyümesini engelleyecek olması vergi işleyişinin içinde devamlı olarak yer almasının bir nedenini oluşturmaktadır (Ömür ve Gerçek, 2017: 199).

Tablo 4.: AB Üyesi Ülkelerde 2011 – 2020 Yılları Arasında Servet Vergilerinin GSYH İçindeki Payı (%)

Ülkeler	***2011***	***2012***	**2013**	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***
Avusturya	41,1	41,8	42,6	42,7	43,1	41,8	41,9	42,3	42,6	42,1
Belçika	43,5	44,3	45,0	44,8	44,1	43,3	43,9	43,9	42,7	43,1
Çek Cum.	33,0	33,4	33,7	32,9	33,1	34,0	34,4	35,0	34,8	34,4
Danimarka	44,8	45,5	45,9	48,5	46,1	45,5	45,5	44,2	46,6	46,5
Estonya	31,5	31,7	31,7	32,1	33,3	33,5	32,5	33,0	33,5	34,5
Finlandiya	41,8	42,4	43,4	43,5	43,5	43,7	42,9	42,4	42,3	41,9
Fransa	43,3	44,4	45,4	45,4	45,3	45,4	46,1	45,9	44,9	45,4
Almanya	36,1	36,8	37,0	36,8	37,3	37,8	37,7	38,4	38,6	38,3
Yunanistan	34,3	36,3	35,9	36,3	36,6	38,9	39,3	40,0	39,5	38,8
Macaristan	36,4	39,0	38,5	38,4	38,7	39,1	37,9	36,8	36,5	35,7
İrlanda	27,8	28,1	28,7	28,7	23,2	23,6	22,6	22,4	21,9	20,2
İtalya	41,6	43,6	43,8	43,3	43,0	42,2	41,9	41,7	42,4	42,9
Lüksemburg	37,1	38,4	38,2	37,5	36,2	36,3	37,4	39,5	38,9	38,3
Hollanda	35,4	35,6	36,1	37,0	37,0	38,4	38,7	38,8	39,3	39,7
Polonya	31,8	32,2	32,1	32,1	32,4	33,4	34,1	35,1	35,1	36,0
Portekiz	32,2	31,7	34,0	34,2	34,4	34,1	34,1	34,7	34,5	34,8
Slovakya	29,1	28,7	31,0	31,9	32,7	33,2	34,0	34,2	34,6	34,8
Slovenya	37,4	37,7	37,2	37,2	37,3	37,4	37,1	37,3	37,2	36,9
İspanya	31,2	32,4	33,1	33,9	33,8	33,6	33,9	34,7	34,7	36,6
İsveç	42,0	42,1	42,5	42,2	42,6	44,1	44,1	43,8	42,8	42,6
B.Krallık	32,9	32,1	31,9	31,7	31,8	32,4	32,9	32,9	32,7	32,8

Kaynak:stats.oecd.org verileri kullanılarak yazar tarafından oluşturulmuştur.

AB üye devletlerinde servet vergilerine konu olan unsurlar dikkate alındıktan sonra, bu vergilerin ülke ekonomilerine olan katkısını net bir şekilde kavrayabilmek için GSYH ve tüm vergi kazançları arasındaki paylarına dikkat etmek gerekmektedir. Bu durumda AB ülkeleri arasında servet vergileri ile ekonomiye en fazla kazanç getiren devletlerin neler olduğunu daha net anlayabilir ve bu devletlerden Türkiye için çıkarımlar sağlanabilir. Yukardaki Tablo 4'de AB üyesi devletlerde 2011 ve 2020 yıllarında servet vergilerinin GSYH içindeki payı yüzdesel olarak verilmektedir. Tablo 4'deki oranlara göre AB ülkeleri arasındaki servet üzerinden alınan vergilerin GSYH içindeki oranının en yüksek olduğu ülke % 45,91 ortalamasıyla Danimarka'dır. Danimarka'yı sonraki yıllarda % 45,15'in üzerine çıkan Fransa ve Belçika takip etmektedir. Servet vergilerinin GSYH içindeki payının en az olduğu ülkeler ise; % 20,2'e yakın ortalama oranıyla İrlanda izlemektedir.

Tablo 5. Türkiye'de 2011-2020 Yılları Arasında Servet Vergilerinin Gelirlerine Oranı (%)

	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
GSHY'ya Oranı	25,7	24,8	25,2	24,5	25,0	25,1	24,7	24,0	23,1	23,9

Kaynak: stats.oecd.org verileri kullanılarak yazar tarafından oluşturulmuştur.

Servet vergilerinin GSYH içindeki payı incelendiğinde 2011 senesinde % 25,7 oranlarındayken, 2020 senesinde % 23,9 oranlarına çıkmıştır. Bu oranlar Fransa ve Belçika gibi devletlerin epey altında seyretmesine rağmen AB üye devletleri ortalamasın küçük bir oranla gerisinde takip etmektedir.

Tablo 6.: Emlak Vergisi'nin Toplam Vergi Gelirleri İçerisindeki Oranı (%)

Ülkeler	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Fransa	8,4	8,5	8,5	8,6	9,0	9,1	9,2	8,7	8,7	8,8
Danimarka	4,2	3,9	4,0	3,8	4,2	4,0	3,9	4,1	4,3	4,2
Türkiye	4,1	4,2	4,6	4,9	4,9	4,8	4,5	4,3	4,2	4,4

Kaynak: stats.oecd.org verileri kullanılarak yazar tarafından oluşturulmuştur.

Tablo 6'de AB üyesi devletlerde servet vergileri arasında önemli bir yer tutan emlak vergilerinin tüm vergi kazançları arasındaki oranı yer almaktadır. AB ülkeleri arasında en yüksek servet vergisi kazancına sahip devletler içerisinde bulunan Fransa ve Danimarka ile Türkiye'yi kıyas ettiğimizde, emlak üzerinden yıllık toplanan vergilerin tüm vergi kazançları arasındaki oranının bu devletlere göre Danimarka'ya yakın olmakla beraber geride kaldığımızı söyleyebiliriz. Toplam vergi gelirleri içerisinde emlak vergisinin oranı 2020 senesinde Fransa'da % 8,8, Danimarka'da % 4,2 olurken Türkiye'de ise % 4 oranındadır. Sonuç olarak

Avrupa Birliği ülkeleri ile kıyaslandığında Türkiye'de emlak vergisinin tüm vergi kazançları arasındaki oranı AB üye ülkeleri ortalamaları ile yakın seyretmektedir.

SONUÇ

Servet vergilerinin konusu, vergi ödeme gücünün göstergelerinden biri olan servetin kendisidir. Servet vergisi, halkın ekonomik faaliyetlerini değil, ekonomik varlıklara sahip olma durumlarıyla ilgilenir. Servet vergisinin alınması ilk zamanlarda mal ve hizmetlerin üretiminde yaygın olarak kölelerin kullanıldığı, bu insanların birer servet unsuru olarak kabul edildiği ilk çağda köle sahipliği üzerinden vergi alınırken aynı zamanda tarım ve hayvancılığın artması ile hayvan mülkiyetinden de vergi alınmaya başlanmıştır.

Varlık vergisi uygulamaya girdiği yıllarda uygulamaya girmesinin makul derecede kabul edilebilirliği açıktır. Çünkü hem halk hem de devlet savaşın getirdikleri karşısında oldukça zorlanırken savaş fırsatçıları haksız kazanç elde etmenin bir yolunu buluyordu. Bunun önüne geçebilmek amacını barındıran Varlık Vergisi, kısa bir dönem yürürlükte kalmıştır.

Servet vergileri, sosyal işleyişi düzenlemeye için, sonuç olarak vergi kazançlarının arasında servet vergisinin oranı gelir ve harcama vergilerine oranla daha az seviyededir. AB ülkeleri ve Türkiye için de durum böyledir. AB üye devletleri arasında servet vergilerinin tüm vergi gelirleri arasındaki oranı en yüksek olan devletler Danimarka(%46,5), Fransa (%45,4), Belçika (%43,1) iken, Türkiye (%23,9) bu devletlerin altında seyretmektedir.

Genel olarak değerlendirmek gerekirse; servet vergilerinin oranı, Türkiye'de de AB üyesi ülkeler ile kıyaslandığında ortalamanın altında ve ortalamaya yakın seyretmektedir. Fakat bu oranın değişmesi mümkün olabilir. AB üye ülkelerinde emlak vergilerinin payı vergi gelirleri içerinde Türkiye'de olduğundan fazladır. Ülkemizde de bu durum sağlandığında verim yakalanacağı öngörülmektedir. Bu durumda AB ortalaması üzerine çıkılabilir. Sonuçta emlak ülkemizde servetin en önemli göstergelerinden biri olması sebebi ile emek harcanmadan elde edilen getirinin neredeyse hepsinin vergilendirilmesini sağlamak mümkündür.

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TÜRKİYE'DE MANDA YETİŞTİRİCİLİĞİNİN MEVCUT DURUMU VE GELECEĞİ

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ÖZET
Bu çalışmanın amacı Türkiye'de manda yetiştiriciliğinin mevcut durumunu, manda et ve süt üretim verileri ile birlikte ortaya koymaktır. Türkiye'de kırmızı et ve süt üretimi büyük oranda sığırlardan karşılanmaktadır. Türkiye'de 2022 verilerine göre mevcut manda sayısı 182.717 baştır. Mandanın Türkiye'deki mevcut büyükbaş hayvan sayısı içerisindeki payı ise %1,02'dir. Bu oran son iki yıllık veriler dikkate alındığında azalış göstermektedir. Hayvan sayılarında ki azalışın (%1,53) yanı sıra mandanın toplam süt üretimindeki payında (%0,19) ve sağılan hayvan başına ortalama süt üretim miktarında da son yıllarda azalış (%11,12) görülmesine karşın sağılan manda sayısı (%4,55), kesilen hayvan sayısı (%26,86) ve et üretim miktarında (%28,57) ise artış söz konusudur. Bu çalışmada manda yetiştiriciliğinde hayvansal üretime ait Türkiye İstatistik Kurumu, Tarım ve Orman Bakanlığı ve Damızlık Manda Yetiştiricileri Birliği verileri değerlendirilmiş olup, modern yetiştiricilik metotlarının uygulanması ve planlı devlet politikaları ile birlikte manda yetiştiriciliğinin de gelecekte hayvansal üretimde önemli bir paya sahip olacağı düşünülmektedir.

Anahtar Kelimeler: Anadolu mandası, büyükbaş, et, süt, yetiştiricilik

CURRENT SİTUATİON AND FUTURE OF BUFFALO BREEDİNG İN TURKEY

ABSTRACT

The aim of this study is to reveal the current situation of water buffalo breeding in Turkey, together with data on buffalo meat and milk production. Red meat and milk production in Turkey is mostly met from cattle. According to 2022 data, the current number of buffaloes in Turkey is 182,717 heads. The share of water buffalo in the current number of cattle in Turkey is 1.02%. This rate shows a decrease when the data of the last two years are taken into account. In addition to the decrease in the number of animals (1.53%), the share of buffalo in total milk production (0.19%) and the average milk production per milked animal have also decreased (11.12%) in recent years, although the number of milked water buffalo (4.55%), the number of slaughtered animals (26.86%) and the amount of meat production (28.57%) increased. In this study, the data of Turkish Statistical Institute, Ministry of Agriculture and Forestry and Breeder Buffalo Breeders' Association regarding animal production in water buffalo breeding were evaluated, and it is thought that water buffalo breeding will have an important share in animal production in the future with the application of modern breeding methods and planned government policies.

Keywords: Anatolian water buffalo, cattle, meat, milk, breeding

1.GİRİŞ

Manda, dünyanın birçok yerinde özellikle gelişmemiş veya gelişmekte olan ülkelerde ekonomik değeri olan bir türdür. Diğer türlerden ayrı olarak kendilerine has kalitede süt ve süt ürünlerinin olması mandalara ayrı bir değer katmaktadır (Canbolat, 2012).

Mandalar, besleyiciliği düşük ve iyi kalitede olmayan meralardan özellikle sığırlara ve koyunlara göre daha iyi yararlanır. Sığır ve koyunların yararlanamadığı ve hastalıklarla bulaşık meralar, mandalar tarafından tehlikesizce kullanılabilmektedir. Çevreye son derece iyi uyum sağlama ve değişik çevre şartlarına uyma özelliğinde olan manda, su birikintilerini ve çamurda yuvarlanmayı sever (Fisher,1975).

Türkçede "su sığırı" olarak tercüme edilen manda Türkiye'de yetiştiriciliği yapıldığı bölgelere göre Camız, Camış, Donbey, Kömüş ve Gameş gibi farklı isimlerle de bilinmektedir (Sarıözkan, 2011; Turan, 2019). Kuzey Anadolu Bölgesi'nde Samsun, Orta Anadolu da Kayseri, kuzey kıyı kesimlerinde Tokat, Amasya, Marmara Bölgesi'nde İstanbul, Doğu Anadolu Bölgesi'nde Bitlis, Kars, Muş ve Sivas, Güney Doğu Anadolu Bölgesi'nde Diyarbakır ve Ege Bölgesi'nde Afyonkarahisar Türkiye'de manda yetiştiriciliğinin yoğun olarak yapıldığı yerlerdir (Atasever ve Erdem, 2007).

Binlerce yıl et, süt, deri ve çeki gücünden faydalanılan mandalar son yıllarda ülkemizde de oldukça ilgi görmektedirler. Özellikle verilen destek ve teşviklerin yanında tüketicilerin manda sütünden elde edilen ürünlere olan talebinin nispeten artıyor olması ile birlikte ülkemizdeki manda sayısı giderek artmaktadır (Turan,2022).

Ülkemizde son yıllarda özellikle Diyarbakır, Eskişehir gibi illerde yetiştiricilere üniversiteler ve belediyeler aracılığı ile manda sütü ve ürünlerine olan destekler sağlanmıştır. Diyarbakır'da GAP Uluslararası Tarım Araştırma ve Eğitim Merkezi, Tarım Orman İl Müdürlüğü, Yenişehir Halk Eğitim Merkezi, Diyarbakır Damızlık Manda Yetiştiricileri Birliği ve Dicle Üniversitesi Veteriner Fakültesi iş birliğiyle 'Kırsalda Kadınlar Mozzarella Peyniri Üretiyor' projesi hayata geçirilmiştir (URL 1 ve URL 2).

Sağılan manda başına ortalama süt üretim miktarı 887 kg'dır (TUİK, 2019). Manda sütü; protein, yağ ve laktoz oranı bakımından sığır, koyun ve keçilerden yüksek değerlere sahip olduğu bilinmektedir. Yağ oranının yüksek olması özellikle yoğurt, peynir ve tereyağı yapımında daha fazla tercih edilmesini sağlar. Peynir ve yoğurt yapımında daha iyi randıman alınmasının ve lezzetli olmasından dolayı sığır sütünden daha yüksek fiyatlara satılmaktadır. Ülkemizde manda sütünden özellikle lüle kaymağı, Afyon kaymağı, şekerlemeler, sütlü tatlılar, dondurma ve tereyağı gibi ürünler elde edilmektedir (İlaslan ve ark., 1983).

Dünya nüfusunun hızla artması ile et üretimine olan ilgi ve talepte artmıştır. Mandada, bir et üretim kaynağı olarak yetiştirildiği çoğu ülkede gittikçe artan bir öneme sahiptir (Şekerden, 2001). Mandalara ait karkas randımanı sığırlara oranla daha düşüktür (Akdağ, 2004). Mandalardan elde edilen etin kendilerine has yapıları (etin düşük yağ ve kolesterol içermesi) sucuk, salam ve pastırma gibi gıdalara yoğun kıvam ve yüksek lezzet vermektedir. Bununla beraber ülkemizde manda etinin coğrafi işaretli ürün olabilme potansiyeli vardır (Özkan ve ark., 2014).

2. MATERYAL VE YÖNTEM

Bu çalışmada kullanılan veriler; Türkiye İstatistik Kurumu, Tarım ve Orman Bakanlığı ve bu alanda yapılmış çalışmalardan temin edilmiş olup alınan veriler, yıllara göre değerlendirilmiş ve tablolar oluşturularak sunulmuştur. Çalışmada, Türkiye'de manda yetiştiriciliğinin mevcut durumları incelenmiş, manda sayısı, sağılan manda sayısı, manda süt üretim miktarı, kesilen hayvan sayısı ve et üretim miktarlarının yıllara göre değişimi arasındaki ilişkiler yorumlanmıştır.

2.1. Türkiye'de Manda Varlığı

Türkiye'de yetiştirilen mandalar, nehir mandalarının bir alt grubu olan Akdeniz mandalarından köken almakta ve Anadolu mandası olarak adlandırılmaktadır (Soysal ve ark., 2005). Kuzey Anadolu Bölgesi'nde Samsun, Orta Anadolu da Kayseri, kuzey kıyı kesimlerinde Tokat, Amasya, Marmara Bölgesi'nde İstanbul, Doğu Anadolu Bölgesi'nde Bitlis, Kars, Muş ve Sivas, Güney Doğu Anadolu Bölgesi'nde Diyarbakır ve Ege Bölgesi'nde Afyonkarahisar Türkiye'de manda yetiştiriciliğinin yoğun olarak yapıldığı yerlerdir (Atasever ve Erdem, 2007).

Türkiye'de manda varlığı II. Dünya Savaşından 1965 yılına kadar sürekli bir artış göstermiş, 1955 ve 1980 yılları arasında ülkemizdeki manda varlığı 1 milyon başın altına inmemiştir. 1965 ve 1970 yılları arasında 1 257 000 baş manda ile ülkemizdeki en yüksek rakamına ulaşmış ve dünyada 10. sırada kendine yer bulmuştur (Turan,2019).

1991 yılında 366 150 baş olan manda sayısı 2007 yılına kadar sürekli bir azalma göstermiş ve 84 705 başa kadar gerilemiştir. 2007 yılından günümüze bu sayı 182 717 başa yükselmiştir (TUİK,2022).

Türkiye'de 2009 yılında uygulanmaya başlanan 'Halk Elinde Anadolu Mandası Islah Projesi' ile birlikte 2010 yılından itibaren manda sayısında düzenli bir artış görülmektedir. Bu proje ile manda türüne yönelik devlet destekli yatırımlar sağlanmakta, manda sayısı korunmaya çalışılıp, yetiştiricilere bazı teşvikler verilmektedir. Bunlarla beraber yetiştiriciliği yapılan birçok yerde mandaların süt ve döl verimi, malakların doğum ağırlığı, belirli yaşlardaki canlı ağırlıkları gibi

birtakım verim bilgileri kayıt altına alınmaktadır. Ayrıca damızlık değeri yüksek erkek hayvanların tespiti yapılarak, işletmeler arası boğa transferleri ile kan değişimi sağlanarak sürüdeki kan yakınlığından, akrabalı yetiştiriciliğinin önüne geçilmesi hedeflenmektedir. (Turan,2022).

Çizelge 1. Türkiye iller bazında manda varlığı (Tuik, 2022)

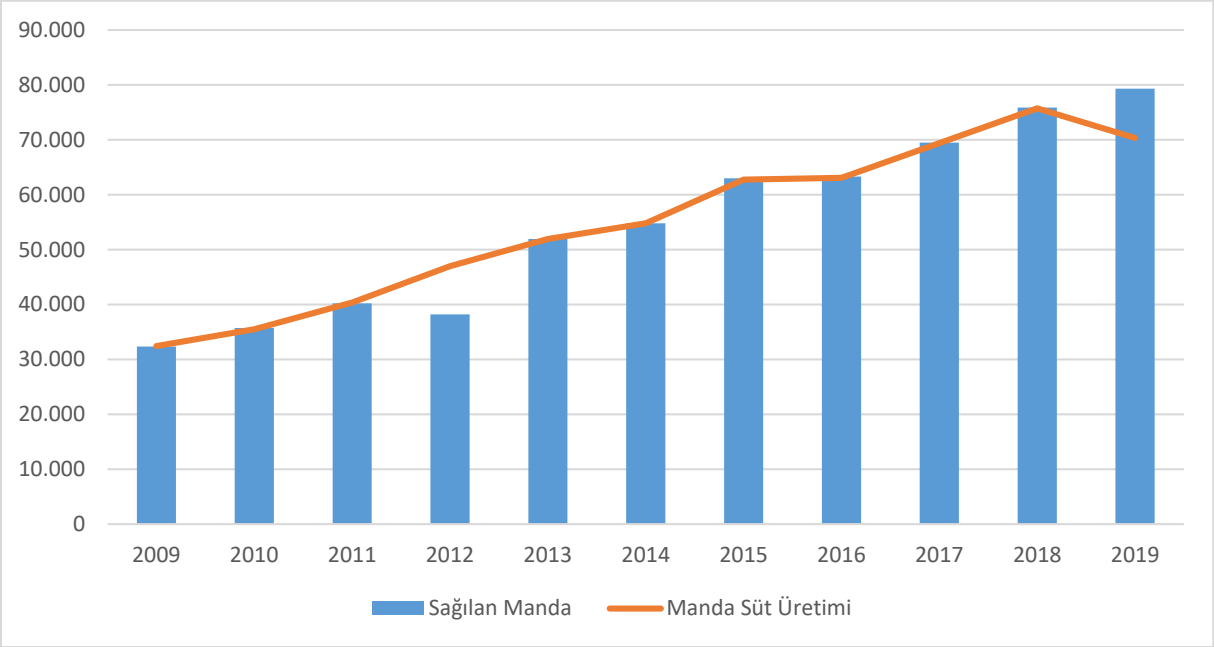
İller		**Manda Varlığı (Baş)**
1.	Samsun	23633
2.	Diyarbakır	15914
3.	İstanbul	15598
4.	Tokat	10846
5.	Bitlis	10123
6.	Muş	7591
7.	Kayseri	7528
8.	Afyonkarahisar	7137
9.	Balıkesir	5475
10.	Sivas	5363

2.2. Süt Üretimi ve Sağılan Manda Sayısı

Sağılan manda sayısı 2019 yılında 79.333 iken elde etilen toplam süt miktarı 79.341 tondur. Bu verilere göre manda başına laktasyon süt verimi 1000 litredir. TUİK 2019 verilerine göre yıllık süt üretim miktarının %90.51'i ineklerden elde edilirken, koyun %6.63, keçi ise %2.51'lik kısmı oluşturmaktadır. Manda da ise bu rakam %0,35'tür.

Şekil 1.'e göre sağılan manda sayısı 2009 yılından 2019 yılına kadar düzenli bir artış gösterirken, manda süt üretim miktarı ise düzensiz bir artışa sahiptir. Bunun sebepleri olarak, yetiştiriciliğin geleneksel yöntemlerle devam ettiriliyor olması, mera alanlarının kısıtlanması ve artan yem fiyatlarının yetiştiriciyi olumsuz etkilemesi olarak ifade edilebilir.

Şekil 1. Sağılan manda sayısı ve manda süt üretimi (ton)



2.3. Et Üretimi ve Kesilen Manda Sayısı

Kesilen manda sayısı 2021 yılı verilerine göre 51.925 baş iken manda et üretimi ise 10 831 ton olarak verilmiştir (TUİK, 2021).

Kesilen manda sayısında sürekli bir artış söz konusu iken manda eti üretiminde ise artış ve azalışlar gözlemlenmektedir (Şekil 2.) Bu durumun sebeplerine bakacak olursak, özellikle son dönemlerde artan yem fiyatlarının yetersiz bakım ve beslemeye yol açması, yetiştiricilerin erken yaşta mandalarını kesmeleri yani besiyi erken sonlandırmaları, geleneksel yetiştiricilik uygulamalarının devam ettirilmesi olarak düşünülebilir.

Şekil 2. Kesilen manda sayısı ve manda et üretim miktarları (ton) (TUİK,2022)

Yıllar	Kesilen Hayvan Sayısı	Et Üretim Miktarı (ton)
2001	**36 072**	**6 486**
2002	**33 257**	**5 728**
2003	**30 004**	**5 242**
2004	**27 586**	**4 952**
2005	**25 060**	**4 629**
2006	**23 867**	**4 442**
2007	**22 916**	**4 347**
2008	**21 494**	**4 128**
2009	**20 111**	**4 019**
2010	**19 126**	**3 785**
2011	**19 127**	**3 780**
2012	**19 967**	**4 027**
2013	**21 465**	**4 580**
2014	**23 899**	**5 004**
2015	**25 713**	**5 300**
2016	**27 663**	**5 470**
2017	**29 476**	**5 868**
2018	**32 389**	**6 515**
2019	**35 695**	**7 150**
2020	**40 929**	**8 424**
2021	**51 925**	**10 831**

3. SONUÇ VE ÖNERİLER

'Halk Elinde Anadolu Mandası Islah Projesi'yle birlikte son yıllarda manda sayısında artış görülmüş ve bu artış 2009 yılından günümüze et ve süt üretim istatistiklerinde bir nebze de olsa olumlu olarak yansımıştır. Bu projenin Türkiye'de manda bulunan diğer illerde de uygulanması hayvancılığa doğrudan katkı sağlayacaktır. Fakat hayvan sayılarında ki artışa rağmen üretim verilerinde ki düzensiz artış ve azalışın önüne geçebilmek için yetiştiricilere sağlık, bakım ve besleme alanlarında uzmanlar tarafından eğitimler verilmeli, manda üretim kalemlerine teşvik edici desteklemeler arttırılmalıdır.

Yapılan bilimsel çalışmalara göre manda sütü diğer türlerle kıyaslandığında daha fazla yağ, protein ve laktoz içeriğine sahip olduğu görülmüştür. Bu durum bir fırsat olarak değerlendirilmeli ve manda sütüne ait ürünlerin üretilmesini teşvik edecek desteklemeler arttırılmalıdır.

Özellikle son yıllarda manda sayısı ve sağılan manda sayısında artış gözlemlenmiş fakat elde edilen yıllık süt miktarında artış gözlenmemiştir. Bunun sebebi olarak verilen desteklemelerin hayvan sayısında artış gösterdiği fakat yetiştiricilik uygulamalarının yetersiz bakım ve besleme

ile sürdürüldüğü sonucuna varılmıştır. Yetiştiricilerin manda bakım ve besleme konusunda bilinçlendirilmesi elde edilen ürün bakımından da fayda sağlayacaktır.

Yapılan bilimsel çalışmalar manda eti mineral miktarını sığır etine kıyasla daha yüksek ve kolesterol miktarının ise sığır etine oranla daha düşük olduğunu göstermiştir. Bu durum manda etindeki yararlı özelliklerden yararlanma konusunda bir fırsat olarak değerlendirilebilir.

Islah çalışmalarının da arttırılması ile birlikte manda yetiştiriciliği ilerleyen dönemlerde daha tercih edilebilir bir hale gelecektir.

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YETİŞTİRİCİ KOŞULLARINDA KARAKAŞ KOYUN IRKINA AİT ÇEŞİTLİ VÜCUT ÖLÇÜSÜ VE SÜT VERİMİ ARASINDAKİ İLİŞKİNİN BELİRLENMESİ

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ÖZET
Bu çalışmada Diyarbakır ilinde yetiştirici koşullarında yetiştirilen karakaş koyunlarının çeşitli vücut ölçüleri ile laktasyon süt verimi arasındaki ilişkinin belirlenmesi amaçlanmıştır. Çalışmada 2, 3, 4 ve 5 yaşlı koyunlara ait cidago yüksekliği (CY), vücut uzunluğu (VU), göğüs derinliği (GD), kürekler arkası göğüs genişliği (KAGG), göğüs çevresi (GÇ) ve but çevresi (BÇ) ölçüleri ile laktasyon süt verimleri alınmıştır. Buna göre vücut ölçülerin ilişkin ortalama değerleri yukarıdaki sıraya göre 65.54±0.154, 65.22±0.168, 32.02±0.120, 21.26±0.134, 91.54±0.280 ve 65.32±0.211 cm olarak belirlenmiştir. Laktasyon süt verimi ise ortalama 72.32±1.13 kg olarak tespit edilmiştir. Koyunların vücut ölçüleri ile laktasyon süt verimi arasındaki fenotipik korelasyonlar hesaplanmıştır. En yüksek korelasyon KAGG ile GÇ (0.578) arasında bulunmuştur. Sonuç olarak karakaş koyunların çeşitli vücut ölçüleri arasında önemli derecede ilişki tespit edilmiştir.

Anahtar Kelimeler: Karakaş koyunu, Vücut ölçüleri, Laktasyon süt verimi, Fenotipik Korelasyon

DETERMINATION OF THE RELATIONSHIP BETWEEN VARIOUS BODY SIZE AND MILK PRODUCTION OF KARAKAŞ SHEEP BREEDS UNDER BREEDERS CONDITIONS

ABSTRACT

In this study, it was aimed to determine the relationship between various body measurements and lactation milk yield of Karakaş sheep raised under different breeder conditions in Diyarbakır. In the study, the measurements of height at withers (HW), body length (BL), chest depth (CD), chest width behind the paddles (CWBP), chest circumference (CC) and thigh circumference (TC) of 2, 3 and 4 years old sheep were measured in lactation milk. yields were obtained. Accordingly, the mean values of body measurements were determined as 65.54±0.154, 65.22±0.168, 32.02±0.120, 21.26±0.134, 91.54±0.280 and 65.32±0.211 cm, respectively. Lactation milk yield was determined as 77 kg on average. The phenotypic correlations between body size of sheep and lactation milk yield were calculated. The highest correlation was found between CWBP and CC (0.578). As a result, a significant correlation was determined between various body measurements of Karakaş sheep.

Keywords: Karakaş Sheep, Body measurements, Lactation milk yield, Phenotypic correlation

1.GİRİŞ

Türkiye sahip olduğu geniş ve verimli meralarla küçükbaş hayvan yetiştiriciliğine uygun bir coğrafik yapıdadır. Koyunlar, diğer çiftlik hayvanlarına göre zayıf meraları ve bitkisel üretime uygun olmayan alanları daha iyi değerlendirir, dolayısıyla et ve süt gibi ürünlerin daha az maliyetle üretilmesine imkân sağlar (Denk, 2022).

Türkiye'nin Güneydoğu Anadolu bölgesinin hâkim yerli ırklarından Karakaş koyun ırkı kombine verim yönlü olup; et, süt, yapağı ve döl verimi yüksek olan yerli bir koyun ırkımızdır. Yetişme alanlarından Batman, Bitlis, Bingöl, Elâzığ, Siirt ve Diyarbakır illerinde yetiştiriciliği oldukça yaygındır. Sürü ve analık içgüdüsü yüksek olup yağlı kuyruklu bir kuyruk yapısına sahiptir. Vücut rengi beyaz, baş, burun, göz çevresi ile kulak ve ayaklarda ise siyah lekeler mevcuttur. Yapağı kaba-karışık ve seyrektir. Deri rengi beyazdır. Kuyruk, yağlı kuyruklu bir yapıya sahip olup S şeklinde bir yapı arz etmektedir.

Vücut ölçüleri ile verimlilik arasında önemli bir ilişki mevcuttur (Sönmez & Alpbaz, 1975). Büyüme ve gelişme özellikleri de erken seleksiyon kriteri olarak kullanılabilir. Yetiştiriciliğin ana hedefi birim hayvandan en kısa sürede ve maksimum fayda elde etmektir. Büyüme, hücre ve dokulardaki kütle ve hacim artışı olup genotip ve çevre koşullarına göre bazı farklılıklar gösterir. Büyüme, belirli bir yaşa kadar devam eder (Chacon ve ark., 2011).

Koyun sütünün yetiştiricilikte önem taşıdığı durumlarda, süt verimi damızlık seçiminde değerlendirilmesi gereken bir özelliktir. Bu anlamda da sütün miktar ve bileşimini etkileyen faktörler ile genetik varyasyona ilişkin bilgilerin elde edilmesi gerekir. Popülasyonların süt verim yeteneklerinin tanımında yaş ve bakım- besleme gibi çevre faktörleri değerlendirmede esas alınır. Ancak bu şekilde koyunların gerçek verim yetenekleri ortaya çıkar. Damızlık seçimindeki başarı ancak gerçek verim yeteneğine göre yapılacak seçimle mümkündür (Karaca ve ark. 2003)

Bu çalışma Diyarbakır ilinde yetiştirici koşullarında yetiştirilen Karakaş koyunlarının çeşitli vücut ölçüleri ile laktasyon süt verimi arasındaki ilişkinin belirlenmesi amacıyla yapılmıştır.

1. MATERYAL VE YÖNTEM

Materyal

Araştırmanın materyalini Diyarbakır ili Ergani ve Çermik ilçelerine bağlı 2 köyde 5 işletmede ekstansif koşullarda yetiştirilen 286 baş 2-5 yaş arası Karakaş koyunlarından alınan çeşitli vücut ölçüleri ile laktasyon süt verimi oluşturmuştur.

Yöntem

Bu çalışmada vücut ölçüleri olarak; cidago yüksekliği (CY) cidagonun en yüksek noktasından yere kadar olan dikey mesafe, vücut uzunluğu (VU) omuz ucundan (atriculus humeri) oturak yumrusu ucuna (tuber ichii) kadar olan mesafe, göğüs derinliği (GD) cidago ile göğüs kemiği (sternum) arasındaki dikey mesafe, kürekler arkası göğüs genişliği (KAGG) scapulanın hemen gerisindeki mesafe ölçü bastonu ile, göğüs çevresi (GÇ) scapulanun hemen arkasından alınan çevre ölçüsü ve but çevresi (BÇ) oturak yumrusu (tuber ichii) ile kalça çıkıntısı (tuber coxa) arasında buttan ölçü şeridiyle çapraz olarak alınan mesafedir. Vücut ölçüleri laktasyon sonunda son kontrol süt sağımı alındığında ölçülmüştür.

Üzerinde durulan özelliklere etki eden makro çevre faktörlerinin etki paylarının hesaplanmasında kullanılan model;

$Y_{ij} = \mu + \alpha_i + e_{ij}$ şeklindedir.

Y_{ij} = i. yaştaki koyunun çeşitli vücut ölçüleri, laktasyon süt verimi, laktasyon süresi ve günlük ortalama süt verimi

μ = Populasyon ortalaması

α_i = i. yaşın etkisi (i= 2, 3, 4 ve 5)

e_{ij} = Bağımsız ve şansa bağlı hata

İlgili modele göre verilerin değerlendirilmesi SPSS 21 paket programında En-Küçük Kareler analiz programına göre yapılmıştır. Ortalamalarının karşılaştırılmasında Duncan Çoklu Karşılaştırma Testi'nden faydalanılmıştır (Düzgüneş ve ark., 1987).

2. BULGULAR VE TARTIŞMA

2.1. Vücut Ölçüleri

Karakaş koyunlarından elde edilen çeşitli vücut ölçüleri işletme ve koyun yaşına göre ortalama değerleri, standart hataları ve çoklu karşılaştırma test sonuçları Çizelge 3.1. de verilmiştir. Çizelge 3.1 incelendiğinde farklı işletmelerde yetiştirilen karakaş koyunlarının laktasyon sonunda belirlenen vücut ölçülerinden CY, VU, GD, KAGG, GÇ ve BÇ ortalaması sırasıyla 65.54±0.154, 65.22±0.168, 32.02±0.120, 21.26±0.134, 91.54±0.280 ve 65.32±0.211 cm olarak ölçülmüştür. Vücut ölçüleri bakımından işletmeler arasında CY ($P<0.05$), VU, GD, KAGG, GÇ ve BÇ ($P<0.01$) istatistiki açıdan anlamlı bulunmuştur. Koyun yaşları bakımından CY ($P<0.05$) anlamlı bulunurken diğer vücut ölçüleri bakımından anlamsız bulunmuştur. İşletmelerin benzer çevre koşullarına sahip olduğu söylenebilir.

Gökdal ve ark. (2000) tarafından köylü koşullarında yetiştirilen Karakaş koyunlarında kırkım döneminde vücut ölçüleri aynı sırayla 67.32, 64.68, 33.37, 19.88, 95.06 ve 62.86 cm olarak

saptanmıştır. Buna göre Gökdal ve ark. (2000) tarafından bildirilen VU, KAGG ve BÇ değerlerinin, Gökdal (1998) tarafından köylü koşullarında yetiştirilen Karakaş koyunlarında doğum döneminde alınan vücut ölçüleri aynı sırayla 68.81, 65.18, 31.50, 18.54, 93.61 ve 60.19 cm olarak saptanmıştır. Buna göre GD, KAGG ve BÇ değerlerinin, Koncagül ve ark. (2012) tarafından Zom koyunlarında yaptıkları çalışmada vücut ölçüleri aynı sırayla 67.90, 60.20, 29.90, 18.10 ve 94.70 cm olarak saptanmıştır. Buna göre VU, GD ve KAGG değerlerinin bu çalışmada bulunan değerlerden daha düşük olduğu gözlenmektedir.

CY, GÇ, bakımından araştırmada bulunan değerler, Akkaraman koyunlarında Sandıkçıoğlu (1960) ve Özcan (1970b), Morkaraman koyunlarında Özcan (1970b), Tuj koyunlarında Yarkın ve Eker (1954), Ulusan ve Aksoy (1996), Kıvırcık koyunlarında Vetulani, (1935), Yarkın (1956), Özcan (1970b), Bilgemre (1948), Karayaka koyunlarında Özcan (1970b), Atasoy ve ark. (2003), İvesi koyunlarında Özbeyaz ve ark. (2018) bulduğu değerlerden yüksek olduğu gözlenmiştir.

2.2. Laktasyon süt verimi

Karakaş koyunlarında laktasyon süt verimi ortalama 72.32±1.13, günlük ortalama süt verimi 431±0.01 gr ve laktasyon süresi ise ortalama 168.0±0.70 olarak bulunmuştur (Çizelge 3.1). İşletmeler ve koyun yaşları bakımından özellikler (P<0.01) istatistiki olarak anlamlı bulunmuştur.

Karaca ve ark. (2003) tarafından Karakaş koyunlarda yapılan araştırmada LSV, LS ve GOSV sırasıyla, 84.7 kg, 155.9 gün ve 529.6 gram olarak verilmiştir. Buna göre çalışmada elde edilen LS yüksek bulunurken, LSV ve GOSV düşük bulunmuştur. Cengiz ve ark. (1998), Yılmaz ve ark. (2003) tarafından Karakaş koyunlarda yapılan araştırmada LSV ve LS, çalışmadan elde edilen değerlerden düşük olduğu gözlenmiştir. Boztepe ve ark. (1998) tarafından Akkaraman, ivesi ve İvesi x Akkaraman melezi koyunlarda yaptıkları çalışmadan elde edilen değerler, bu çalışmadan elde edilen değerlerden düşük bulunmuştur.

2.3. Çeşitli Vücut Ölçüleri ile Laktasyon Süt Verimi Arasındaki Fenotipik Korelasyonlar

Karakaş koyunlarının vücut ölçüleri ile LSV ve LS arasındaki korelasyonlar Çizelge 3.2 verilmiştir. Çizelge 3.2'de verilmekte olan ** yazılı olan rakamların önem dereceleri P<0.01, *olarak verilen rakamların önem dereceleri P<0.05 olan korelasyonları ifade etmektedir. Vücut ölçüleri arasında hesaplanan korelasyon katsayıları pozitif, LSV ve LS ile olan korelasyonlar ise çoğunlukla negatif korelasyonlara sahiptir. GD, KAGG ve GÇ arasındaki korelasyon 0.50'nin üzerinde, diğer vücut ölçüleri arasındaki korelasyonlar ise 0.12 ile 0.48 arasında

değiştiği görülmektedir. LSV ile CY arasındaki korelasyon 0.491 ve LS ile vücut ölçüleri arasında CY hariç korelasyonlar ise negatif bulunmuştur.

Çizelge 3.2. Karakaş koyunlarda çeşitli vücut ölçüleri ile LSV ve LS arasındaki Fenotipik Korelasyonlar

	VU	GD	KAGG	GÇ	BÇ	LSV	LS
CY	0.481**	0.345**	0.215**	0.224**	0.216**	0.491**	0.024
VU		0.366**	0.122*	0.215**	0.273**	-0.014	-0.003
GD			0.544**	0.571**	0.289**	-0.006	-0.111
KAGG				0.578**	0.362**	-0.044	-0.101
GÇ					0.426**	-0.121*	-0.134*
BÇ						-0.035	-0.117*
LSV							0.195**

3. SONUÇ

Karakaş koyunlarının çeşitli vücut ölçüleri ve laktasyon süt verimine ait değerler, yerli ırklarımız üzerinde yapılan çalışmalarda elde edilen bulgularla karşılaştırıldığında bazı özellikler bakımından yüksek değerler, bazı özellikler bakımından ise benzer özellikler gösterdiği görülmektedir. Bu bakımdan Karakaş koyunlarının ele alınan özellikler açısından yetiştirici koşulları dikkate alındığında bölgenin önemli bir üretim kaynağı durumundadırlar.

Karakaş koyunu yerli gen kaynaklarımızdan olup, verim performanslarının tanımlanma çalışmalarıyla birlikte, verim özelliklerinin geliştirilmesine ilişkin çalışmalar yerli gen kaynaklarımızın korunması için de gerekli bilgileri sağlamaktadır.

Karakaş koyunu yetiştiricilerinin faaliyetlerine devam etmeleri ve koyun yetiştirme alışkanlıklarını terk etmemeleri önem kazanmaktadır. Bu anlamda da yerli koyun ırklarımızın sahip oldukları özellikleri ortaya koymayı amaçlayan çalışmalar önem kazanmaktadır.

Çizelge 3.1. Karakaş koyunlarda çeşitli vücut ölçüleri ile LSV ve LS ait tanıtıcı istatistikler

İşletme	Yaş	N	CY		VU		GD		KAGG		GÇ		BÇ		LSV		LS	
			$\bar{X} \pm S_{\bar{X}}$		$\bar{X} \pm S_{\bar{X}}$		$\bar{X} \pm S_{\bar{X}}$		$\bar{X} \pm S_{\bar{X}}$		$\bar{X} \pm S_{\bar{X}}$		$\bar{X} \pm S_{\bar{X}}$		$\bar{X} \pm S_{\bar{X}}$		$\bar{X} \pm S_{\bar{X}}$	
1	2	6	65,50	1,18	64,67	0,80	32,33	0,84	20,33	0,33	94,17	1,887	65,50	1,057	41,00	5,29	168,3	1,73
	3	11	65,82	0,77	66,73	0,66	31,91	0,34	20,00	0,23	91,36	0,766	68,64	1,323	65,35	3,02	160,8	3,83
	4	35	65,20	0,44	64,69	0,46	32,06	0,20	20,40	0,22	92,74	0,767	65,43	0,576	64,79	1,67	163,7	1,96
	5	33	64,48	0,43	65,48	0,48	31,21	0,25	19,85	0,20	90,67	0,596	66,48	0,574	79,04	2,19	165,8	1,38
	Toplam	**85**	**65,02^{b}**	**0,28**	**65,26^{a}^{b}**	**0,29**	**31,73^{b}**	**0,152**	**20,13^{b}**	**0,126**	**91,86^{b}**	**0,436**	**66,26^{a}**	**0,385**	**68,71^{b}**	**1,633**	**164,46^{b}**	**1,097**
2	2	17	66,00	0,45	64,71	0,55	32,65	0,45	24,59	0,34	94,53	1,022	66,35	0,951	63,09	4,29	165,6	2,71
	3	7	66,57	1,63	63,43	1,34	32,14	1,68	24,57	1,39	95,00	2,127	69,00	1,397	71,36	7,56	151,1	6,98
	4	18	64,11	0,64	63,89	0,41	33,94	0,41	24,56	0,41	95,39	1,026	65,83	0,801	80,54	5,70	167,1	1,34
	5	18	66,44	0,52	64,56	1,06	32,94	0,88	24,33	0,76	95,17	1,158	67,17	0,954	68,39	3,81	166,7	1,92
	Toplam	**60**	**65,63^{a}^{b}**	**0,35**	**64,27^{b}**	**0,40**	**33,07^{a}**	**0,37**	**24,5^{a}**	**0,311**	**95,03^{a}**	**0,586**	**66,75^{a}**	**0,493**	**70,88^{b}**	**2,636**	**164,68^{b}**	**1,425**
3	2	23	66,48	0,53	65,30	0,61	31,52	0,349	20,83	0,20	89,22	0,955	65,13	0,520	59,53	3,70	173,5	3,04
	3	13	65,00	0,64	66,15	0,53	32,23	0,343	20,85	0,32	89,62	0,944	64,92	0,625	86,43	4,62	170,8	5,30
	4	13	65,15	0,67	65,08	0,60	32,31	0,382	20,62	0,24	90,38	1,185	64,00	0,531	97,03	4,98	176,4	2,10
	5	6	64,33	1,52	64,50	0,99	32,00	0,632	20,00	0,37	88,67	1,145	65,33	1,174	114,06	4,08	173,0	8,07
	Toplam	**55**	**65,58^{a}^{b}**	**0,36**	**65,36^{a}^{b}**	**0,33**	**31,93^{b}**	**0,202**	**20,69^{b}**	**0,132**	**89,53^{c}^{d}**	**0,543**	**64,84^{b}**	**0,315**	**80,7^{a}**	**3,457**	**173,47^{a}**	**2,00**
4	2	13	66,69	0,80	66,23	0,66	31,62	1,00	20,62	0,266	93,15	1,363	64,77	1,110	58,82	4,23	168,8	2,67
	3	23	65,87	0,47	66,09	0,59	31,74	0,32	20,78	0,274	89,65	1,009	65,00	0,780	66,52	2,56	169,6	2,18
	4	13	66,54	0,72	67,08	1,06	31,85	0,44	20,31	0,458	90,15	1,501	64,08	0,796	72,28	2,50	170,2	3,23

	5	7	66,14	0,83	65,57	0,72	32,29	0,52	21,00	0,488	91,43	1,412	63,00	0,535	66,54	3,70	178,9	2,44
	Toplam	**56**	**66,25^{a}**	**0,33**	**66,29^{a}**	**0,39**	**31,8^{b}**	**0,285**	**20,66^{b}**	**0,175**	**90,8^{bc}**	**0,662**	**64,48^{b}**	**0,454**	**66,08^{b}**	**1,695**	**170,73^{a}**	**1,39**
5	2	6	65,17	1,30	65,17	0,60	31,17	0,60	20,33	0,21	89,00	1,342	61,83	1,276	74,49	4,86	173,3	0,49
	3	11	65,18	0,71	65,27	0,81	31,55	0,58	19,91	0,48	89,27	1,045	62,27	0,885	77,08	3,87	164,2	3,39
	4	8	65,75	0,67	64,13	1,03	30,88	0,40	20,00	0,42	87,13	1,619	61,75	0,881	87,04	6,02	176,8	1,62
	5	5	65,60	1,63	64,20	2,01	32,00	0,45	20,40	0,68	89,60	0,400	63,60	1,631	92,21	5,68	168,2	4,89
	Toplam	**30**	**65,4^{ab}**	**0,464**	**64,77^{b}**	**0,516**	**31,37^{b}**	**0,273**	**20,1^{b}**	**0,232**	**88,7^{d}**	**0,636**	**62,27^{c}**	**0,529**	**81,74^{a}**	**2,704**	**170,03^{a}**	**1,768**

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İVESİ KOYUNLARININ AŞIM VE DOĞUMDAKİ AĞIRLIĞININ DİŞİ KUZU DOĞUM, SÜTTEN KESİM VE ALTINCI AY AĞIRLIĞI ÜZERİNE ETKİSİNİN BELİRLENMESİ

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ÖZET

Bu çalışmanın amacı İvesi koyunlarının aşım ve doğumdaki ağırlıklarının dişi kuzu doğum ve sütten kesim ağırlığı üzerine etkisinin araştırılmasıdır. Çalışmanın hayvan materyalini 2, 3, 4 ve 5 yaşlı toplam 117 koyun ve bunlardan doğan dişi kuzular oluşturmuştur. Çalışmada koyunların aşım ve doğumdaki ağırlığı, kuzu doğum, sütten kesim ve altıncı ay ağırlığı sırasıyla 50.46±0.651, 56.91±0.698, 4.62±0.066, 20.69±0.426 ve 30.25±0.505 kg olarak saptanmıştır. Ele alınan özelliklerden koyun aşım ağırlığı, doğumdaki ağırlığı, kuzu doğum ağırlığı, sütten kesim ağırlığı ve altıncı ay ağırlığı arasında pozitif önemli korelasyonlar bulunmuştur ($P<0.05$; $P<0.01$). Aşım ağırlığı ile kuzu doğum ağırlığı ($P<0.05$), 6. ay ağırlığı arasında ($P<0.01$), Ananın doğumdaki ağırlığı ile 6. ay ağırlığı ($P<0.01$) üzerine önemli bir etkiye sahip olduğu anlaşılmıştır. Sonuç olarak ananın aşım ve doğumdaki ağırlığının kuzuların doğum ve 6. ay ağırlığı üzerine pozitif yönde etkilediği bu maksatla ananın aşım ve gebelik döneminde bakım beslemeye gereken önemin verilmesi önem arz etmektedir.

Anahtar Kelimeler: İvesi, Aşım ağırlığı, Kuzu doğum ağırlığı, Sütten kesim ağırlığı

THE EFFECT OF THE WEIGHT OF INVISIBLE SHEEP AT BREAKING AND BIRTH ON THE WEIGHT OF EWE LAMB BIRTH AND WEANING

ABSTRACT

The aim of this study is to investigate the effect of breeding and birth weights of Awassi sheep on the birth and weaning weight of female lambs.The animal material of the study consisted of a total of 117 sheep aged 2, 3, 4 and 5 years old and female lambs born from them.In the study, the weight of sheep at breeding and birth, lamb birth, weaning and sixth month weight were determined as 50.46±0.651, 56.91±0.698, 4.62±0.066, 20.69±0.426 and 30.25±0.505 kg, respectively. Positive and significant correlations were found between sheep overshoot weight, weight at birth, lamb birth weight, weaning weight and sixth month weight ($P<0.05$; $P<0.01$). It was found that there was a significant effect between the breeding weight and the lamb birth weight ($P<0.05$), the 6th month weight ($P<0.01$), and the maternal weight at birth and the 6th month weight ($P<0.01$). As a result, it is important to give importance to the care and feeding of the mother during the breeding and pregnancy period, for this purpose that the mother's weight at breeding and birth has a positive effect on the birth and 6th month weight of the lambs.

Keywords: Awassi, Overweight, Lamb birth weight, Weaning weight

1.GİRİŞ

Farklı verimleriyle insanların birçok ihtiyacını karşılayan koyunlar kalitesi düşük meraları en iyi şekilde değerlendiren bir hayvan türü olup masrafı az, zor şartlara ve hastalıklara dayanıklı, sevk ve idaresi kolaydır (Akçapınar, 2000).

Türkiye'de koyunculuk alanında değişik kültür ırklarıyla birçok melezleme çalışması yapılmıştır. Bu çalışmalardan elde edilen sonuçların birkaçı hariç sahaya aktarılması ve yaygınlaşması mümkün olamamıştır. Bu nedenle yerli kaynaklar ile üretimin arttırılmasının daha akılcı bir yol olacağı belirtilmiştir (Akçapınar,1996).

Küresel iklim değişikliği ve su kaynaklarının azalması, hayvancılık sektöründe yaygın veya yarı yoğun koşullarda yetiştirilebilen İvesi koyunu gibi yerli gen kaynaklarını daha çok tercih edilir hale getiriyor. (Kutan ve Keskin, 2022)

İvesi koyunu da hem et hem de süt üretimi dikkate alındığında, Güneydoğu Anadolu Bölgesinde yetiştirilen yağlı kuyruklu ırklar arasında ilk akla gelen ırktır. Genellikle Mezopotamya bölgesinde yetiştirilen bu ırk, yurdumuzun ve dünyanın birçok bölgesine götürülmüş, saf veya melez olarak üretimde başarılı sonuçlar elde edilmiştir (Gül ve Keskin, 2010; Üstüner ve Oğan, 2013; Özbeyaz ve ark., 2018; Biçer ve ark., 2019).

İvesi koyunlarının kendi yetiştirilme bölgeleri içerisinde gelişim, döl ve süt verim özelliklerinin bilimsel olarak tespit edilerek, bu bilgilerin güncel olarak yetiştirici ve diğer kullanıcılar ile paylaşılmasında yarar bulunmaktadır (Gül ve Oflaz, 2021)

Bu çalışmada ülkemizin Güneydoğu Anadolu Bölgesi'nde yer alan Şanlıurfa ilinde İvesi koyunlarının aşım ve doğumdaki ağırlıklarının kuzulara ait doğum ve sütten kesim ağırlığına olan etkileri araştırılmıştır.

2. MATERYAL VE YÖNTEM

Materyal

Araştırmanın materyalini Şanlıurfa ilinde yetiştirici koşullarında entansif yetiştirilen İvesi koyunlarında yürütülmüştür. Koyunlar 2-5 yaşlı 117 baş Kıvırcık ırkı koyun ve bunlardan doğan 131 baş dişi kuzu oluşturmuştur.

Yöntem

İvesi koyunları Ağustos-Ekim aylarında arama koçu kullanılarak kızgınlıkları belirlenmiş ve aşım öncesi canlı ağırlıkları tartılmıştır, koyunların doğum hemen sonra doğumdaki canlı ağırlığı 50 gram hassasiyette tartı ile alınmıştır. Kuzuların doğum ağırlıkları doğumundan sonraki 2 saat içinde, yaklaşık 3 aylık yaşta sütten kesilen kuzuların SKA belirlenmiş, 6. ay sonunda da 6. ay canlı ağırlıkları 50 gram hassasiyette tartı ile alınarak kaydedilmiştir.

Araştırmada incelenen özelliklere ait verinin normal dağılıma uygunluğu kontrol edilmiş ve normal dağıldığı görülmüştür. Bu nedenle verilere herhangi bir dönüşüm uygulanmamıştır. Büyüme özelliklerine etkili faktörleri belirlemek için varyans analizi ve grupların karşılaştırılmasında Duncan çoklu karşılaştırma testi yapılmıştır. Analizler için SPSS 21 paket programının GLM prosedürü kullanılmıştır (SPSS, 2020). Bunların yanı sıra değerlendirilen özellikler arası korelasyonlar da hesaplanmıştır. DA, SKA ve 6. ay CA için kullanılan model aşağıdaki şekildedir.

$Y_{ijk} = \mu + \alpha_i + \beta_j + b_1X_{ijk} + e_{ijk}$

Y_{ijk}: i. doğum tipinde j. ağırlık grubundaki anadan doğan k kuzusunun doğum,sütten kesim veya 6. ay ağırlığı, μ: populasyonun beklenen ortalaması,

α_i: i. doğum tipinin etkisi (tek, ikiz), β_j: j. ana ağırlık grubunun etkisi,

b_1: ananın aşım veya doğumdaki ağırlığının kuzu doğum, SKS veya 6. ay ağırlığına kısmi regresyon katsayısı,

e_{ijk}: ortalaması 0 standart sapması 1 olan normal dağılım gösteren hata etkisi

3. BULGULAR ve TARTIŞMA

Araştırmada özelliklere ait tanımlayıcı istatistikler Çizelge 1'de verilmiştir. Aşım ağırlığı, ananın doğumdaki ağırlığı DA, SKA ve 6. ay ağırlığı için ortalamalar sırasıyla 50.46±0.651, 56.91±0.698, 4.62±0.066, 20.69±0.426 ve 30.25±0.505 kg olarak bulunmuştur.

Araştırma kapsamında değerlendirilen özellikler arası korelasyon katsayıları hesaplanmış ve sonuçlar Çizelge 2'de verilmiştir. AA ile ADA, DA, SKA ve AAA; ADA ile DA ve AAA; DA ve SKA ile AAA arasındaki korelasyonlar önemli bulunmuştur ($P<0.01$; $P<0.05$). Kuzularda SKA ile AAA arasındaki korelasyon katsayısı beklendiği gibi yüksek olup r = 0.921 olarak tespit edilmiştir. ADA ile DA arasındaki korelasyon pozitif ve önemlidir. Şireli (2019), 3 yaşlı 98 baş ivesi koyunu ile yapmış olduğu çalışmasında; koyunların doğumdaki ağırlığı ve vücut kondisyon skorlarının kuzu doğum ağırlığı bakımından, tekiz doğan kuzular, ikiz doğan kuzulardan önemli ölçüde ($P<0.01$) farklılık göstermiştir. Çalışmada ayrıca ortalama kuzu doğum ağırlığı bakımından cinsiyetler arasında önemli bir fark gözlemlenmemiştir. Akçapınar ve ark. (2000), Sakız koçlarla birleştirilen Akkaraman kuzularda doğum, sütten kesim (90 gün) ve 180. gün düzeltilmiş ortalama ağırlıkları 4.71, 22.89 ve 34.96 kg olarak bildirmişlerdir.

Koyuncu ve ark. (2018), kıvırcık kuzularında yapmış oldukları çalışmada doğum ağırlığı ile günlük canlı ağırlık artışı arasındaki korelasyon katsayısını 0.425, doğum ağırlığı ile sütten kesim ağırlığı arasındaki korelasyon katsayısını 0.378 ve sütten kesim ağırlığı ile günlük canlı ağırlık arasındaki korelasyon katsayısını ise 0.877 olarak tespit etmişlerdir.

Çizelge 1. İvesi koyun ve kuzulara ait çeşitli ağırlıklar

Yaş	DT	N	Aşım Ağırlığı				Ananın Doğumdaki Ağırlığı				Kuzu DA				Kuzu SKA				Kuzu 6. ay canlı ağırlığı			
			$\bar{X}$	$\pm S_{\bar{X}}$	Min.	Mak.	$\bar{X}$	$\pm S_{\bar{X}}$	Min.	Mak.	$\bar{X}$	$\pm S_{\bar{X}}$	Min.	Mak.	$\bar{X}$	$\pm S_{\bar{X}}$	Min.	Mak.	$\bar{X}$	$\pm S_{\bar{X}}$	Min.	Mak.
2	T	48	47,15	0,76	38,62	56,32	52,95	0,77	45,18	71,30	4,54	0,08	3,32	5,90	21,21	0,73	9,90	32,34	30,67	0,782	19,42	39,5
	İ	4	44,38	7,14	37,24	51,52	49,73	2,02	45,96	55,46	3,55	0,37	2,80	4,52	21,79	0,93	19,96	22,98	28,43	2,68	20,60	32,44
	Genel		46,96b				52,7b				4,46				21,24				30,49			
3	T	20	49,13	1,17	42,98	56,94	58,02	1,41	48,28	76,54	4,61	0,16	3,32	5,84	19,31	0,91	11,34	27,60	28,86	1,13	18,08	40,28
	İ	1	46,42	.	46,42	46,42	57,56	.	57,56	57,56	4,88	.	4,88	4,88	18,22	.	18,22	18,22	28,38	.	28,38	28,38
	Genel		48,95b				57,99a				4,63				19,25				28,84			
4	T	12	53,41	1,68	45,04	60,3	59,70	1,53	52,86	71,50	4,97	0,20	3,72	6,26	22,79	0,88	17,94	28,22	33,86	1,05	27,14	41,22
	İ	1	52,01	.	59,72	59,72	65,40	.	65,40	65,40	4,22	.	4,22	4,22	15,50	.	15,50	15,50	26,08	.	26,08	26,08
	Genel		53,99a				60,14a				4,91				22,18				33,26			
5	T	23	54,8	1,48	42,8	65,95	62,48	1,69	43,18	78,70	5,03	0,11	3,88	6,00	20,56	0,86	11,62	28,96	30,87	1,07	19,66	40,28
	İ	8	52,01	1,37	47,86	59,12	60,11	3,68	43,20	74,15	3,97	0,33	2,46	5,00	18,19	2,20	11,24	24,44	25,80	2,48	15,58	36,32
	Genel		54,02a				61,87a				4,75				20,07				29,42			

Çizelge 2. Koyun ve kuzulara ait incelenen özellikler arasındaki korelasyonlar

	Ananın doğumdaki ağırlığı	Kuzu doğum ağırlığı	Sütten kesim ağırlığı	6. ay ağırlığı
Aşım ağırlığı	0.714**	0.370**	0.288*	0.373**
Ananın doğumdaki ağırlığı		0.537**	0.030	0.235*
Kuzu doğum ağırlığı			0.042	0.268**
Sütten kesim ağırlığı				0.921**

**P<0.05, *P<0.01

3. SONUÇ VE ÖNERİLER

Kuzularda erken damızlıkta kullanım için, kuzuların çeşitli dönem canlı ağırlıklarının bilinmesi önem arz etmektedir. Bu nedenle koyunların dengeli bir rasyon ile beslenebilmelidir. Bununla birlikte ele alınan ağırlıkların ırka ve işletmeye göre değişebileceği unutulmamalıdır. Özellikle koyun yetiştirmede üreme sezonunda, koyunların aşım ve doğumdaki ağırlığın değerlendirilmesi, sınırlı yem kaynaklarının daha etkin kullanımını sağlayabilir ve koyunlarda üretkenliği artırabilir ki bu da üretimin daha ekonomik bir şekilde gerçekleşmesini sağlayacaktır. Bu kapsamda koyun yetiştiriciliğinde verimliliği attırmak için yıllık mera mevsimi ve mera koşullarına göre dikkatli bir planlama yapılmalı ve koyunlar fizyolojik dönemlerine uygun ağırlıklara sahip olmalıdır.

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