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INTERNATIONAL agriculture SCIENCES CONGRESS

October 26–28, 2026
Divan Ankara Hotel

ABSTRACT BOOK

ISBN: 978-625-30007-1-4

EDITORS
Prof. Dr. Naim SAĞLAM
Prof. Dr. Serap GÖNCÜ



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Ankara, TÜRKİYE

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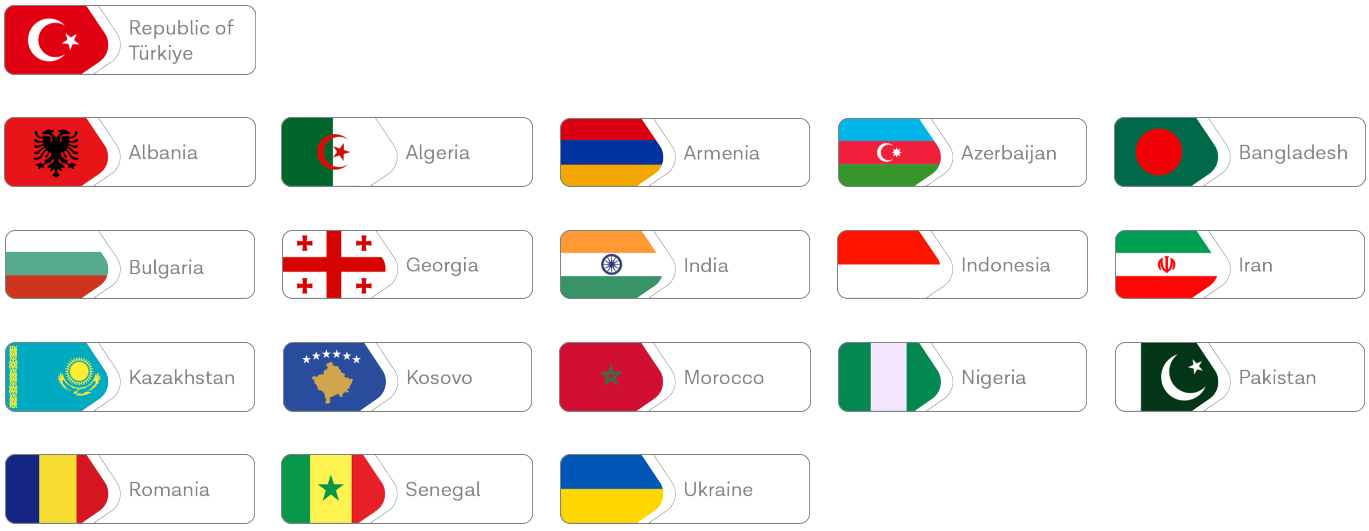
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11 *Total Rejected Papers*

44 *Accepted Article (Türkiye)*

55 *Accepted Article (Other Countries)*

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CONGRESS PROGRAM



ABOUT THE CONGRESS

The International Congress of Agricultural Sciences is an international scientific event aimed at sharing current, original, and high-quality academic research conducted across different disciplines. The congress seeks to bring together studies produced within a broad academic spectrum, ranging from social sciences to science and engineering, and from health sciences to education and cultural studies, on a common scientific platform.

Within the scope of the congress, the presented studies are discussed through both face-to-face and online sessions, providing participants with the opportunity to engage in scholarly interaction with experts in their respective fields and to receive academic feedback. In this respect, the congress serves not only as a presentation platform but also as a dynamic environment that supports academic development and scholarly exchange.

All papers presented within the scope of the congress have been evaluated through a double-blind peer review process in accordance with international academic publishing standards and principles of scientific ethics. During the evaluation process, each study was carefully assessed in terms of originality, methodological rigor, contribution to the literature, and overall scientific quality. As a result of this comprehensive academic review process, a total of 99 papers from 19 different countries, 44 of which are from Türkiye, were accepted.

The accepted papers will be published in the proceedings book, registered with ISBN and DOI numbers, thereby ensuring that the studies become internationally accessible, permanent, and citable academic sources.

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REGARDING ONLINE PRESENTATIONS

The online presentations of our congress will be conducted via AKAP MEET, the proprietary platform of the International Academic Platform (AKAP). Detailed information regarding the system is provided below.

TECHNICAL INFORMATION

- The AKAP MEET system is free of charge; no additional membership registration is required.
- Session access links and login details will be sent via email to the authors of accepted papers.
- You must log in to the system using your registered email address, password, and full name.
- The system is accessible via computer, tablet, and mobile devices.
- All congress participants may attend and follow the sessions live within the program schedule.
- You are required to log in to the system at least 15 minutes before your presentation time.
- Presentation duration is limited to the time specified in the program and must not be exceeded.
- Compliance with the moderator's instructions is mandatory.
- The Q&A session will be conducted under the supervision of the moderator.

IMPORTANT – PLEASE READ CAREFULLY

- Please ensure that your microphone is functioning properly.
- You must be able to share your screen during the presentation.
- It is recommended that your presentation file be prepared in PDF or PowerPoint format.
- Please check your internet connection and device in advance to prevent potential technical issues.



REGARDING ONLINE PRESENTATIONS

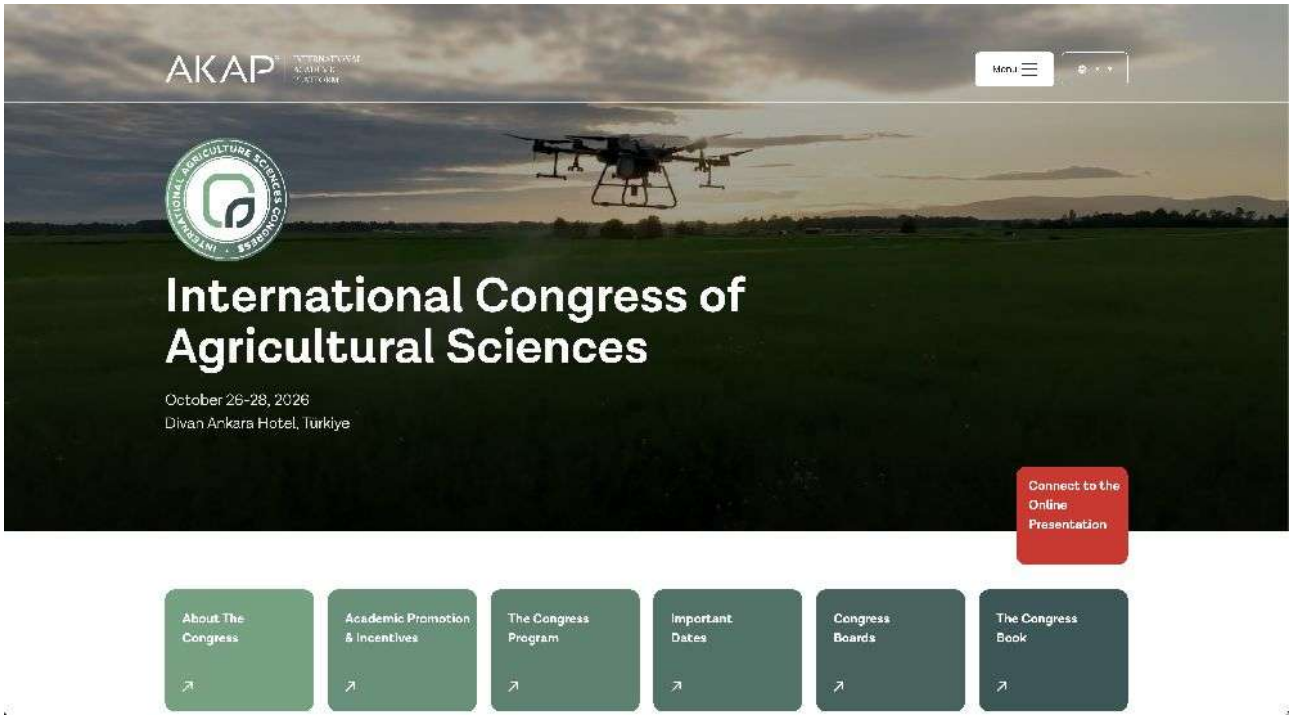
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STEP 2

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STEP 3

- Enter your username and password. In the next step, after entering your name, you will gain access to the session room where you will deliver your presentation.

INFORMATION FOR SESSION CHAIRS

- Session Chairs are authorized to manage and conduct their assigned sessions on behalf of the Organizing Committee.
- At the scheduled start time, you are kindly requested to open the session with a brief introductory remark.
- It is recommended to follow the presentation order stated in the program. However, if deemed necessary, minor adjustments to the sequence may be made in accordance with the session flow.
- Each presentation is allocated 10–12 minutes. Please ensure that presenters adhere to the designated time limits.
- The Q&A session may be conducted either after each presentation or collectively at the end of the session, at your discretion.
- The video recordings of the presentations will be handled by our technical team. Therefore, session chairs are not required to take or manage any recordings themselves.
- Should you require any assistance during the session, please feel free to contact the congress coordination team.

  We sincerely appreciate your valuable contribution and wish you a productive and successful session.



Oct 27, 2026 SESSION1 | HALL1

ANKARA TIME
09:30 - 11:30

ONLINE PRESENTATIONS

HEAD OF SESSION:

Dr. Aslıhan Argan ŞAHİN

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Dr. Aslıhan Argan ŞAHİN Dr. Öğr.Üyesi Şeyma ŞENGÜR	Ordu University (Türkiye)	BIODIVERSITY POTENTIAL OF THE COASTAL LANDSCAPE OF ALTINORDU DISTRICT, ORDU PROVINCE
Dr. Aslıhan Argan ŞAHİN Dr. Öğr.Üyesi Şeyma ŞENGÜR	Ordu University (Türkiye)	SPATIAL FRAGMENTATION ANALYSIS OF THE LOWER MELET BASIN, ORDU PROVINCE
Asst. Prof. Dr. Sefa GUN	Ordu University (Türkiye)	EFFECTS OF FOLIAR METHYL JASMONATE ON FLOWERING PERFORMANCE AND FLOWER LONGEVITY OF PANSY (VIOLA × WITTROCKIANA)
Dr. Emrecan ARPACI Prof. Dr. Sami İMAMOĞLU	Bursa Technical University (Türkiye)	NON-WOOD FIBRE RAW MATERIALS FOR PAPERMAKING: THE AGRICULTURAL AND INDUSTRIAL WASTE POTENTIAL OF TÜRKIYE
Dr. Emrecan ARPACI	Bursa Technical University (Türkiye)	BIOCHAR FROM AGRICULTURAL RESIDUES: PYROLYSIS CONDITIONS, PROPERTIES, APPLICATIONS AND THE PRODUCTION POTENTIAL OF TÜRKİYE: A REVIEW
Talha KİTAPÇI Assist. Prof. Dr. Zübeyir AĞIRAĞAÇ Prof. Dr. Şeyda Zorer ÇELEBİ	Van Yuzuncu Yil University (Türkiye)	FROM THE PAST TO THE FUTURE IN THE VAN BASIN: POST-2004 CLIMATE CHANGE AND THE TRANSFORMATION OF THE AGRICULTURAL CROP PATTERN
Assist. Prof. Dr. Umut MUCAN	Çanakkale Onsekiz Mart University (Türkiye)	AGROCLIMATIC CHARACTERIZATION OF DRY-SEASON STRUCTURE IN ÇANAKKALE, TÜRKİYE USING BAGNOULS–GAUSSEN AND DE MARTONNE INDICES
Master's Student/Environmental Engineer Samet Serhat YÖRÜK Prof. Dr. Kamil EKİNCİ Prof. Dr. İsmail TOSUN	Suleyman Demirel University (Türkiye) Isparta University of Applied Sciences (Türkiye)	STABILIZATION OF SPENT MUSHROOM SUBSTRATE USING DIFFERENT COMPOSTING APPROACHES AND EVALUATION OF PHYTOTOXICITY

Oct 27, 2026 SESSION1 | HALL2

ANKARA TIME
09:30 - 11:30

ONLINE PRESENTATIONS

HEAD OF SESSION:

Assist. Prof. Dr. Fizyon Sönmez ERDOĞAN

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Assist. Prof. Dr. Fizyon Sönmez ERDOĞAN	Hatay Mustafa Kemal University (Türkiye)	THE IMPORTANCE OF GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING TECHNOLOGIES IN ACHIEVING AGRICULTURAL SUSTAINABILITY
Kutay Artun GÖREN Assoc. Prof. Dr. Safiye Pınar TUNALI Prof. Dr. Necdet DAĞDELEN	Aydın Adnan Menderes University (Türkiye)	POSSIBILITIES OF USING REMOTE SENSING TECHNIQUES IN LAND CONSOLIDATION STUDIES
Selin ŞİMŞEK Prof. Dr. Necdet DAĞDELEN Assoc. Prof. Dr. Safiye Pınar TUNALI	Aydın Adnan Menderes University (Türkiye)	FERTIGATION PRACTICES IN AGRICULTURE
Dr. Muhammed İkbal YEŞİL	Osmaniye Korkut Ata University (Türkiye)	PSYCHOSOCIAL RISKS AND BURNOUT IN LIVESTOCK PRODUCTION FROM AN OCCUPATIONAL SAFETY PERSPECTIVE
Dr. Muhammed İkbal YEŞİL	Osmaniye Korkut Ata University (Türkiye)	THE EFFECTS OF DIGITALIZATION ON OCCUPATIONAL HEALTH AND SAFETY IN LIVESTOCK PRODUCTION
Dr. Recep BALKIÇ	Akdeniz University (Türkiye)	COMPARISON OF POD AND SEED TRAITS AND SEED GERMINATION PERFORMANCE AMONG CAROB (CERATONIA SILIQUA L.) CULTIVARS AND A WILD GENOTYPE
Dr. Recep BALKIÇ Prof. Dr. Hamide GÜBBÜK Dr. Lokman ALTINKAYA	Akdeniz University (Türkiye)	GENERAL PRINCIPLES OF COFFEE (COFFEA ARABICA L.) CULTIVATION AND INITIAL OBSERVATIONS FROM OPEN FIELD AND PROTECTED COFFEE CULTIVATION IN TÜRKİYE
Asst. Prof. Andaç Kutay SAKA	Ordu University (Türkiye)	DETERMINATION OF PLANT GROWTH AND LEAF PHYSIOLOGICAL TRAITS IN TOMATO GENOTYPES WITH DIFFERENT FRUIT COLORS

Oct 27, 2026 SESSION1 | HALL3

ANKARA TIME
09:30 - 11:30

ONLINE PRESENTATIONS

HEAD OF SESSION:

Assoc. Prof. Ali ENDES

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Assoc. Prof. Ali ENDES Dr. Sevim ATMACA	Yozgat Bozok University (Türkiye)	BOTRYOSPHAERIACEAE IN WOODY PLANTS: CURRENT ADVANCES IN TAXONOMY, HOST–PATHOGEN INTERACTIONS, CLIMATE CHANGE AND DISEASE MANAGEMENT
Assoc. Prof. Ali ENDES Dr. Sevim ATMACA	Yozgat Bozok University (Türkiye)	SALICYLIC ACID IN THE INDUCTION OF PLANT DEFENSE: CURRENT APPROACHES AGAINST FUNGAL DISEASES
Dr. Nasibe Tekiner AYDIN	Artvin Coruh University (Türkiye)	EVALUATION OF THE IN VITRO ANTAGONISTIC ACTIVITY OF TRICHODERMA ISOLATES AGAINST FUSARIUM TRICINCTUM ISOLATED FROM ZINNIA ELEGANS JACQ.
Assoc. Prof. Serkan PEHLİVAN Enver TAN Hogır CEYLAN	Cukurova University (Türkiye)	INSECTICIDAL ACTIVITY OF DIFFERENT PLANT ESSENTIAL OILS AGAINST SPODOPTERA FRUGIPERDA (J.E. SMITH, 1797) (LEPIDOPTERA: NOCTUIDAE) LARVAE
Agricultural Engineer Esra MARAŞLIOĞLU Assoc. Prof. Melih YILAR Assist. prof. Yusuf BAYAR	Kırşehir Ahi Evran University (Türkiye)	INVESTIGATION OF THE ALLELOPATHIC EFFECT OF THE METHANOL EXTRACT OF ZIZIPHORA CAPITATA L.
Agricultural Engineer Esra MARAŞLIOĞLU Assist. Prof. Dr. Yusuf BAYAR Assoc. Prof. Dr. Melih YILAR	Kırşehir Ahi Evran University (Türkiye)	ANTIFUNGAL POTENTIAL OF LEAF AND FRUIT EXTRACTS OF PISTACIA TEREBINTHUS L. AGAINST FUSARIUM OXYSPORUM F. SP. MELONIS AND ALTERNARIA SOLANI
Assist Prof. Dr. İlknur ESKİMEZ Assoc. Prof. Müge ŞAHİN	Isparta University of Applied Sciences (Türkiye) Bilecik Şeyh Edebali University (Türkiye)	POTENTIAL OF ROSEHIP (ROSA SPP.) GENETIC RESOURCES AS ALTERNATIVE ORNAMENTAL PLANTS IN XERISCAPING LANDSCAPES
Assist Prof. Dr. İlknur ESKİMEZ Assoc. Prof. Dr. Müge ŞAHİN	Isparta University of Applied Sciences (Türkiye) Bilecik Şeyh Edebali University (Türkiye)	POTENTIAL USE OF FRUIT SPECIES AS ORNAMENTAL PLANTS IN CLIMATE CHANGE-ADAPTED SUSTAINABLE LANDSCAPE AREAS

Oct 27, 2026 SESSION1 | HALL4

ANKARA TIME
09:30 - 11:30

ONLINE PRESENTATIONS

HEAD OF SESSION:

Prof. Dr. Ahmet OKUMUŞ

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Ziraat Mühendisi Rumeysa Işık SARI Prof. Dr. Barış Bülent AŞIK	Bursa Uludag University (Türkiye)	FERTILITY STATUS OF SOILS USED FOR HAZELNUT CULTIVATION IN SAKARYA PROVINCE
MSc Student Ayşe Nur YENİPAZARLI Assoc. Prof. Dr. İlker UZ	Akdeniz University (Türkiye)	ISOLATION OF PHOSPHATE-SOLUBLE BACTERIA FROM VERMICOMPOST AND INVESTIGATION OF ITS MICROBIAL FERTILIZER POTENTIAL ON LETTUCE CROPS
master's student Habibe ERGEN Prof. Dr. Sertaç DOKUZLU	Bursa Uludağ University (Türkiye)	ECONOMIC ANALYSIS AND VALUE CHAIN OF BLUEBERRY CULTIVATION: THE CASE OF BURSA PROVINCE
Prof. Dr. Ahmet OKUMUŞ Dr. Zafer SEÇGİN	Adnan Menderes University (Türkiye) Etka Biotechnology Ltd (Türkiye)	DETERMINATION OF TSWV-RESISTANT INBRED TOMATO LINES BY SW GENE MARKERS
Prof. Dr. Ahmet OKUMUŞ Agricultural Engineer Ceyhun ASLI	Adnan Menderes University (Türkiye)	VARIETY IDENTIFICATION IN SELFED TOMATO LINES USING SSR MARKERS
Assist. Prof. Dr. Gül Boztok ALGIN Yüksek Lisans Öğrencisi Esra SİNLER	Ege University (Türkiye)	SMARTAGRO: AN EXPLAINABLE SMART IRRIGATION RECOMMENDATION SYSTEM BASED ON MULTI-SENSOR DATA

Oct 27, 2026 SESSION1 | HALL5

ANKARA TIME
09:30 - 11:30

ONLINE PRESENTATIONS

HEAD OF SESSION:

Dr. Öğretim Üyesi Şükrü ÖMÜR

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Dr. Öğretim Üyesi Şükrü ÖMÜR Res. Assist. Dr. Nilay Örk EFENDİOĞLU	Aydın Adnan Menderes University (Türkiye) Ege University, (Türkiye)	UV–VIS SPECTROSCOPIC MONITORING OF GREEN SILVER NANOPARTICLE SYNTHESIS MEDIATED BY TURKISH PINE (PINUS BRUTIA) BARK TANNIN
Assoc. Prof. Ecem AKAN	Aydın Adnan Menderes University (Türkiye)	GREEN EXTRACTION TECHNOLOGIES FOR THE SUSTAINABLE VALORIZATION OF ARTICHOKE BY-PRODUCTS
Assoc. Prof. Ecem AKAN Mustafa DİKME	Aydın Adnan Menderes University (Türkiye) Hatay Mustafa Kemal University (Türkiye)	EVALUATION OF FIG (FICUS CARICA L.) BY-PRODUCTS AS SOURCES OF PHENOLIC COMPOUNDS: GREEN EXTRACTION APPROACHES
Dr. Soner UYSAL	Ataturk University (Türkiye)	EVALUATION OF BRIX VALUES IN CORN SILAGES OF DIFFERENT QUALITY BASED ON THEIR PHYSICAL CHARACTERISTICS
Assoc. Prof. Ebru ERDEMİR Dr. Lecturer Kübra FETTAHOĞLU Assoc. Prof. Melek ZOR	Agri Ibrahim Cecen University (Türkiye)	EVALUATION OF OXIDATIVE QUALITY CHARACTERISTICS OF CHICKEN DRUMSTICK MEAT OBTAINED FROM MARKETS IN AĞRI
Master's Student Alper Cüneyt TÜRKMEN Master's Student Sena İrem OK	Bursa Uludağ University (Türkiye)	AN INVESTIGATION OF THE FACTORS INFLUENCING THE IMPACT OF SUPERMARKET EMPLOYEES' ATTITUDES AND BEHAVIORS ON CONSUMERS' PURCHASING DECISIONS USING ORDINAL LOGISTIC REGRESSION ANALYSIS
Pelinsu DEVECİ Prof. Dr. Sertaç DOKUZLU	Bursa Uludağ University (Türkiye)	A LOCAL GOVERNMENT-SUPPORTED PRODUCTION AND MARKETING MODEL FOR WOMEN'S ECONOMIC PARTICIPATION: THE CASE OF NİLÜFER MUNICIPALITY

Oct 27, 2026 SESSION1 | HALL6

ANKARA TIME
09:30 - 11:30

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Dr. Abir BOUNAAMA

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Dr. Abir BOUNAAMA Dr. Messaoud M AOUNI	Abdelhamid Mehri Constantine 2 University (Algeria) 20 Aout 1955 University (Algeria)	BLOW UP TIME ESTIMATES FOR SOLUTIONS TO HYPERBOLIC WAVE EQUATIONS WITH SOURCE TERMS
Prof. Asoc. Dr. Valbon BYTYQI	University of Prishtina, (Kosova)	ANALYSIS OF SOIL TEMPERATURE VARIABILITY AT DIFFERENT DEPTHS DURING THE 2023 VEGETATION PERIOD AT THE MITROVICA METEOROLOGICAL STATION
Dr. Anamika BASU	Gurudas College (Affiliated to University of Calcutta) (India)	NETWORK PHARMACOLOGY ANALYSIS OF CHRYSIN
Dr. Wassila SOUFI	Mustapha Stambouli University of Mascara (Algeria)	THEORETICAL STUDY AND MOLECULAR MODELING OF QUINOLINE DERIVATIVES WITH THERAPEUTIC POTENTIAL AGAINST NEURODEGENERATIVE DISEASES
Dr. Opeyemi O. FAYEHUN Professor Labunmi LAJİDE Dr. Zaccheus S OLOLADE	University of Medical Sciences (Nigeria)	NEPHROPROTECTIVE AND ANTIUROLITHIATIC EFFECTS OF BRASSICA OLERACEA AND CALLIANDRA HAEMATOCEPHALA IN ETHYLENE GLYCOL–INDUCED MICE
Dr. R. DEVİ Prof. Dr. Devi RAMAN	Bharath Institute of Higher Education and Research (India) Bharath University (India)	FOOD ADDITIVES AS GUT DISRUPTORS: A SYSTEMATIC REVIEW ON THE IMPACT OF EMULSIFIERS, ARTIFICIAL SWEETENERS, AND NANOPARTICLES ON GUT BARRIER AND MICROBIOME
Mohamed MASTİR Khalil EL-HAMİ	Mohammed V University in Rabat (Morocco)	PHYSICS-INFORMED GRAPH NEURAL NETWORKS FOR PREDICTING CASCADING INFRASTRUCTURE FAILURES IN URBAN DIGITAL TWINS

HALL6 – CONTINUED ON THE NEXT PAGE

Oct 27, 2026 SESSION1 | HALL6

ANKARA TIME
09:30 - 11:30

ONLINE PRESENTATIONS

HEAD OF SESSION:

Dr. Abir BOUNAAMA

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Dr. Anamika BASU Prof. Anasua SARKAR	Gurudas College (India) Jadavpur University (India)	DEEP GENERATIVE NETWORK MAPPING OF BRAHMI PHYTOCOMPOUNDS AGAINST ALZHEIMER'S TRANSCRIPTOMIC TARGETS
Mr. Muhammad NAEEM Prof. Dr. Syed Makhdoom HUSSAİN	Government College University Faisalabad (Pakistan)	EFFECT OF INSECT MEAL BASED DIET ON ANTIOXIDANT ACTIVITY OF PANGASSIUS HYPOPHTHALMUS FINGERLING

Oct 27, 2026 SESSION2 | HALL1

ANKARA TIME
12:00 - 14:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Deputy Manager (R&D) Md. Daraj Uddin PRODHAN

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Deputy Manager (R&D) Md. Shahadat HOSSEN Director (Marketing) Iram MALİK Senior Researcher Md. Zohurul ISLAM Senior Researcher Dibyendu CHATTARJEE Senior Researcher Abdul KAİUM Manager -Quality Control Dr. Bimal Chandra KUNDU Md. Daraj Uddin PRODHAN	A. R Malik Seeds Pvt. Ltd (Bangladesh)	EVALUATION OF DOUBLE-ROW BED PLANTING FOR IMPROVING SEED TUBER YIELD IN POTATO (SOLANUM TUBEROSUM L.)
A. PENCHEVA M. DESHEV G. DESHEVA E. VALCHİNOVA B. KYOSEV	Institute of Plant Genetic Resources “K. Malkov” (Bulgaria)	MORPHOLOGICAL VARIABILITY AND PRINCIPAL COMPONENT ANALYSIS OF WILD WHEAT RELATIVES (AEGILOPS SPECIES)
Dr. Albena PENCHEVA Dr. Manol DESHEV Dr. Gergana DESHEVA Dr. Evgeniya VALCHİNOVA Dr. Bozhidar KYOSEV	Institute of Plant Genetic Resources "Konstantin Malkov" (Bulgaria)	MORPHOLOGICAL VARIABILITY AND PRINCIPAL COMPONENT ANALYSIS OF WILD WHEAT RELATIVES (AEGILOPS SPECIES)
RA NAYEEM	Bangladesh Agricultural University (Bangladesh)	EVALUATION OF GROWTH AND YIELD OF CHILLI (CAPSICUM FRUTESCENS L.) GENOTYPES DURING SUMMER

HALL1 – CONTINUED ON THE NEXT PAGE

Oct 27, 2026 SESSION2 | HALL1

ANKARA TIME
12:00 - 14:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Deputy Manager (R&D) Md. Daraj Uddin PRODHAN

AUTHOR(S)	ORGANISATION	TOPIC TITLE
RA Abu NAYEEM	Bangladesh Agricultural University (Bangladesh)	EFFECT OF VARIETIES AND FOLIAR APPLICATION OF GIBBERELLIC ACID (GA3) ON GROWTH AND YIELD OF OKRA (ABELMOSCHUS ESCULENTUS L.)
Assoc. Prof. Dr. Dr. Rabia GHAFFAR Hina SULTAN	University of Education (Pakistan)	EVALUATING YEAST-ENRICHED ORGANIC FERTILIZERS ON THE LETTUCE GROWTH AND BIOMASS PRODUCTION
Dr. Ndongo DIOUF Dr. Jules DIOUF	Cheikh Anta Diop University (UCAD) (Senegal)	WEED IMPACT AND CRITICAL PERIOD OF WEED CONTROL IN COTTON CROPS IN EASTERN SENEGAL
Dr. Ndiogou GUEYE	Université Cheikh Anta Diop (Sénégal)	BIOCONTROL POTENTIAL OF TRICHODERMA INDIGENOUS SPECIES AGAINST SOIL-BORN TOMATO PATHOGENS (FUSARIUM OXYSPORUM AND SCLEROTIUM ROLFSII) IN SENEGAL

Oct 27, 2026 SESSION2 | HALL2

ANKARA TIME 12:00 - 14:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Ms. Mahsa KHALEGHİ

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Ms. Mahsa KHALEGHİ	Shahid Beheshti University of Medical Sciences (Iran)	BEYOND SINGLE-CONTAMINANT TESTING: MULTI-RESIDUE ANALYSIS AND EXPOSURE-BASED PRIORITIZATION OF CHEMICAL HAZARDS IN FOOD
Dr. Oksana BIHUN	National Scientific Center "Institute for Soil Science and Agrochemistry Research named after O.N. Sokolovsky" (Ukraine)	DEVELOPMENT OF A ZONE-SPECIFIC PEDOTRANSFER FUNCTION FOR SOIL BULK DENSITY PREDICTION IN THE STEPPE ZONE OF UKRAINE
Muhammad Zubairu RABİ'U Musa ZAKARI Yusuf Yunusa RİKO Yahaya Yunusa RİKO	Al-Farabi Kazakh National University (Kazakhstan) Universitas Aisyiyah Yogyakarta (Indonesia) Umaru Musa Yar'adua University (Nigeria)	COMPUTER VISION AND AGENTIC AI FOR SOIL FOOD WEB AND NUTRIENT CYCLING OPTIMIZATION: A REVIEW OF EMERGING APPROACHES AND RESEARCH GAPS
Ibrahim Enesi ABDULLAHI Adewale Abdulhameed ODESEYE	Agricultural and Rural Management Training Institute (ARMTI), Ilorin (Nigeria)	EFFECT OF HORTICULTURAL LAND-USE SYSTEMS ON SOIL MOISTURE, SELECTED SOIL PHYSICAL AND CHEMICAL INDICATORS AT OHIANA IN OKENE, KOGI STATE
Ibrahim Enesi ABDULLAHI	Agricultural and Rural Management Training Institute (ARMTI) (Nigeria)	EFFECT OF FARM MECHANIZATION ON SOIL PHYSICAL PROPERTIES AND ORGANIC CARBON SEQUESTRATION AT THE AGRICULTURAL AND RURAL MANAGEMENT TRAINING INSTITUTE (ARMTI) TRAINING AND DEMONSTRATION FARM, ILORIN, NIGERIA
Dr. Volodymyr MESHCHERİAKOV Master's degree Maria GARKAVA	State Biotechnological University (Ukraine)	INNOVATION DRIVERS OF PROFITABILITY ENHANCEMENT IN UKRAINIAN AGRICULTURAL ENTERPRISES

HALL2 – CONTINUED ON THE NEXT PAGE

Oct 27, 2026 SESSION2 | HALL2

ANKARA TIME
12:00 - 14:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Ms. Mahsa KHALEGHİ

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Prof. As. Dr. Oumar BA Dr. Abdou Khadr SANE Prof. As. Dr Mariama NGOM Dr. Abraham DIEME Prof. Dr. Mame Ourèye SY	Cheikh Anta Diop University of Dakar (Senegal)	PLANT BIOTECHNOLOGY FOR CROP DEVELOPMENT IN SENEGAL: MICROPROPAGATION, DOMESTICATION, QUALITY PLANTING MATERIAL AND SALINITY RESPONSES
Dr. Nadjet CHETTIH Dr. Dounia KEDDARI	Centre de Recherche en Aménagement du Territoire (CRAT) (Algeria)	METAHEURISTIC-DRIVEN MACHINE LEARNING FOR INTELLIGENT CROP RECOMMENDATION IN INDIAN AGRICULTURE

Oct 27, 2026 SESSION2 | HALL3

ANKARA TIME 12:00 - 14:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Prof. Dr. Xxx

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Assistant Prof. Dr. Sobia MAQSOOD	The University of Faisalabad (Pakistan)	GENDER, CLIMATE CHANGE, AND AGRICULTURAL VULNERABILITY IN PAKISTAN: A SYSTEMATIC REVIEW OF RURAL WOMEN'S LIVELIHOODS, ADAPTATION STRATEGIES, AND STRUCTURAL INEQUALITIES
Master Student Mujahid Subhan ASLAM Dr. Muhammad AMJAD Prof. Dr Syed Makhdoom HUSSAİN	Government College University Faisalabad (Pakistan)	A REVIEW: PLANT FOLIAGE AS A LOW-COST PROTEIN RESOURCE FOR FRESHWATER FISH
Master Student M. Numan RAZA Dr. Syed Makhdoom HUSSAİN Mujahid Subhan ASLAM Muhammad AMJAD	Government College University Faisalabad (Pakistan)	MICROPLASTICS AND FISH HEALTH. OXIDATIVE STRESS, IMMUNE DYSFUNCTION, AND ORGAN DAMAGE
M.Phil. Scholar Shanza SHOUKAT Prof. Dr. Syed Makhdoom HUSSAİN	Government College University Faisalabad (Pakistan)	IMPORTANCE OF BIOACTIVE FEED ADDITIVES IN AQUACULTURE
Miss Amina KHALİD Miss Hafsa ALİ Miss Wasifa SHAH	Government College University Faisalabad (Pakistan)	SEAWEED- BASED BIOPLASTICS: A RENEWABLE SOLUTION FOR REDUCING PLASTIC USE AND ADVANCING CIRCULARITY IN AQUACULTURE
Miss Wasifa SHAH Miss Amina KHALİD Miss Hafsa ALİ	Government College University Faisalabad (Pakistan)	INNOVATIVE BIOTECHNOLOGICAL STRATEGIES FOR ENHANCING AQUACULTURE PRODUCTIVITY AND SUSTAINABILITY

HALL3 – CONTINUED ON THE NEXT PAGE

Oct 27, 2026 SESSION2 | HALL3

ANKARA TIME
12:00 - 14:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Prof. Dr. Xxx

AUTHOR(S)	ORGANISATION	TOPIC TITLE
MD, PhD, Dr. Professor Nodar SULASHVİLİ MD, PhD, Dr. Professor Margarita BEGLARYAN MD, PhD, Dr. Professor Nana GORGASLİDZE MD, PhD, Dr. Professor Nato ALAVİDZE Dr. Professor Ketevani GABUNİA MD, PhD, Dr. Professor Maka BULEİSHVİLİ Dr. Professor Mariam DARBAİDZE Dr. Professor Irina IMERLİSHVİLİ Dr. Professor Nino ABULADZE Dr. Professor Maka JAVAKHİA MD, PhD, Dr. Professor Lali PATSİA MD, Dr. Professor Marika SULASHVİLİ	Georgian International University (Georgia) Yerevan State Medical University After Mkhitar Heratsi (Republic of Armenia) Tbilisi State Medical University (Georgia) Akaki Tsereteli State University (Georgia) BAU International University Batumi (Georgia) The University of Georgia (Georgia)	THE COMPREHENSIVE INTERDISCIPLINARY SCIENTIFIC EVALUATION OF FOOD SCIENCES, FOOD CHEMISTRY, NUTRITIONAL BIOCHEMISTRY, FOOD MICROBIOLOGY, FOOD SAFETY, AND TECHNOLOGICAL INNOVATION: COMPOSITIONAL CHARACTERIZATION, NUTRITIONAL QUALITY, CONTAMINANT DETECTION, BIOACTIVE COMPOUNDS, AND SUSTAINABLE FOOD PROCESSING FOR HUMAN HEALTH AND GLOBAL FOOD SECURITY

HALL3 – CONTINUED ON THE NEXT PAGE

Oct 27, 2026 SESSION2 | HALL3

ANKARA TIME
12:00 - 14:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Prof. Dr. Xxx

AUTHOR(S)	ORGANISATION	TOPIC TITLE
MD, PhD, Professor Nodar SULASHVİLİ MD, PhD, Sc. Dr, Professor Margarita BEGLARYAN MD, PhD, Professor Nana GORGASLİDZE MD, PhD, Professor Nato ALAVİDZE MD, PhD, Professor Ketevani GABUNİA MD, PhD, Professor Maka BULEİSHVİLİ MD, PhD, Professor Mariam DARBAİDZE PhD, Professor Irina IMERLİSHVİLİ MD, PhD, Professor Nino ABULADZE PhD, Professor Maka JAVAKHİA MD, PhD, Professor Lali PATSİA MD, Professor Marika SULASHVİLİ	Georgian International University (Georgia) Yerevan State Medical University After Mkhitar Heratsi (Republic of Armenia) Tbilisi State Medical University (Georgia) Akaki Tsereteli State University (Georgia) BAU International University Batumi (Georgia)	THE INTEGRATED SCIENTIFIC ASSESSMENT OF AGRICULTURAL SCIENCES, FIELD CROP PRODUCTIVITY, HORTICULTURAL INNOVATION, AND PLANT PROTECTION: SUSTAINABLE CROP PRODUCTION, PLANT HEALTH MANAGEMENT, AGROECOLOGICAL RESILIENCE AND CLIMATE-SMART AGRICULTURAL DEVELOPMENT

Oct 27, 2026 SESSION2 | HALL4

ANKARA TIME 12:00 - 14:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Prof. Dr. Xxx

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Dr. Smaın FATİHA	Abou Beker Belkaid University (Algeria)	INTEGRATED ASSESSMENT OF A PHOTOVOLTAIC-POWERED REVERSE OSMOSIS SYSTEM FOR SUSTAINABLE IRRIGATION IN SEMI-ARID ALGERIA: ENERGY, ENVIRONMENTAL AND ECONOMIC PERFORMANCE TOWARD SUSTAINABLE WATER MANAGEMENT
Dr. Aboubacar Sidigh SYLLA Dr. Mohssine GHAZOUİ Dr. Aziz IHAMMİ Dr. Ilham KİRM Dr. Chigr MOHAMMED	Sultan Moulay Slimane University (Morocco)	UTILIZATION OF ZIZIPHUS LOTUS SEEDS AS A LIGNIN SOURCE FOR ACTIVATED CARBON PREPARATION AND RED CONGO DYE ADSORPTION: OPTIMIZATION, KINETIC BEHAVIOR, ISOTHERMAL MODELS, AND THERMODYNAMIC PROPERTIES
MSc Student Hermıs MELE Dr. Marcela MELE	Agricultural University of Tirana (Albania) University Aleksandër Moisiu of Durrës (Albania)	SUSTAINABLE UNDERGROUND AGROTOURISM DEVELOPMENT THROUGH PERMACULTURE PRINCIPLES: A CASE STUDY KORÇA REGION, ALBANIA
PhD Student Maksim O. KVİTKO Prof. Dr. Yuriy V. LYKHOLAT Lect. Oleksandr I. KOREN PhD Student Tetyana Y. LYKHOLAT Prof. Dr. Olena A. LYKHOLAT	Kryvyi Rih State Pedagogical University (Ukraine) Oles Honchar Dnipro National University (Ukraine) University of Customs and Finance (Ukraine)	WOODY AND SHRUBBY SPECIES LIFE FORMS ANALYSIS ON DISTURBED LANDS IN THE UKRAINE KRYVYI RIH REGION
Dr. Yusifova K.YU. - Agakhanova A.SH	Veterinary Research Scientific Institute (Azerbaijan)	CANINE DISTEMPER VIRUS IN DIAGNOSTIC SAMPLES
Dr. Yusifova K.YU.	Veterinary Research Scientific Institute (Azerbaijan)	THE ROLE OF ABIOTIC FACTORS ON DISEASES OF THE SILKWORM

HALL4 – CONTINUED ON THE NEXT PAGE

Oct 27, 2026 SESSION2 | HALL4

ANKARA TIME
12:00 - 14:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Prof. Dr. Xxx

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Hafiza Ghulam FATİMA Dr. Muhammad Muddassir ALİ	University of Veterinary and Animal Sciences (Pakistan)	INTEGRATED MOLECULAR AND SEROLOGY-BASED APPROACHES FOR VETERINARY DISEASE SURVEILLANCE IN LIVESTOCK
Usman, Francis ROBERT	Kogi State Polytechnic (Nigeria)	GENDER DIFFERENTIAL IN CASSAVA PRODUCTION AND PROCESSING IN OKENE LOCAL GOVERNMENT AREA, KOGI STATE, NIGERIA
Usman, Francis ROBERT	Kogi State Polytechnic (Nigeria)	CREDIT UTILIZATION AND REPAYMENT PERFORMANCE BY COOPERATIVES AND INDIVIDUAL FARMERS IN DELTA STATE, NIGERIA

Oct 27, 2026 SESSION2 | HALL5

ANKARA TIME 12:00 - 14:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Dr. Marcela MELE

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Ms. Mahsa KHALEGHİ	Shahid Beheshti University of Medical Sciences (Iran)	BIOPRESERVATION WITH PROTECTIVE CULTURES AND POSTBIOTICS: OPPORTUNITIES AND LIMITATIONS FOR SAFER READY-TO-EAT FOODS
Dr. Abubakar R. A. Mr. Adamu A. U. Mr. Shehu S.A	Audu Bako College of Agriculture (Nigeria)	DESIGN, CONSTRUCTION AND PERFORMANCE ANALYSIS OF A COMBINED CHARCOAL OVEN AND STOVE FOR HOUSEHOLD AND SMALL-SCALE USE
Dr. Abubakar R. A. Mr Adamu A. U. Mr Shehu S.A	Audu Bako College of Agriculture Dambatta (Nigeria)	DESIGN, FABRICATION AND PERFORMANCE ANALYSIS OF A MANUAL SPIKED-ROLLER SOIL AERATOR FOR SMALLHOLDER FARMS
Dr. Marcela MELE MSc Student Hermıs MELE	University Aleksandër Moisiu of Durrës (Albania) Agricultural University of Tirana (Albania)	MOBILITY TRANSITIONS, DIASPORA RETURN AND CIRCULATORY LIVING BETWEEN ALBANIA, GREECE AND NORTH MACEDONIA
Dr. Muhammad AMJAD Prof. Dr. Syed Makhdoom HUSSAİN Zainab AKRAM	Government College University Faisalabad (Pakistan)	AMELIORATIVE POTENTIAL OF CORIANDER SEED EXTRACT (CSE) AGAINST TANNERY EFFLUENT-INDUCED TOXICITY IN CATLA CATLA
Miss Hafsa ALİ Miss Amina KHALİD Miss Wasifa SHAH	Government College University Faisalabad (Pakistan)	THE INVISIBLE FRACTION: NANOPLASTICS IN AQUATIC ENVIRONMENTS, FROM DETECTION AND FATE TO ECOLOGICAL RISK
Associate Prof. PhD. Brînduşa Mihaela RADU	Institute for Economic Forecasting - Romanian Academy (Romania)	FOOD INFLATION IN ROMANIA: STRUCTURAL DETERMINANTS AND DISTRIBUTIVE IMPLICATIONS
Associate Prof. PhD. Brînduşa Mihaela RADU	Institute for Economic Forecasting - Romanian Academy (Romania)	NON-FOOD INFLATION IN ROMANIA: TRANSMISSION MECHANISMS, EXTERNAL DEPENDENCIES, AND PRICE RIGIDITIES

Oct 27, 2026 SESSION2 | HALL6

ANKARA TIME 12:00 - 14:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Assist. Prof. Dr. Gökçe ÜSTÜNDAĞ

AUTHOR(S)	ORGANISATION	TOPIC TITLE
Assist. Prof. Dr. Gökçe ÜSTÜNDAĞ	Zonguldak Bülent Ecevit University (Türkiye)	PESTICIDE USE IN THE CLIMATE CRISIS: IMPLICATIONS FOR GREENHOUSE GAS EMISSIONS AND SUSTAINABLE AGRICULTURE
Assoc. Prof. Dr. Kamuran KAYA	Hatay Mustafa Kemal University (Türkiye)	DETERMINATION OF CICADELLIDAE (HEMIPTERA) SPECIES AND THEIR POPULATION DENSITIES ON WEEDS IN CITRUS ORCHARDS IN HATAY PROVINCE, TÜRKİYE
Muhammed Buğra CELİL Asist. Prof. Başak ULAŞLI	Hatay Mustafa Kemal University (Türkiye)	FALL ARMYWORM IN HATAY MAIZE CULTIVATION: DISTRIBUTION PATTERN, DAMAGE RATE, AND NATURAL ENEMIES
Dr. Esra GÜL	Ankara University (Türkiye)	PHYLOGENETIC ANALYSIS OF ALBUGO SPECIES INFECTING SOME PLANTS IN THE BRASSICACEAE FAMILY IN TÜRKIYE
Dr. Yasemin AYDIN İsmail ATAY Eslam Mohamed ALBASTAWISI Prof. Dr. Cem ÖZKAN	Ankara University (Türkiye) Trimail Biological Agriculture (Türkiye)	FIELD EFFICACY OF BIOLOGICAL CONTROL AGAINST THE TOMATO LEAFMINER (TUTA ABSOLUTA): A CASE STUDY IN MANISA PROVINCE, TÜRKİYE
Assoc. Prof. Aygun AZİZOVA Ramin MAMMADOV Assoc. Prof. Azar HASANOV	Veterinary Scientific-Research Institute (Azerbaijan)	PATHOGENETIC SNERGISM MECHANISMS AND EPIDEMIOLOGICAL DYNAMICS OF ASSOCIATIVE EIMERIA AND HELMINTH INFECTIONS IN DOMESTIC CHICKENS

HALL6 – CONTINUED ON THE NEXT PAGE

Oct 27, 2026 SESSION2 | HALL6

ANKARA TIME
12:00 - 14:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Assist. Prof. Dr. Gökçe ÜSTÜNDAĞ

AUTHOR(S)	ORGANISATION	TOPIC TITLE
PhD Student Gular Mammadov A Assoc. Prof., PhD in biology Aygun AZİZOVA Ulviyya SAMADOVA	Veterinary Scientific-Research Institute (Azerbaycan)	ASSOCIATIVE INFECTION OF BABESIA OVIS AND MONIEZIA EXPANSA IN SHEEP OF THE GUBA-KHACHMAZ ECONOMIC REGION: EPIZOOTIOLOGICAL CHARACTERISTICS, IMPACT ON HEMATO-BIOCHEMICAL PARAMETERS, AND ECONOMIC EVALUATION
Dr. Hasan ER	Bingol University (Türkiye)	MACHINE LEARNING-BASED EVAPOTRANSPIRATION ESTIMATION FOR PRECISION IRRIGATION AND AGRICULTURAL WATER REUSE

Oct 28, 2026 SESSION-1/TELAFI OTURUMU | SESSION-1/TELAFI OTURUMU	ANKARA TIME 13:00 - 15:00

ONLINE PRESENTATIONS

HEAD OF SESSION:

Prof. Dr. Xxx

AUTHOR(S)	ORGANISATION	TOPIC TITLE

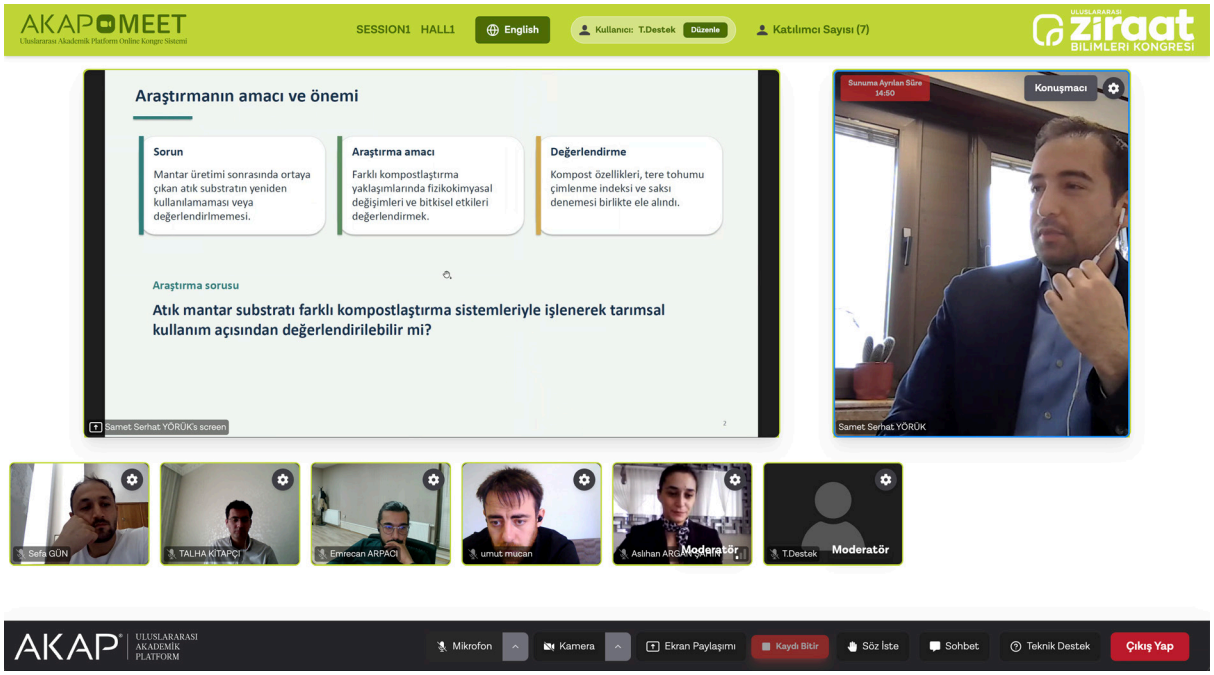
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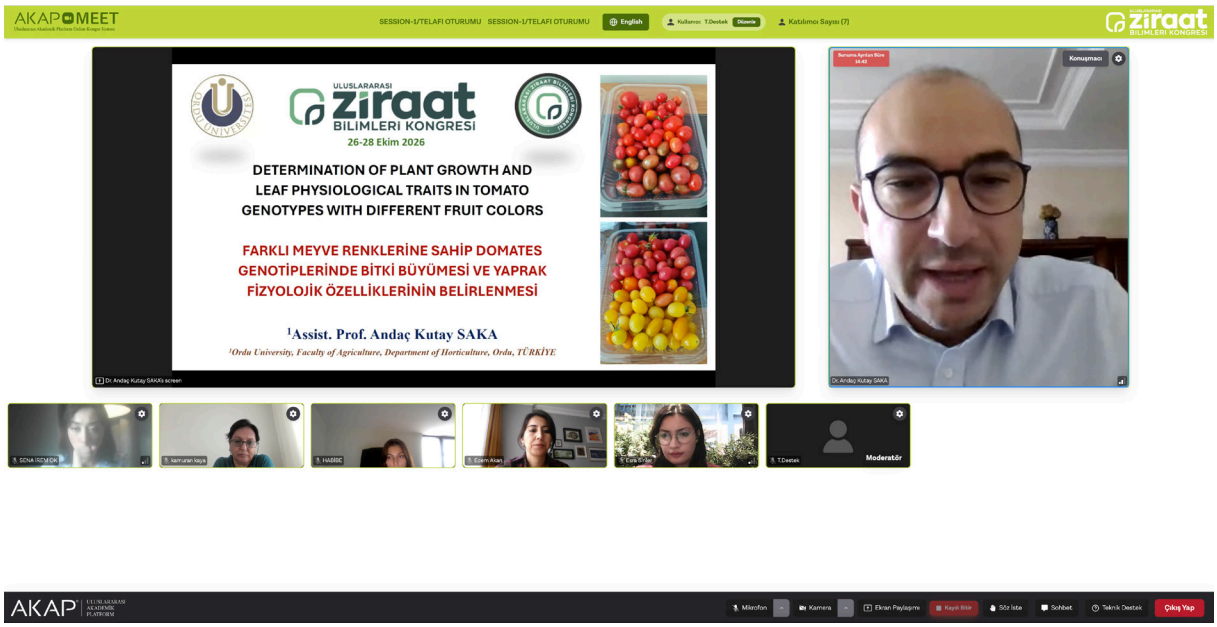
INTERNATIONAL agriculture SCIENCES CONGRESS

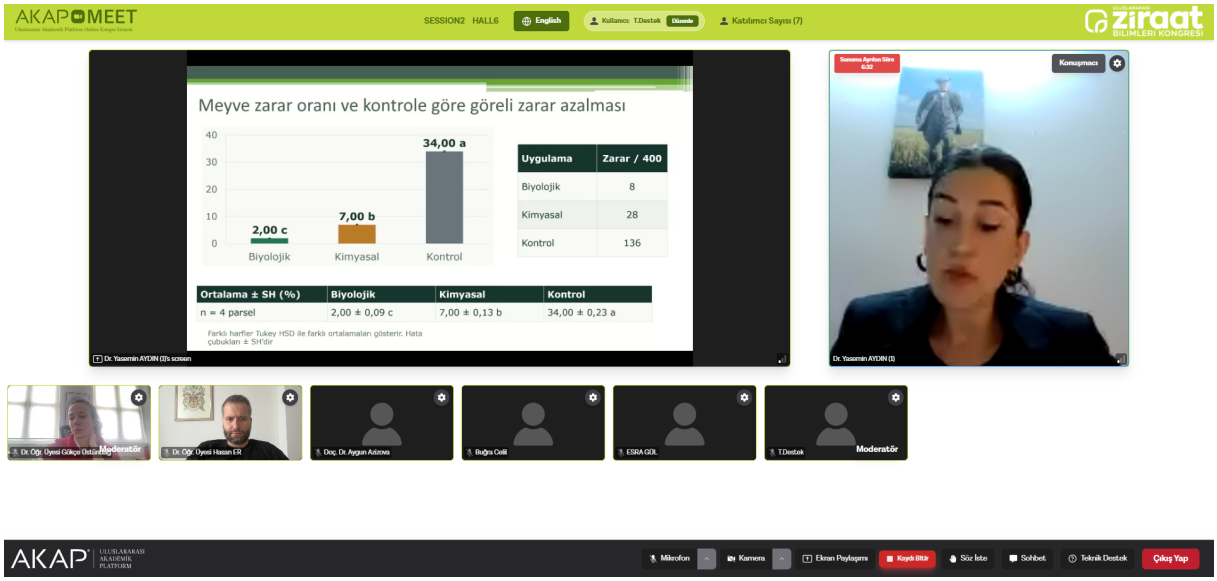
October 26–28, 2026
Divan Ankara Hotel

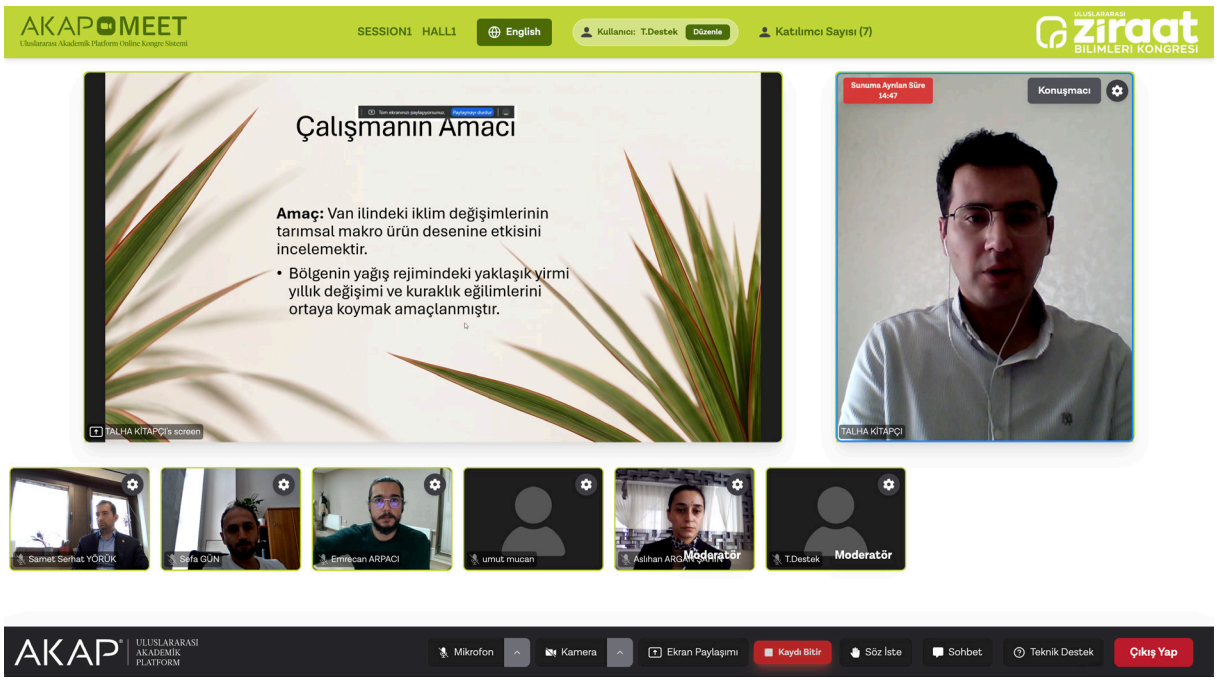
CONGRESS PROGRAM




AKAP MEET
SESSION1 HALL1
English
Katılımcı Sayısı (7)
ziraat BİLİMLERİ KONGRESİ
Araştırmanın amacı ve önemi
Sorun
Mantar üretimi sonrasında ortaya çıkan atık substratın yeniden kullanılamaması veya değerlendirilmemesi.
Araştırma amacı
Farklı kompostlaştırma yaklaşımlarında fizikokimyasal değişimleri ve bitkisel etkileri değerlendirmek.
Değerlendirme
Kompost özellikleri, tere tohumu çimlenme indeksi ve saksı denemesi birlikte ele alındı.
Araştırma sorusu
Atık mantar substratı farklı kompostlaştırma sistemleriyle işlenerek tarımsal kullanım açısından değerlendirilebilir mi?
Samet Serhat YÖRÜK's screen
Konuşmacı
Samet Serhat YÖRÜK
Sefa GÜN
TALHA KİTAPÇI
Emrecan ARPACI
umut mucan
Moderatör
T.Destek
AKAP ULUSLARARASI AKADEMİK PLATFORM
Mikrofon
Kamera
Ekran Paylaşımı
Kaydı Bitir
Söz İste
Sohbet
Teknik Destek
Çıkış Yap


AKAP MEET
ziraat BİLİMLERİ KONGRESİ
26-28 Ekim 2026
DETERMINATION OF PLANT GROWTH AND LEAF PHYSIOLOGICAL TRAITS IN TOMATO GENOTYPES WITH DIFFERENT FRUIT COLORS
FARKLI MEYVE RENKLERİNE SAHİP DOMATES GENOTİPLERİNDE BİTKİ BÜYÜMESİ VE YAPRAK FİZYOLOJİK ÖZELLİKLERİNİN BELİRLENMESİ
[1]Assist. Prof. Andaç Kutay SAKA
[1]Ordu University, Faculty of Agriculture, Department of Horticulture, Ordu, TÜRKİYE
Konuşmacı
Moderatör
AKAP ULUSLARARASI AKADEMİK PLATFORM
Çıkış Yap


AKAPMEET
SESSION2 HALL6
English
Katılımcı Sayısı (7)
ziraat BİLİMLERİ KONGRESİ
Meyve zarar oranı ve kontrole göre göreli zarar azalması
34,00 a
7,00 b
2,00 c
Biyolojik
Kimyasal
Kontrol
Uygulama
Zarar / 400
Biyolojik 8
Kimyasal 28
Kontrol 136
Ortalama ± SH (%)
Biyolojik
Kimyasal
Kontrol
n = 4 parsel
2,00 ± 0,09 c
7,00 ± 0,13 b
34,00 ± 0,23 a
Konuşmacı
Moderatör
Moderatör
AKAP
Mikrofon
Kamera
Ekran Paylaşımı
Kaydı Bitir
Söz İste
Sohbet
Teknik Destek
Çıkış Yap


AKAPMEET
SESSION1 HALL1
English
Katılımcı Sayısı (7)
ziraat BİLİMLERİ KONGRESİ
Çalışmanın Amacı
Amaç: Van ilindeki iklim değişimlerinin tarımsal makro ürün desenine etkisini incelemektir.
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MACHINE LEARNING-BASED EVAPOTRANSPIRATION ESTIMATION FOR PRECISION IRRIGATION AND AGRICULTURAL WATER REUSE

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ÖZET

Referans evapotranspirasyon (ET 0) ve bitki evapotranspirasyonu (ET c) dahil olmak üzere evapotranspirasyonun (ET) doğru tahmin edilmesi, artan iklim değişkenliği ve su kıtlığı koşullarında hassas sulama, tarımsal su yönetimi ve sürdürülebilir su kullanımı açısından büyük önem taşımaktadır. Güvenilir ET tahminleri, sulama programlarının bitkilerin su gereksinimleriyle uyumlu biçimde oluşturulmasını sağlayarak geri kazanılmış suyun tarımsal üretimde verimli ve sürdürülebilir kullanımına da katkıda bulunmaktadır. ET tahmininde, özellikle FAO-56 Penman – Monteith yaklaşımı olmak üzere geleneksel ampirik ve fiziksel temelli yöntemler yaygın olarak kullanılmaktadır. Bununla birlikte, bu yöntemlerin uygulanabilirliği yüksek meteorolojik veri gereksinimleri ve veri kısıtlılığı bulunan koşullar nedeniyle sınırlanabilmektedir. Yapay zekâ, hesaplama teknolojileri ve uzaktan algılama alanındaki gelişmeler, evapotranspirasyon tahmininde makine öğrenmesi (ML) yöntemlerinin kullanımını artırmıştır. Bu derlemede, geleneksel tahmin yaklaşımlarının yanı sıra yapay sinir ağları (ANN), destek vektör makineleri (SVM), aşırı öğrenme makineleri (ELM), evrişimli sinir ağları (CNN), uzun kısa süreli bellek ağları (LSTM), Random Forest ve XGBoost gibi makine öğrenmesi modelleri ele alınmaktadır. Meteorolojik değişkenlerin etkisi, veri erişilebilirliği ve farklı iklim koşullarındaki model performansları, hassas sulama ve tarımsal suyun yeniden kullanımı açısından değerlendirilmektedir. Önceki çalışmalar, makine öğrenmesi yaklaşımlarının özellikle meteorolojik değişkenler arasında karmaşık ve doğrusal olmayan ilişkilerin bulunduğu koşullarda geleneksel yöntemlerden daha yüksek tahmin doğruluğu sağlayabildiğini göstermektedir. Ayrıca hibrit modeller, optimizasyon teknikleri ve uzaktan algılama ile bütünleştirilen yaklaşımlar, tahmin doğruluğunun ve modellerin farklı koşullara uyum yeteneğinin geliştirilmesinde önemli potansiyel taşımaktadır. Genel olarak makine öğrenmesine dayalı ET tahmini, sulama programlamasının iyileştirilmesi, tarımsal su kullanım etkinliğinin artırılması ve geri kazanılmış su kaynaklarının yönetimi açısından umut vadeden bir yaklaşım sunmaktadır.

Anahtar Kelimeler: Referans evapotranspirasyon, Makine öğrenmesi, Hassas sulama, Tarımsal suyun yeniden kullanımı, Sürdürülebilir su yönetimi

ABSTRACT

Accurate estimation of evapotranspiration (ET), including reference evapotranspiration (ET 0) and crop evapotranspiration (ETc), is essential for precision irrigation, agricultural water management, and sustainable water use under increasing climate variability and water scarcity. Reliable ET estimation is also important for agricultural water reuse, where irrigation scheduling must be aligned with crop water requirements to support the efficient and sustainable application of reclaimed water. Conventional empirical and physically based methods, particularly the FAO-56 Penman – Monteith approach, have been widely used for ET estimation. However, their application may be limited by extensive meteorological data requirements and reduced applicability under data-limited conditions. Recent developments in artificial intelligence, computational technologies, and remote sensing have increased the application of machine learning (ML) methods for ET prediction. This review examines conventional estimation approaches and ML-based models, including artificial neural networks (ANN), support vector machines (SVM), extreme learning machines (ELM), convolutional neural networks (CNN), long short-term memory networks (LSTM), Random Forest, and XGBoost. Particular emphasis is placed on the influence of meteorological variables, data availability, and model performance under different climatic conditions, with consideration of their applications in precision irrigation and agricultural water reuse. Previous studies have demonstrated that ML approaches can achieve higher predictive accuracy than conventional methods, particularly when complex nonlinear relationships exist among meteorological variables. Furthermore, hybrid models, optimization techniques, and remote sensing–integrated approaches have shown potential for improving estimation accuracy and model adaptability. Overall, ML-based ET estimation represents a promising approach for improving irrigation scheduling, agricultural water-use efficiency, and the management of reclaimed water resources.

Keywords: Reference evapotranspiration, Machine learning, Precision irrigation, Agricultural water reuse, Sustainable water management

ÇANAKKALE'DE AGROKLİMATİK KURU DÖNEM YAPISININ BAGNOULS–GAUSSEN VE DE MARTONNE İNDİSLERİ İLE DEĞERLENDİRİLMESİ

AGROCLIMATIC CHARACTERIZATION OF DRY-SEASON STRUCTURE IN ÇANAKKALE, TÜRKİYE USING BAGNOULS–GAUSSEN AND DE MARTONNE INDICES

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ÖZET

Tarımsal üretimin iklim koşullarına duyarlılığı, özellikle yağışın yetersiz olduğu ve sıcaklıkların yükseldiği dönemlerde belirgin biçimde artmaktadır. Akdeniz ikliminin etkisi altında bulunan Çanakkale'de tarımsal üretim açısından kuru dönemin başlangıcı, süresi ve şiddetinin belirlenmesi, sulama planlaması ve su kaynaklarının etkin kullanımı bakımından önem taşımaktadır. Bu çalışmanın amacı, Çanakkale'de uzun dönemli agroklimatik kuru dönem yapısını Bagnouls–Gaussen ve De Martonne indisleri kullanılarak değerlendirmektir. Çalışmada Meteoroloji Genel Müdürlüğü Çanakkale istasyonuna ait 1929–2025 dönemini kapsayan aylık ortalama sıcaklık ve toplam yağış verileri kullanılacaktır. Bagnouls–Gaussen yaklaşımında aylık yağışın aylık ortalama sıcaklığın iki katından düşük olduğu dönemler kuru ay olarak sınıflandırılacak ve kuruluk açığı yağış–sıcaklık ilişkisi üzerinden nicel olarak belirlenecektir. De Martonne aridite indisi yardımıyla ise aylık sıcaklık ve yağış koşulları farklı aridite sınıfları açısından değerlendirilecektir. Analizlerde yıllık ve Nisan–Ekim dönemindeki kuru ay sayısı, kuru dönemin başlangıç ve bitiş zamanı, en uzun ardışık kuru dönem ve toplam kuruluk açığı incelenecektir. Ayrıca 1929–1958 ve 1996–2025 dönemleri karşılaştırılarak agroklimatik kuru dönem özelliklerinde meydana gelen dönemsel farklılıklar değerlendirilecektir. Elde edilecek sonuçların, Çanakkale'de tarımsal kuru sezonun yapısının ortaya konulmasına ve sulama planlamasında kullanılabilecek yorumlanabilir agroklimatik göstergelerin geliştirilmesine katkı sağlaması beklenmektedir.

Anahtar Kelimeler: Agroklimatoloji, Bagnouls–Gaussen, De Martonne, Kurak Dönem, Sulama

ABSTRACT

Agricultural drought risk in Mediterranean environments is controlled not only by total precipitation but also by the balance between rainfall and thermal conditions during the growing season. This study aims to characterize the long-term structure of agroclimatic dryness in Çanakkale, Türkiye, by jointly using the Bagnouls–Gaussen criterion and the De Martonne aridity index. Monthly mean temperature and total precipitation observations from Turkish State Meteorological Service station 17112 for 1929–2025 will be analyzed. According to the Bagnouls–Gaussen criterion, months in which precipitation is lower than twice the mean temperature ($P < 2T$) will be classified as dry, and a monthly dryness deficit will be quantified as $\max(2T - P, 0)$. In parallel, the monthly De Martonne aridity index will be calculated to provide a complementary classification of temperature–precipitation balance. The analysis will quantify the number of dry months, the onset and termination of the dry season, the longest consecutive dry sequence, cumulative dryness deficit, and April–October agroclimatic dryness characteristics. To evaluate long-term differences without relying on monotonic trend tests, the early period (1929–1958) and the recent period (1996–2025) will be compared using non-parametric distribution tests, categorical frequency analyses, and effect-size measures. Year-by-month heat maps and period-comparison graphics will be used to visualize changes in dry-season timing and intensity. The study is expected to provide a simple and interpretable framework for identifying changes in the duration, seasonal position, and severity of agroclimatic dryness in Çanakkale and to contribute to irrigation planning and agricultural climate-risk assessment under Mediterranean conditions.

Keywords: Agroclimatology, Bagnouls–Gaussen, De Martonne, Dry Season, Çanakkale

ORDU İLİ AŞAĞI MELET HAVZASININ MEKANSAL PARÇALANMA ANALİZİ

SPATIAL FRAGMENTATION ANALYSIS OF THE LOWER MELET BASIN, ORDU PROVINCE

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ÖZET
Peyzaj parçalanması, arazi örtüsü deseninin mekânsal yapısında meydana gelen değişimleri yansıtan ve doğal alanların bütünlüğünün değerlendirilmesinde kullanılan önemli bir peyzaj ekolojisi konusudur. Peyzaj parçalarının sayısının belirli bir alan içerisindeki dağılımını ifade eden yama yoğunluğu, peyzaj deseninin mekânsal yapısını ve parçalanma özelliklerini incelemede yararlanılan temel göstergelerden biridir. Bu çalışmanın amacı, Ordu ili Aşağı Melet Havzası'ndaki peyzaj desenini yama yoğunluğu göstergesi üzerinden analiz ederek havzanın mekânsal parçalanma özelliklerini ortaya koymaktır. Araştırmada, havzaya ait arazi örtüsü ve arazi kullanımı verilerinden yararlanılarak Coğrafi Bilgi Sistemleri (CBS) ortamında mekânsal analizler gerçekleştirilmiştir. Peyzaj parçalanmasının değerlendirilmesinde, belirlenen arazi örtüsü sınıflarına ait yama sayılarının alan büyüklüğüyle ilişkisini ortaya koyan Yama Yoğunluğu (Patch Density – PD) metriği Fragstats yazılımında oluşturulmuş ve haritalandırılmıştır. Bu gösterge aracılığıyla havza içerisindeki peyzaj deseninin mekânsal dağılımının incelenmesi ve yama yoğunluğunun farklı arazi örtüsü sınıfları bakımından değişiminin belirlenmesi amaçlanmaktadır. Elde edilen bulgular, Aşağı Melet Havzası'ndaki peyzaj yapısının mekânsal özelliklerinin anlaşılmasına, parçalanmanın belirginleştiği alanların tanımlanmasına ve arazi kullanım kararlarının peyzaj ekolojisi perspektifinden değerlendirilmesine olanak sağlamaktadır. Aynı zamanda araştırma havza ölçeğinde mekânsal desenin değerlendirilmesine yönelik CBS tabanlı bir yaklaşım sunmaktadır.

Anahtar Kelimeler: Peyzaj parçalanması, yama yoğunluğu, peyzaj ekolojisi, Coğrafi Bilgi Sistemleri, Aşağı Melet Havzası

ABSTRACT
Landscape fragmentation is an important topic in landscape ecology, reflecting changes in the spatial structure of land cover patterns and providing a basis for assessing the integrity of natural areas. Patch density, which represents the number of landscape patches per unit area, is one of the key indicators used to examine the spatial structure of landscape patterns and their fragmentation characteristics. This study aims to analyze the landscape pattern of the Lower Melet Basin in Ordu Province, Türkiye, using the patch density indicator to identify the spatial fragmentation characteristics of the basin. Spatial analyses were conducted in a Geographic Information Systems (GIS) environment using land cover and land use data for the basin. To assess landscape fragmentation, the Patch Density (PD) metric, which expresses the number of patches within a given land cover class relative to the area, was calculated using FRAGSTATS software and mapped. This indicator was used to examine the spatial distribution of landscape patterns within the basin and to identify variations in patch density among different land cover classes. The findings contribute to understanding the spatial characteristics of the landscape structure in the Lower Melet Basin, identifying areas where fragmentation is more pronounced, and evaluating land-use decisions from a landscape ecology perspective. The study also provides a GIS-based approach for assessing spatial landscape patterns at the watershed scale.

Keywords: Landscape Fragmentation, Patch Density, Landscape Ecology, Geographic Information Systems (GIS), Lower Melet Basin

ORDU İLİ ALTINORDU İLÇESİ KIYI ŞERİDİ PEYZAJININ BİYOÇEŞİTLİLİK POTANSİYELİ

BIODIVERSITY POTENTIAL OF THE COASTAL LANDSCAPE OF ALTINORDU DISTRICT, ORDU PROVINCE

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ÖZET

Kentsel kıyı şeritleri, doğal ve antropojenik etkilerin bir arada görüldüğü, biyoçeşitliliğin korunması ve sürdürülebilir peyzaj planlaması açısından önem taşıyan alanlardır. Bu alanlarda bulunan odunsu bitki türlerinin belirlenmesi tür çeşitliliği ve tür zenginliği değerlerinin bu kapsamda hesaplanması, kıyı peyzajlarının mevcut biyoçeşitlilik potansiyelinin ortaya konulmasına katkı sağlamaktadır. Bu araştırmanın amacı, Ordu ili Altınordu ilçesinde kıyı şeridi peyzajı üzerinden odunsu bitki türlerinin biyoçeşitlilik potansiyelini belirlemektir. Araştırma kapsamında kıyı şeridinde tespit edilen 36 odunsu bitki türü değerlendirmeye alınmıştır. Türlere ilişkin saha verilerinden yararlanılarak türçeşitliliği ve tür zenginliği değerleri belirlenmiş olup analizler BİÇEB yazılımında gerçekleştirilmiştir. Araştırma sonucunda odunsu bitki çeşitliliğinin düzeyinin ortaya konulması ve kıyı peyzajının biyoçeşitlilik açısından değerlendirilmesi amaçlanmaktadır. Çalışmanın, kentsel kıyı alanlarında bitkisel çeşitliliğin belirlenmesine, mevcut doğal ve kültürel bitki varlığının değerlendirilmesine ve biyoçeşitliliğin korunmasına yönelik peyzaj planlama ve yönetim çalışmalarına bilimsel veri sağlaması beklenmektedir. Bu yönüyle araştırma, kentsel kıyı şeritlerinin yalnızca rekreasyonel ve görsel kullanım alanları olarak değil, aynı zamanda biyolojik çeşitlilik bakımından değerlendirilmesi gereken peyzaj alanları olarak ele alınmasına katkı sunmayı hedeflemektedir.

Anahtar Kelimeler: Biyoçeşitlilik, Tür Zenginliği, Tür Çeşitliliği, BİÇEB, Kentsel Kıyı Peyzajı

ABSTRACT

Urban coastal zones are areas where natural and anthropogenic influences coexist and which are important for biodiversity conservation and sustainable landscape planning. Identifying woody plant species in these areas and calculating species diversity and species richness values contribute to revealing the existing biodiversity potential of coastal landscapes. This study aims to determine the biodiversity potential of woody plant species within the coastal landscape of Altınordu District, Ordu Province, Türkiye. A total of 36 woody plant species identified along the coastal zone were included in the assessment. Based on field data, species diversity and species richness values were determined, and the analyses were performed using the BİÇEB software. The study aims to characterize the level of woody plant diversity and evaluate the coastal landscape in terms of its biodiversity potential. The findings are expected to provide scientific data for landscape planning and management practices aimed at identifying plant diversity in urban coastal areas, assessing existing natural and cultivated vegetation, and conserving biodiversity. In this respect, the study seeks to contribute to the recognition of urban coastal zones not only as recreational and visually valuable spaces but also as landscapes that warrant assessment in terms of biological diversity.

Keywords: Biodiversity, Species Richness, Species Diversity, BİÇEB, Urban Coastal Landscape

YAPRAKTAN UYGULANAN METİL JASMONATİN HERCAİ MENEKŞEDE (VIOLA × WITTROCKIANA) ÇİÇEKLENME PERFORMANSI VE ÇİÇEK ÖMRÜ ÜZERİNDEKİ ETKİLERİ

EFFECTS OF FOLIAR METHYL JASMONATE ON FLOWERING PERFORMANCE AND FLOWER LONGEVITY OF PANSY (VIOLA × WITTROCKIANA)

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ÖZET

Hercai menekşe (Viola × wittrockiana), değeri büyük ölçüde çiçeklenme performansına bağlı olan ve yaygın olarak yetiştirilen bir yastık bitkisidir. Bu çalışmada, tek bir yaprak uygulaması şeklinde verilen metil jasmonatın (MeJA) hercai menekşe 'Yellow with Purple Wing' çeşidinin çiçeklenme performansı üzerine etkileri değerlendirilmiştir. Hercai menekşe bitkilerine şaşırtmadan bir hafta sonra 0 (kontrol), 10, 50 veya 100 µM MeJA püskürtülmüş ve bitkiler serada 21 gün boyunca her gün izlenmiştir. İlk çiçek açma süresi, haftalık çiçek açma, toplam açan çiçek sayısı, çiçek ömrü, çiçek çapı, çiçek sapı uzunluğu ve bitki boyu kaydedilmiştir. MeJA, çiçek çapı dışındaki tüm özellikleri önemli düzeyde etkilemiş ve en belirgin çiçeklenme tepkisi 100 µM'de gözlenmiştir. Kontrole kıyasla 100 µM MeJA, ilk çiçeklenmeye kadar geçen süreyi 5.50 günden 3.50 güne kısaltmış, toplam açan çiçek sayısını bitki başına 6.00'dan 9.00'a çıkarmış (%50) ve çiçek ömrünü 13.09 günden 15.37 güne uzatmıştır. Kontrol bitkilerinde çiçek açma 8–14. günlerde en yüksek düzeydeyken, MeJA uygulanan bitkiler en fazla çiçeği 15–21. günlerde açmıştır. Çiçek sapları 50 ve 100 µM'de 10 µM'ye göre daha kısa olmuş, bitki boyu ise 6.93 cm'den 6.30 cm'ye azalma eğilimi göstermiştir. Sonuçlar, 100 µM MeJA'nın yapraktan uygulanmasının hercai menekşede çiçek boyutunu azaltmadan ilk çiçek açmayı öne çektiğini, çiçek sayısını artırdığını ve çiçek ömrünü uzattığını göstermektedir. MeJA, hercai menekşenin çiçeklenme performansını iyileştirmek için umut verici bir uygulama olabilir.

Anahtar Kelimeler: Mevsimlik süs bitkisi, çiçek ömrü, çiçek açımı, çiçek çapı, bitki büyüme düzenleyicisi, süs bitkisi

ABSTRACT

Pansy (Viola × wittrockiana) is a widely grown bedding plant whose value depends mainly on its flowering performance. This study evaluated the effects of a single foliar spray of methyl jasmonate (MeJA) on the flowering performance of pansy 'Yellow with Purple Wing'. Plants bearing three to four flower buds were sprayed with 0 (control), 10, 50 or 100 µM MeJA one week after transplanting and observed daily for 21 days in a greenhouse. First flowering time, weekly flower opening, total number of opened flowers, flower longevity, flower diameter, peduncle length and plant height were recorded. MeJA significantly affected all traits except flower diameter, and the largest effects on flowering were found at 100 µM. Compared with the control, 100 µM MeJA shortened the time to first flowering from 5.50 to 3.50 days, increased the total number of opened flowers from 6.00 to 9.00 per plant (50%) and extended flower longevity from 13.09 to 15.37 days. Flower opening in the control was highest during days 8–14, whereas MeJA-treated plants opened the most flowers during days 15-21. Peduncles were shorter at 50 and 100 µM than at 10 µM, and plant height tended to decrease from 6.93 to 6.30 cm. The results show that a single spray of 100 µM MeJA can advance flowering, increase flower number and extend flower life in pansy without reducing flower size. MeJA may therefore be used as a treatment to improve the flowering performance of pansy.

Keywords: Bedding plant, Flower longevity, flower opening, flower diameter, plant growth regulator, ornamental plant

SMARTAGRO: ÇOKLU SENSÖR VERİLERİNE DAYALI AÇIKLANABİLİR AKILLI SULAMA ÖNERİ SİSTEMİ

SMARTAGRO: AN EXPLAINABLE SMART IRRIGATION RECOMMENDATION SYSTEM BASED ON MULTI-SENSOR DATA

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ÖZET

Sulama kararlarının yalnızca toprak nemi ölçümüne ve sabit eşiklere dayandırılması, sıcaklık, atmosferik nem, bitki su gereksinimi ve hava tahmini gibi etkenlerin birlikte değerlendirilmesini sınırlandırmakta; yalnızca anlık ölçüm sunan sistemler ise verileri yorumlama sorumluluğunu üreticiye bırakmaktadır. Bu çalışmada, çoklu sensör verilerini çevresel göstergeler ve meteorolojik tahminlerle birlikte değerlendirerek gerekçeli sulama önerileri sunan, kural tabanlı ve açıklanabilir bir karar destek sistemi olan SmartAgro geliştirilmiştir. Sistem; sıcaklık, bağıl nem, atmosfer basıncı ve toprak nemini ölçen ESP32 tabanlı sensör düğümü, bitki görüntülerini elde eden ESP32-CAM ve ASP.NET Core 8 ile SQLite tabanlı yerel sunucudan oluşmaktadır. Sensör verileri medyan ve Kalman filtreleriyle işlenerek altı saatlik toprak nemi öngörüsü oluşturulmaktadır. Buhar basıncı açığı (VPD) Tetens bağıntısıyla (Tetens, 1930; Murray, 1967), referans evapotranspirasyon (ET_0) FAO-56 Penman–Monteith yöntemiyle (Allen vd., 1998) hesaplanmış; pilot bitki olarak seçilen domatesin su tüketimi gelişim dönemine özgü bitki katsayılarıyla (Kc) belirlenmiştir. Öneri motoru; sensör tutarlılığı, kritik toprak nemi, su gereksinimi, don riski, gece kısıtı, mantar riski, VPD ve yağış beklentisini öncelik sırasıyla değerlendirerek SULA, ERTELE, ENGELLE veya BEKLE önerisi üretmekte ve her öneriyi dayandığı ölçüm ve kurallarla kaydetmektedir. Arayüz; anlık ve geçmiş ölçümleri, bitki görüntülerinden hesaplanan bitki örtüsü göstergelerini (Woebbecke vd., 1995; Meyer ve Neto, 2008), risk uyarılarını ve karar gerekçelerini bir arada sunmaktadır. Sistem sekiz senaryoyla simülasyonda ve laboratuvar prototipinde sınanmıştır. Ankara'da bir temmuz günü için ET_0 6,31 mm/gün; domatesin günlük su tüketimi başlangıç döneminde 3,78 mm/gün, orta dönemde 7,25 mm/gün hesaplanmıştır. Sekiz senaryonun tamamında beklenen karar kuralı tetiklenmiştir. 40 mm yağış beklentisinde 32 mm etkili yağış, 28,3 mm toplam su gereksinimini karşıladığından sulama ertelenmiş; toprak neminin %13'e düştüğü senaryoda kritik nem kuralı yüksek VPD kuralına öncelik kazanarak sınırlı acil sulama önermiş, don riskinde ise sulama engellenmiştir. Bulgular, sistemin teknik işleyişine ilişkin ilk doğrulamayı sağlamaktadır.

Anahtar Kelimeler: Akıllı sulama, çoklu sensör verileri, açıklanabilir karar destek sistemi, uzman sistem

ABSTRACT

Irrigation decisions based solely on soil moisture and fixed thresholds ignore temperature, humidity, crop water requirement and weather forecasts, while systems that only display instantaneous measurements leave data interpretation to the grower. This study presents SmartAgro, a rule-based, explainable decision support system that combines multi-sensor data with environmental indicators and meteorological forecasts to provide justified irrigation recommendations. The system comprises an ESP32-based sensor node measuring temperature, relative humidity, atmospheric pressure and soil moisture, an ESP32-CAM capturing plant images, and a local ASP.NET Core 8 and SQLite server. Median and Kalman filters produce a six-hour soil moisture forecast from sensor data. Vapour pressure deficit (VPD) was calculated with the Tetens equation (Tetens, 1930; Murray, 1967) and reference evapotranspiration (ET_0) with the FAO-56 Penman–Monteith method (Allen et al., 1998); water use of tomato, the pilot crop, was determined using stage-specific crop coefficients (Kc). The recommendation engine prioritises sensor consistency, critical soil moisture, water requirement, frost risk, night-time restriction, fungal risk, VPD and expected rainfall, producing an IRRIGATE, POSTPONE, BLOCK or WAIT recommendation logged with its underlying measurements and rules. The interface displays measurements, image-based vegetation indices (Woebbecke et al., 1995; Meyer & Neto, 2008), risk alerts and decision rationales. The system was tested with eight simulated scenarios and a laboratory prototype. For a July day in Ankara, ET_0 was 6.31 mm/day and tomato water use was 3.78 mm/day in the initial and 7.25 mm/day in the mid-season stage. The expected rule was triggered in all scenarios. With 40 mm of forecast rainfall, irrigation was postponed as 32 mm of effective rainfall met the 28.3 mm requirement; at 13% soil moisture, the critical moisture rule overrode the high-VPD rule and recommended limited emergency irrigation; under frost risk, irrigation was blocked. These results initially validate the system's operation.

Keywords: Smart irrigation, multi-sensor data, explainable decision support system, expert system

ARAZİ TOPLULAŞTIRMA ÇALIŞMALARINDA UZAKTAN ALGILAMA TEKNİKLERİNİN KULLANIM OLANAKLARI

POSSIBILITIES OF USING REMOTE SENSING TECHNIQUES IN LAND CONSOLIDATION STUDIES

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ÖZET

Arazi toplulaştırması, tarım arazilerinin parçalı ve dağınık yapısını düzenleyerek tarımsal üretimde verimliliği artırmayı, tarımsal altyapıyı geliştirmeyi ve doğal kaynakların sürdürülebilir kullanımını amaçlayan önemli bir uygulamadır. Bu çalışmaların etkin biçimde yürütülebilmesi için araziye ilişkin güncel, doğru ve güvenilir verilere ihtiyaç vardır. Uzaktan algılama teknolojileri, geniş alanlara ait verilerin hızlı ve ekonomik bir şekilde elde edilmesine olanak sağlayarak arazi toplulaştırma çalışmalarında önemli avantajlar sunar. Bu çalışmanın amacı, arazi toplulaştırma projelerinin planlama, uygulama ve değerlendirme aşamalarında uzaktan algılama tekniklerinin kullanım olanaklarını incelemek ve bu tekniklerin sağladığı katkıları ortaya koymaktır. Çalışma kapsamında uzaktan algılama kavramı, kullanılan temel veri kaynakları ve arazi toplulaştırmasındaki başlıca uygulama alanları ele alınmıştır. Landsat ve Sentinel-2 gibi multispektral uydu görüntülerinin yanı sıra insansız hava araçları, LiDAR ve sayısal yüzey modellerinin kullanım alanları değerlendirilmiştir. NDVI ve SAVI gibi bitki örtüsü indekslerinin arazi kullanımı ve bitki gelişiminin izlenmesindeki rolü açıklanmıştır. Ayrıca arazi kullanım ve örtü haritalarının oluşturulması, topografik analizler, parsel sınırlarının belirlenmesi, arazi kullanım uygunluğunun değerlendirilmesi ve toplulaştırma sonrası değişimlerin izlenmesi konuları incelenmiştir. Türkiye'de ve farklı ülkelerde gerçekleştirilen uygulama örnekleri üzerinden uzaktan algılama tekniklerinin arazi kullanım değişimlerini belirleme, tarımsal üretim performansını değerlendirme ve planlama süreçlerini destekleme potansiyeli ortaya konulmuştur. Sonuç olarak, uzaktan algılama verilerinin Coğrafi Bilgi Sistemleri ile bütünleştirilmesinin arazi toplulaştırma çalışmalarının doğruluğunu, hızını ve sürdürülebilirliğini artırabileceği değerlendirilmiştir.

Anahtar Kelimeler: Arazi Toplulaştırması, Bitki Örtüsü İndeksleri, Coğrafi Bilgi Sistemleri, Uzaktan Algılama

ABSTRACT

Land consolidation is an important practice that aims to increase agricultural productivity, improve agricultural infrastructure, and ensure the sustainable use of natural resources by reorganizing the fragmented and scattered structure of agricultural land. Carrying out these efforts effectively requires up-to-date, accurate, and reliable land data. Remote sensing technologies offer significant advantages in land consolidation projects by enabling the rapid and cost-effective acquisition of data over large areas. This study examines the potential of remote sensing techniques during the planning, implementation, and evaluation phases of land consolidation projects and highlights their contributions. The study covers the concept of remote sensing, the primary data sources employed, and the main areas of application within land consolidation. It evaluates the use of multispectral satellite imagery—such as that from Landsat and Sentinel-2—as well as unmanned aerial vehicles (UAVs), LiDAR, and digital surface models. It explains the role of vegetation indices, such as NDVI and SAVI, in monitoring land use and crop development. Furthermore, the study explores topics including the creation of land use and land cover maps, topographic analysis, the determination of parcel boundaries, the assessment of land suitability, and the monitoring of changes following land consolidation. Through examples from Türkiye and various other countries, the study demonstrates the potential of remote sensing techniques to identify land-use changes, evaluate agricultural production performance, and support planning processes. In conclusion, integrating remote sensing data with Geographic Information Systems can improve the accuracy, speed, and sustainability of land consolidation efforts.

Keywords: Land Consolidation, Vegetation Indices, Geographic Information Systems, Remote Sensing

TARIMDA FERTİGASYON UYGULAMALARI

FERTIGATION PRACTICES IN AGRICULTURE

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ÖZET
Tarımsal üretimde su kaynaklarının sınırlı olması ve üretim girdilerinin etkin kullanılması gerekliliği, sulama ve gübreleme işlemlerinin birlikte planlanmasını önemli hâle getirmiştir. Fertigasyon, bitkilerin ihtiyaç duyduğu besin elementlerinin sulama suyu içinde çözündürülerek bitki kök bölgesine ulaştırılması esasına dayanan bir uygulamadır. Bu yöntem, özellikle basınçlı sulama sistemleriyle birlikte kullanıldığında, gübrelerin gelişme dönemlerine göre uygulanmasına ve sulama ile gübreleme işlemlerinin tek bir işletme programında birleştirilmesine olanak tanır. Bununla birlikte, fertigasyonun başarısı: sulama yönteminin seçimi, su kalitesi, gübrelerin çözünürlüğü ve kimyasal uyumluluğu, filtreleme, enjeksiyon ünitesinin doğru çalışması ve sistem bakımına bağlıdır. Bu çalışmada tarımda fertigasyonun yeri, basınçlı sulama yöntemleriyle ilişkisi, sistemin temel teknik bileşenleri, gübre çeşitleri ve bitki türlerine göre uygulama esasları literatür temelinde değerlendirilmiştir. Yağmurlama, ağaç altı mikro yağmurlama, damla ve toprak altı damla sulama yöntemlerinin fertigasyon açısından özellikleri ele alınmış; hidrosiklon, gübre enjeksiyon ünitesi, filtreler, kontrol elemanları, manifold ve lateral hatların işlevleri açıklanmıştır. Ayrıca pamuk ve turunçgillerde besleme ve sulama programlarının bitki gelişme dönemleri ile toprak ve su koşulları dikkate alınarak hazırlanması gerektiği vurgulanmıştır. Sonuç olarak, fertigasyon, doğru planlandığında su ve besin elementlerinin yönetimini kolaylaştıran bir yöntemdir. Ancak aşırı genelleştirilmiş uygulamalar yerine analizlere dayalı, bitkiye özgü ve sistem bakımını içeren bir yaklaşım benimsenmelidir.

Anahtar Kelimeler: Basınçlı Sulama Sistemleri, Bitki Besleme, Damla Sulama, Fertigasyon, Gübreleme

ABSTRACT

The limited availability of water resources in agricultural production and the need for efficient use of production inputs have made integrated planning of irrigation and fertilization essential. Fertigation dissolves the nutrients plants require in irrigation water and delivers them directly to the root zone. When used in conjunction with pressurized irrigation systems, this method allows for the application of fertilizers tailored to specific plant growth stages. It enables the consolidation of irrigation and fertilization processes into a single operational program. However, the success of fertigation depends on several factors: the choice of irrigation method, water quality, the solubility and chemical compatibility of fertilizers, effective filtration, the proper operation of the injection unit, and regular system maintenance. This study examines the role of fertigation in agriculture, its relationship to pressurized irrigation methods, the system's fundamental technical components, and application principles based on fertilizer types and plant species. The study discusses the characteristics of sprinkler, micro-sprinkler (under-tree), drip, and subsurface drip irrigation methods in the context of fertigation. It explains the functions of components such as hydrocyclones, fertilizer injection units, filters, control elements, manifolds, and lateral lines. It also emphasizes that irrigation and nutrient management programs for crops like cotton and citrus must be developed by considering specific plant growth stages, as well as soil and water conditions. In conclusion, when properly planned, fertigation supports effective water and nutrient management. Nevertheless, rather than relying on overly generalized practices, adopt an approach based on analysis, crop-specific requirements, and consistent system maintenance.

Keywords: Pressurized Irrigation Systems, Plant Nutrition, Drip Irrigation, Fertigation, Fertilization

FARKLI MEYVE RENKLERİNE SAHİP DOMATES GENOTİPLERİNDE BİTKİ BÜYÜMESİ VE YAPRAK FİZYOLOJİK ÖZELLİKLERİNİN BELİRLENMESİ

DETERMINATION OF PLANT GROWTH AND LEAF PHYSIOLOGICAL TRAITS IN TOMATO GENOTYPES WITH DIFFERENT FRUIT COLORS

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ÖZET

Domates çeşitleri, pigment bileşimindeki farklılıkların yönlendirdiği çeşitli meyve renklerine sahiptir; ancak, bu renk sınıflarının vejetatif büyüme ve yaprak gaz değişim performansında daha geniş bir varyasyonla ilişkili olup olmadığı belirsizliğini korumaktadır. Bu çalışma, serada farklı meyve rengine sahip sırık domates genotipleri arasında bitki büyüme özellikleri ve yaprak fizyolojik özelliklerini karşılaştırmayı amaçlamıştır. Deney, Mayıs-Eylül 2026 tarihleri arasında bir polikarbon serada, önceki tohum stoklarından temin edilen dört genotip kullanılarak gerçekleştirilmiştir. Hasattan hemen önce, bitki boyu, gövde çapı, yaprak ve salkım sayısı, klorofil indeksi (SPAD), stomatal iletkenlik ve görünür transpirasyon hızı ile fotosentetik hız ölçülmüştür. Tukey's HSD (α=0.05) ile yapılan ANOVA, bitki boyu ($p<0.05$), gövde çapı ($p<0.01$) ve SPAD ($p<0.05$) değerlerinde anlamlı genotipik farklılıklar göstermiştir; ancak yaprak sayısı, salkım sayısı, görünür transpirasyon hızı, stomatal iletkenlik ve fotosentetik hızda anlamlı farklılık gözlenmemiştir. G4 en uzun (139,63 cm) ve en yüksek SPAD değerine (40,27) sahipken, G2 en kısa (95,60 cm), en kalın gövdeye (10,33 mm) ve en düşük SPAD değerine (30,20) sahip genotip olarak bulunmuştur. Fotosentez oranlarında ise büyük sayısal farklar olsa da (G1'de 35,67 µmol m^{-2} s^{-1}, G3'te 16,67), bu farklılıklar istatistiksel olarak anlamlı bulunmamıştır. Genel olarak, genotipler arasında büyüme özellikleri ve yaprak klorofil durumu değişiklik gösterirken, tek bir zamanda yapılan yaprak fizyolojik ölçümleri bu genotipleri kesin olarak ayırt edememiştir; meyve rengi ise, genotip ile karışık olduğundan bağımsız bir faktör olarak değerlendirilememiştir. Gelecekteki araştırmalara bir ön çalışma niteliğinde sunulan bu çalışma ile farklı meyve rengine sahip genotiplerde, eşzamanlı gaz değişim ölçümleri yapılmalı ve çalışma kapsamına yaprak pigment profilleri ile meyve biyokimyasal içerikleri de dahil edilerek fizyolojik ilişkiler tam anlamıyla ortaya konmalıdır.

Anahtar Kelimeler: Genotip, Meyve Rengi, Fotosentez Hızı, Yaprak Fizyolojik Özellikleri, Bitki Büyümesi

ABSTRACT

Tomato cultivars display diverse fruit colours driven by differences in pigment composition, yet it remains unclear whether such colour classes are associated with broader variation in vegetative growth and leaf gas-exchange performance. This study aimed to compare plant growth characteristics and leaf physiological traits among indeterminate tomato genotypes differing in fruit colour under greenhouse conditions. The experiment was conducted from May to September 2026 in a polycarbonate greenhouse, using four genotypes sourced from prior seed stocks. Immediately before harvest day, plant height, stem diameter, leaf and cluster numbers, chlorophyll index (SPAD), stomatal conductance and apparent transpiration rate, and photosynthetic rate were measured. ANOVA with Tukey's HSD (α=0.05) indicated significant genotypic differences in plant height ($p<0.05$), stem diameter ($p<0.01$), and SPAD ($p<0.05$), but not in leaf number, cluster number, apparent transpiration rate, stomatal conductance, or photosynthetic rate. G4 was tallest (139.63 cm) and had the highest SPAD (40.27), whereas G2 was shortest (95.60 cm), had the thickest stem (10.33 mm), and the lowest SPAD (30.20). Although there were large numerical differences in photosynthesis rates (35.67 µmol m^{-2} s^{-1} in G1 versus 16.67 in G3), these differences were not found to be statistically significant. In general, while growth characteristics and leaf chlorophyll status varied among genotypes, physiological measurements of leaves taken at a single time point could not definitively distinguish these genotypes from one another; fruit color, however, could not be evaluated as a standalone factor because it was confounded with genotype. Presented as a preliminary study for future research, this study should involve simultaneous gas exchange measurements in genotypes with different fruit colors; furthermore, leaf pigment profiles and fruit biochemical compositions should be included in the scope of the study to fully elucidate the physiological relationships.

Keywords: Genotypes, Fruit Color, Photosynthetic Rate, Leaf Physiological Traits, Plant Growth

TÜRKİYE'DE BRASSICACEAE FAMİLYASINDAKİ BAZI BİTKİLERİ ENFEKTE EDEN ALBUGO TÜRLERİNİN FİLOGENETİK ANALİZİ

PHYLOGENETIC ANALYSIS OF ALBUGO SPECIES INFECTING SOME PLANTS IN THE BRASSICACEAE FAMILY IN TÜRKIYE

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ÖZET

Brassicaceae familyasında tarımsal olarak ekonomik önemi bulunan bitkiler, süs bitkileri, yağ üretiminde kullanılan bitkiler, biyoyakıt üretiminde kullanılabilecek bitkiler, baharat üretiminde kullanılan bitkiler ve hayvan yemi olarak kullanılabilecek bitkiler bulunmaktadır. Bu nedenle, bu familyadaki bitkileri enfekte eden hastalıkların tanımlanması, hastalıklarla mücadele programlarının oluşturulabilmesi için önem arz etmektedir. Türkiye'de bu familyadaki bitkileri enfekte eden Albugo türlerinin tanımlanması ile ilgili yeterince çalışma bulunmamaktadır. Bu gerekçeyle, Türkiye'nin farklı illerinde survey çalışması gerçekleştirilerek enfekteli bitkiler elde edilmiştir. Bu çalışmada, Brassicaceae familyasında yer alan bazı bitkileri enfekte eden Albugo türlerinin filogenetik analizlerinin gerçekleştirilmesi amaçlanmıştır. Albugo ile enfekteli bitki materyallerini elde etmek için survey çalışmaları gerçekleştirilmiştir. Elde edilen bitkilerin herbaryumları hazırlanmıştır. Enfekteli bitkilerden DNA izolasyon kiti kullanılarak DNA izolasyonu gerçekleştirilmiştir. PCR ve agaroz jel elektroforezinden sonra PCR ürünlerinden sekans analizleri hizmet alımı ile gerçekleştirilmiştir. Bu çalışmada Albugo türlerinin ITS sekansları elde edilmiştir. Elde edilen ITS sekansları, Geneious programı kullanılarak edit edildikten sonra, MEGA11 programında referans sekanslarla birlikte hizalanmış, sağ ve sol taraftan kesilerek filogenetik analizde kullanılabilecek sekans dosyası hazırlanmıştır. Filogenetik analiz MEGA11 programında gerçekleştirilmiştir. Brassicaceae familyasında yer alan, farklı cinslerdeki bitki türlerini enfekte eden 3 Albugo türü filogenetik olarak belirlenmiştir. Ancak bu türlerin çok lokuslu filogenetik analizinin gerçekleştirilmesi ve morfolojik özelliklerinin detaylı olarak incelenmesi gibi ilave çalışmalara ihtiyaç duyulmaktadır.

Anahtar Kelimeler: Brassicaceae, Albugo, tür

ABSTRACT

The Brassicaceae family comprises plants of significant agricultural and economic importance, including ornamental plants, oil-producing crops, potential biofuel sources, spice plants, and forage crops. Therefore, identifying the diseases infecting plants within this family is essential for developing effective disease management strategies. In Türkiye, research on the identification of Albugo species that infect plants in this family remains limited. To address this gap, surveys were conducted across several provinces in Türkiye to collect infected plant specimens. This study aimed to perform phylogenetic analyses of Albugo species infecting certain plants within the Brassicaceae family. Plant materials infected with Albugo were collected, and herbarium specimens were prepared. DNA was isolated from the infected plant tissues using a DNA isolation kit. Following PCR amplification and agarose gel electrophoresis, the PCR products were subjected to sequence analysis through an external service provider for sequence analyses. In this study, the ITS sequences of Albugo species were obtained. These sequences were then edited using Geneious software, aligned with reference sequences using MEGA11, and trimmed at both ends to generate a dataset suitable for phylogenetic analysis. Phylogenetic analysis was performed using MEGA11. Three Albugo species, infecting various plant genera within the Brassicaceae family, were identified based on phylogenetic analyses. However, further studies, including multi locus phylogenetic analysis and detailed examination of morphological characteristics are required to characterize these species.

Keywords: Brassicaceae, Albugo, species

YAPAY ZEKÂ DESTEKLİ BİLGİLERİN TARIM ÜRÜNÜ TERCİHİNDEKİ YERİ: TÜKETİCİ ALGISI ÜZERİNE BİR ARAŞTIRMA

THE ROLE OF AI-ASSISTED INFORMATION IN AGRICULTURAL PRODUCT PREFERENCES: A STUDY ON CONSUMER PERCEPTION

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ÖZET

Bu çalışmanın amacı, yapay zekâ sanal asistanlarından elde edilen bilgilerin tüketicilerin tarım ürünü tercihlerindeki yerini ve tüketicilerin bu asistanlara yönelik algılarını belirlemektir. Araştırmanın verileri, yapay zekâ asistanlarını kullanan 18 yaş ve üzeri 163 tüketiciden 9 Nisan–4 Mayıs 2026 tarihleri arasında Google Formlar aracılığıyla çevrim içi anket yoluyla toplanmıştır. Örneklemin belirlenmesinde kolayda örnekleme yöntemi kullanılmıştır. Anket formunda, yapay zekâ asistanlarına yönelik algı ve tutumlar ile bu asistanlardan elde edilen bilgilerin tarım ürünü tercihlerine etkisini ölçen ve beşli Likert ölçeğiyle derecelendirilen 26 ifade yer almıştır. Ölçeğin güvenilirliği Cronbach alfa katsayısıyla test edilmiş; veriler SPSS 21 programında aritmetik ortalama ve standart sapma değerleri hesaplanarak analiz edilmiştir. Bulgulara göre tüketiciler yapay zekâ asistanlarını kullanımı kolay ($\bar{x}$ = 4,10) ve faydalı ($\bar{x}$ = 3,89) bulmakta, gelecekte etkilerinin artacağını düşünmektedir ($\bar{x}$ = 3,53). Buna karşın satın alma niyeti ($\bar{x}$ = 3,12) ve algılanan güven ($\bar{x}$ = 2,74) kararsızlık düzeyinde kalmıştır. Güven boyutunda en düşük ortalamalar kişisel verilerin korunması ($\bar{x}$ = 2,59) ve gizlilik ($\bar{x}$ = 2,45) ifadelerine aittir. Yapay zekâ bilgisinin etkisi bilgi edinme aşamasında en yüksek düzeydeyken tercih ve satın alma aşamalarına geçildikçe azalmakta, ek ödeme istekliliğinde ($\bar{x}$ = 2,70) en düşük seviyeye inmektedir. Sonuç olarak tüketiciler yapay zekâ asistanlarını pratik bir bilgi kaynağı olarak kabul etmekle birlikte, özellikle veri güvenliği ve gizlilik konusundaki güven eksikliğinin bu bilgilerin tarım ürünü satın alma kararlarına yansımasını sınırladığı söylenebilir.

Anahtar Kelimeler: Yapay zekâ, sanal asistan, tarım ürünleri, tüketici algısı, satın alma niyeti

ABSTRACT

The aim of this study is to determine the role of information obtained from artificial intelligence (AI) virtual assistants in consumers' agricultural product preferences and to reveal consumers' perceptions of these assistants. The data were collected through an online survey prepared with Google Forms from 163 consumers aged 18 and over who use AI assistants, between 9 April and 4 May 2026. Convenience sampling was used to determine the sample. The questionnaire included 26 statements, rated on a five-point Likert scale, measuring perceptions of and attitudes towards AI assistants and the effect of the information they provide on agricultural product preferences. The reliability of the scale was tested with Cronbach's alpha coefficient, and the data were analysed in SPSS 21 by calculating means and standard deviations. The findings show that consumers find AI assistants easy to use ($\bar{x}$ = 4.10) and useful ($\bar{x}$ = 3.89) and expect their influence to increase in the future ($\bar{x}$ = 3.53). However, purchase intention ($\bar{x}$ = 3.12) and perceived trust ($\bar{x}$ = 2.74) remained at the level of indecision. Within the trust dimension, the lowest means belonged to the protection of personal data ($\bar{x}$ = 2.59) and privacy ($\bar{x}$ = 2.45). The influence of AI-based information is highest at the information-seeking stage, decreases at the preference and purchasing stages, and reaches its lowest level in willingness to pay more ($\bar{x}$ = 2.70). In conclusion, although consumers accept AI assistants as a practical source of information, a lack of trust, particularly regarding data security and privacy, appears to limit the reflection of this information in their agricultural product purchasing decisions.

Keywords: Artificial intelligence, virtual assistant, agricultural products, consumer perception, purchase intention

HAYVANCILIKTA DİJİTALLEŞMENİN İŞ SAĞLIĞI VE GÜVENLİĞİ ÜZERİNE ETKİLERİ

THE EFFECTS OF DIGITALIZATION ON OCCUPATIONAL HEALTH AND SAFETY IN LIVESTOCK PRODUCTION

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ÖZET

Bu derleme, hayvancılık işletmelerinde dijitalleşmenin iş sağlığı ve güvenliği (İSG) üzerindeki çift yönlü etkilerini incelemektedir. Mevcut metinde değerlendirilen literatür ve teknolojik uygulamalar üzerinden otomatik sağım ve yemleme, giyilebilir sensörler, çevresel izleme ve yapay zekâ destekli erken uyarı sistemlerinin fiziksel, ergonomik ve biyolojik tehlikeleri azaltma potansiyeli ele alınmıştır. Diğer yandan teknostres, bilişsel aşırı yük, alarm yorgunluğu, sistem arızalarına bağımlılık ve veri güvenliği gibi yeni risk alanları tartışılmıştır. Değerlendirme, teknoloji temelli önleme stratejilerinin ancak çalışan eğitimi, insan merkezli tasarım ve düzenli risk değerlendirmesi ile birlikte etkili olabileceğine işaret etmektedir. Çalışma, özgün saha verisi sunmayan anlatısal bir literatür incelemesidir.

Anahtar Kelimeler: Hayvancılık, dijitalleşme, iş sağlığı ve güvenliği, hassas hayvancılık, teknostres

ABSTRACT

This narrative review examines the dual effects of digitalization on occupational health and safety (OHS) in livestock operations. Drawing on the literature and technological applications discussed in the source manuscript, it considers how automated milking and feeding, wearable sensors, environmental monitoring, and artificial intelligence-based early warning systems may reduce physical, ergonomic, and biological hazards. It also discusses emerging risks, including technostress, cognitive overload, alarm fatigue, dependence on system reliability, and data security. The synthesis suggests that technology-based prevention strategies should be accompanied by workforce training, human-centered system design, and regular risk assessment. This paper presents a narrative review rather than original field data.

Keywords: Livestock production, digitalization, occupational health and safety, precision livestock farming, technostress

HAYVANCILIKTA İŞ GÜVENLİĞİ AÇISINDAN PSİKOSOSYAL RİSKLER VE TÜKENMİŞLİK

PSYCHOSOCIAL RISKS AND BURNOUT IN LIVESTOCK PRODUCTION FROM AN OCCUPATIONAL SAFETY PERSPECTIVE

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ÖZET
Bu anlatısal derlemede hayvancılık sektöründeki psikososyal risk faktörleri ve tükenmişliğin iş güvenliği bakımından önemi ele alınmıştır. Kaynak metinde değerlendirilen çalışmalar temelinde sosyal izolasyon, uzun ve düzensiz çalışma saatleri, ekonomik belirsizlik, zoonotik hastalıklara ilişkin kaygı, hayvan kaynaklı korku ve iş yeri sosyal baskısı öne çıkan risk kategorileri olarak incelenmiştir. İş Talepleri–Kaynakları modeli ve tükenmişlik literatürü bu risklerin çalışanların dikkat, karar verme ve güvenli davranışları üzerindeki olası etkilerini açıklamak için kullanılmıştır. Bulgular, psikososyal tehlikelerin iş sağlığı ve güvenliği risk değerlendirmelerine dahil edilmesi ve sosyal destek, iş yükü yönetimi, eğitim ve koruyucu organizasyonel önlemlerle ele alınması gerektiğini göstermektedir. Bu çalışma özgün anket veya saha verisi içermez.

Anahtar Kelimeler: Hayvancılık, psikososyal riskler, tükenmişlik, iş güvenliği, sosyal izolasyon

ABSTRACT
This narrative review addresses psychosocial risk factors and the occupational safety implications of burnout in livestock production. Based on the studies discussed in the source manuscript, social isolation, long and irregular working hours, economic uncertainty, anxiety about zoonotic diseases, fear related to animal handling, and workplace social pressure are examined as key risk categories. The Job Demands–Resources framework and burnout literature are used to interpret their potential effects on attention, decision-making, and safe work practices. The synthesis highlights the need to integrate psychosocial hazards into OHS risk assessments and address them through social support, workload management, training, and preventive organizational measures. No original survey or field data are reported.

Keywords: Livestock production, psychosocial risks, burnout, occupational safety, social isolation

VERMİKOMPOSTTAN FOSFAT ÇÖZEN BAKTERİLERİN İZOLE EDİLMESİ VE MİKROBİYAL GÜBRE POTANSİYELİNİN MARUL BİTKİSİNE ETKİLERİNİN İNCELENMESİ

ISOLATION OF PHOSPHATE-SOLUBLE BACTERIA FROM VERMICOMPOST AND INVESTIGATION OF ITS MICROBIAL FERTILIZER POTENTIAL ON LETTUCE CROPS

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ÖZET

Kimyasal gübre kullanımının çevresel etkilerini azaltmak ve sürdürülebilir tarımı desteklemek amacıyla yürütülen bu çalışmada, vermikompost ve vermikompost uygulanmış topraktan izole edilen fosfat çözücü bakterilerin marul bitkisindeki mikrobiyal gübre potansiyeli araştırılmıştır. Çalışma, sera koşullarında yaklaşık 81 gün sürmüş; tesadüf parselleri deneme desenine göre iki kontrol ve beş bakteri izolatından oluşan yedi uygulama, üç tekerrürlü olarak toplam 21 saksıda yürütülmüştür. İzolatların seçiminde çözünme indeksi (SI) ve 16S rRNA gen dizileme sonuçları kullanılmıştır. SI değerleri 3,00–6,33 arasında değişmiştir. Hasat sonunda rizosfer toprağında üreaz, alkali fosfataz, β-glikozidaz ve dehidrogenaz aktiviteleri ile mezofilik heterotrofik bakteri sayısı; bitkilerde ise verim, kalite ve besin elementi içerikleri belirlenmiştir. Veriler SPSS 17.0 programında analiz edilmiş; varyans analizi, Duncan çoklu karşılaştırma testi ve Pearson korelasyon testi kullanılmıştır. Toprak analizlerinde PNB-B3 uygulaması en yüksek üreaz (25,77), β-glikozidaz (21,506) ve bakteri sayısı bakımından öne çıkarken, PBV-A9 en yüksek alkali fosfataz aktivitesini (13,823) sağlamıştır. Dehidrogenaz aktivitesi PHB-A8 uygulamasında 0,382 ile en yüksek düzeye ulaşmıştır. Bitkilerde en yüksek azot içeriği PNB-B3 (%1,421), fosfor içeriği PBV-A9 (%0,1323), kalsiyum içeriği PNB-B3 (%1,651) ve magnezyum içeriği PHB-A8 (%0,509) uygulamalarında belirlenmiştir. İstatistiksel değerlendirmede toprak enzim aktiviteleri ve besin elementi içeriklerinde anlamlı farklılıklar saptanırken, kök boğazı çapı ve yaprak genişliği bakımından anlamlı fark bulunmamıştır. Sonuç olarak PNB-B3 ve PBV-A9 izolatları, toprak biyolojik aktivitesi ve bitki beslenmesine katkılarıyla mikrobiyal gübre adayı olarak öne çıkmıştır.

Anahtar Kelimeler: Vermikompost, fosfat çözücü bakteri, mikrobiyal gübre, marul, rizosfer.

ABSTRACT

In this study, conducted to reduce the environmental impacts of chemical fertilizer use and support sustainable agriculture, the microbial fertilizer potential of phosphate-solubilizing bacteria isolated from vermicompost and soil treated with vermicompost was investigated in lettuce plants. The study lasted approximately 81 days under greenhouse conditions; following a randomized block design, seven treatments—consisting of two controls and five bacterial isolates—were conducted in three replicates, totaling 21 pots. Solubility index (SI) and 16S rRNA gene sequencing results were used in the selection of isolates. SI values ranged from 3.00 to 6.33. At harvest, urease, alkaline phosphatase, β-glucosidase, and dehydrogenase activities, as well as the number of mesophilic heterotrophic bacteria in the rhizosphere soil, were determined; while yield, quality, and nutrient content in the plants were also assessed. The data were analyzed using SPSS 17.0; analysis of variance (ANOVA), Duncan's multiple range test, and Pearson's correlation test were employed. In soil analyses, the PNB-B3 treatment stood out for the highest urease (25.77), β-glucosidase (21.506), and bacterial counts, while the PBV-A9 treatment provided the highest alkaline phosphatase activity (13.823). Dehydrogenase activity reached its highest level (0.382) with the PHB-A8 application. The highest nitrogen content in plants was observed in the PNB-B3 treatment (1.421%), the highest phosphorus content in the PBV-A9 treatment (0.1323%), the highest calcium content in the PNB-B3 treatment (1.651%), and the highest magnesium content in the PHB-A8 treatment (0.509%). Statistical analysis revealed significant differences in soil enzyme activities and nutrient element contents, while no significant differences were found in root collar diameter and leaf width. As a result, the PNB-B3 and PBV-A9 isolates emerged as promising microbial fertilizer candidates due to their contributions to soil biological activity and plant nutrition.

Keywords: Vermicompost, phosphate-solubilizing bacteria, microbial fertilizer, lettuce, rhizosphere.

GEÇMİŞTEN GELECEĞE VAN İLİ : 2004 SONRASI İKLİM DEĞİŞİMİ VE TARIMSAL ÜRÜN DESENİNDEKİ DÖNÜŞÜM

FROM THE PAST TO THE FUTURE IN THE VAN BASIN: POST-2004 CLIMATE CHANGE AND THE TRANSFORMATION OF THE AGRICULTURAL CROP PATTERN

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ÖZET

Küresel iklim krizinin tetiklediği hidrolojik kuraklık, su kaynaklarına doğrudan bağımlı olan tarım sektöründe yapısal dönüşümlere yol açmaktadır. Bu çalışmanın amacı, 2004–2025 döneminde Van ilinde gözlenen iklimsel değişimlerin (yağış ve sıcaklık) bölgenin makro tarımsal ürün deseni üzerindeki etkisini nicel verilerle incelemektir. Araştırmada, 11 ilçeye ait meteorolojik veri setleri ile TÜİK bitkisel üretim istatistikleri birlikte değerlendirilmiş; ekim alanlarındaki değişim, uç yıllar arasındaki yüzde değişim, doğrusal trend ve alan payları üzerinden analiz edilmiştir. Bulgulara göre il genelinde 2004 yılında 590.7 mm olan yıllık ortalama yağış miktarı 2025'te 431.7 mm'ye gerileyerek %26.9 oranında azalmıştır. Yıllar arası dalgalanma yüksek olduğundan doğrusal trend çizgisi, dönem boyunca yaklaşık %15'lik (588 mm → 501 mm; yaklaşık 4.2 mm/yıl) bir azalışa işaret etmektedir. Bu su kısıtı ürün desenine çok yönlü yansımıştır: endüstri bitkileri (şeker pancarı, yağlı tohumlar ve patates) ekim alanlarında %81.6, yemeklik tane baklagillerde %83 ve tahıllarda %24.4 oranında daralma gözlemlenmiştir. Yem bitkileri ekim alanı 697 bin dekardan yaklaşık 1.57 milyon dekara (%125) yükselmiştir; ancak bu artışın büyük bölümü, verilerde 2021'den itibaren ayrı kalem olarak görünen çayır otu (yeşil ot) alanından kaynaklanmakta, bu kalem hariç tutulduğunda artış yaklaşık %13'te kalmaktadır. Meyve veren yaşta ağaç sayısı ise 421 bin adetten 958 bin adete (%127.5) yükselmiştir; bu durum damla sulamaya uygun uzun vadeli meyveciliğe yönelimle ilişkili olabilir. Sonuç olarak Van ilinde ticari tarla tarımının payı azalırken, hayvancılığı destekleyen kaba yem üretimi ve meyvecilik öne çıkmaktadır. Yağış ile ekim alanı arasında doğrudan istatistiksel bir ilişki bulunmamış olup, dönüşümde tarım politikaları, girdi maliyetleri ve teşvikler gibi yağış dışı etkenlerin de rol oynadığı düşünülmektedir.

Anahtar Kelimeler: İklim Değişikliği, Van ili, Tarımsal Ürün Deseni, Kuraklık Adaptasyonu, Yem Bitkileri

ABSTRACT

Hydrological drought triggered by the global climate crisis is causing structural transformations in the agricultural sector, which depends directly on water resources. This study aims to examine, with quantitative data, the impact of climatic changes (precipitation and temperature) observed in Van Province between 2004 and 2025 on the province's macro-level agricultural crop pattern. Meteorological datasets of 11 districts representing Van Province were analyzed together with crop production statistics of the Turkish Statistical Institute (TurkStat); changes in sown area were assessed through percentage change between end years, linear trends and area shares. Mean annual precipitation across Van Province declined from 590.7 mm in 2004 to 431.7 mm in 2025, a decrease of 26.9%. Because inter-annual variability is high, the linear trend indicates a more moderate decline of about 15% over the period (588 mm → 501 mm; about 4.2 mm per year). This water constraint was reflected in the crop pattern in several ways: sown area declined by 81.6% for industrial crops (sugar beet, oilseeds and potatoes), 83% for edible grain legumes and 24.4% for cereals. Forage crop area increased from 697 thousand decares to approximately 1.57 million decares (125%); however, most of this increase stems from the meadow grass (green fodder) item that appears as a separate category in the data from 2021 onwards, and excluding it the increase is only about 13%. The number of fruit trees at bearing age rose from 421 thousand to 958 thousand (127.5%), which may be related to a shift toward long-term fruit growing suited to drip irrigation. Overall, the share of commercial field crops in Van Province is decreasing while roughage production supporting livestock farming and fruit growing are coming to the fore. No direct statistical relationship was found between precipitation and sown area, and non-precipitation factors such as agricultural policies, input costs and incentives are thought to have contributed to the transformation.

Keywords: Climate Change, Van Province, Agricultural Crop Pattern, Drought Adaptation, Forage Crops

HATAY'DA MISIR YETİŞTİRİCİLİĞİNDE GÜZ TIRTILI: YAYILIŞ DESENİ, ZARAR ORANI VE DOĞAL DÜŞMANLARI

FALL ARMYWORM IN HATAY MAIZE CULTIVATION: DISTRIBUTION PATTERN, DAMAGE RATE, AND NATURAL ENEMIES

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ABSTRACT

Maize (Zea mays L.) is a key crop in Türkiye, important to the food and livestock industries. The Mediterranean region's Hatay Province has experienced issues with the fall armyworm (Spodoptera frugiperda [J.E. Smith, 1797]; Lepidoptera: Noctuidae), which was introduced in 2022 and has become a major pest. This study assessed its distribution, damage rate, and natural enemies in the region. Field research was conducted in 2025 from April to November in the Hatay Province district of Arsuz and İskenderun. S. frugiperda was absent in the initial season (April–July) but prevalent in the subsequent season (July–November). The first crop was dominated by Chilo partellus (Swinhoe, 1885) (Crambidae) and Mythimna loreyi (Duponchel, 1827) (Noctuidae), whereas S. frugiperda dominated the second, remaining active in the Arsuz plain for around four months. Higher population densities were recorded in coastal areas, with the most severe damage occurring at the early vegetative stages (6-, 8, and 10-leaf). Damage rates were monitored weekly at six locations: in Iskenderun (1) and Arsuz (5). The lowest rate (2%) occurred at the 2–4 leaf stages in Iskenderun, whereas the highest (100%) was recorded from the 10–12 leaf stages to pre-harvest in Arsuz. Fixed-plot observations confirmed the greatest susceptibility occurred at thev 6-, 8, and 10-leaf stages, with the level of damage increasing in subsequent phases. The identified natural enemies are gneralist predators previously recorded in Türkiye's entomofauna; however, this is their first documented association with S. frugiperda in İskenderun and Arsuz. Six predators were identified: Scymnus sp., Hippodamia variegata (Goeze, 1777), Coccinella septempunctata (Linnaeus, 1758), Propylea quatuordecimpunctata (Linnaeus, 1758), and Adalia decempunctata (Linnaeus, 1767) (Coleoptera: Coccinellidae), alongside Chrysoperla carnea (Stephens, 1836) (Neuroptera: Chrysopidae). Additionaly, Cotesia ruficrus (Haliday, 1834; Microgaster) (Braconidae) has been recorded for the first time in Türkiye as a larval parasitoid of S. frugiperda.

Keywords: Spodoptera frugiperda, Türkiye, Turkey, Predator, Parasitoid

SÜS BİTKİSİ OLARAK KULLANILAN MEYVE TÜRLERİNİN İKLİM DEĞİŞİKLİĞİNE UYUMLU SÜRDÜRÜLEBİLİR PEYZAJ ALANLARINDA KULLANIM POTANSİYELİ

POTENTIAL USE OF FRUIT SPECIES AS ORNAMENTAL PLANTS IN CLIMATE CHANGE-ADAPTED SUSTAINABLE LANDSCAPE AREAS

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ÖZET
Küresel iklim değişikliğine bağlı olarak artan sıcaklıklar, sıcaklık dalgalanmaları, kuraklık, düzensiz yağış rejimleri ve su kaynaklarının azalması, sürdürülebilir peyzaj alanlarında bitki seçiminde ekolojik uyum ve dayanıklılığın önemini artırmaktadır. Meyve türlerinin süs bitkisi olarak kullanımını ifade eden "ORNAFRUIT" kavramı, Şahin (2020) tarafından literatüre kazandırılmış olup bu türlerin estetik, ekolojik ve işlevsel özellikleriyle peyzaj alanlarında değerlendirilmesini kapsamaktadır. Bu türler; çiçek, yaprak ve meyve renkleri, taç yapıları ve mevsimsel değişimleriyle peyzaj alanlarına görsel zenginlik katarken, yenilebilir meyveleriyle kentsel gıda üretimine ve sağlıklı beslenmeye katkı sağlamaktadır. Bunun yanı sıra, insanların doğayla etkileşimini güçlendirmeleri ve farklı duyusal deneyimler sunmaları, psikolojik rahatlama, stresin azaltılması ve yaşam kalitesinin iyileştirilmesi açısından da önem taşımaktadır. Çiçekleriyle tozlayıcı böceklere, meyveleriyle kuşlara ve diğer yaban hayvanlarına besin kaynağı oluşturmaları ise biyolojik çeşitliliğin desteklenmesine katkı sağlamaktadır. Bu kapsamda iğde, zeytin, hünnap, kızılcık, kocayemiş, dut, elma ve asma gibi meyve türleri, estetik özelliklerinin yanı sıra farklı iklim ve çevre koşullarına uyum potansiyelleriyle dikkat çekmektedir. Bu türlerden bazılarının kuraklık, tuzluluk, yüksek ve düşük sıcaklıklar gibi abiyotik stres koşullarına tolerans gösterebilmesi, iklim değişikliğine uyumlu peyzaj uygulamalarında kullanılmaları açısından önemli avantajlar sunmaktadır. Bununla birlikte, türlerin ve genotiplerin yerel iklim koşullarına uyumlarının, su gereksinimlerinin ve çevresel streslere dayanıklılıklarının belirlenmesi, uygun bitki seçimi açısından önemlidir. Sonuç olarak, meyve türlerinin estetik, yenilebilir ve ekolojik özelliklerinin bir arada değerlendirilmesi, su kaynaklarının daha verimli kullanıldığı, biyolojik çeşitliliği destekleyen ve iklim değişikliğine karşı daha dirençli sürdürülebilir peyzaj alanlarının oluşturulmasına katkı sağlayabilir.

Anahtar Kelimeler: Ornafruit, Kuraklık, Adaptasyon, Peyzaj

ABSTRACT
Increasing temperatures, temperature fluctuations, drought, irregular precipitation patterns, and declining water resources associated with global climate change have highlighted the importance of ecological adaptation and resilience in plant selection for sustainable landscapes. The term “ORNAFRUIT”, introduced into the scientific literature by Şahin (2020), refers to the use of fruit species as ornamental plants, emphasizing their aesthetic, ecological, and functional potential in landscape applications. These species enhance the visual appeal of landscapes through their flower, leaf, and fruit colors, canopy structures, and seasonal changes, while their edible fruits contribute to urban food production and healthy nutrition. Furthermore, by strengthening people's connection with nature and providing diverse sensory experiences, they offer potential benefits for psychological well-being, stress reduction, and improved quality of life. Their flowers provide food resources for pollinating insects, while their fruits support birds and other wildlife, thereby contributing to biodiversity conservation. In this context, fruit species such as oleaster, olive, jujube, cornelian cherry, strawberry tree, mulberry, apple, and grapevine are noteworthy not only for their ornamental characteristics but also for their potential to adapt to diverse climatic and environmental conditions. The ability of some of these species to tolerate abiotic stresses, including drought, salinity, and high and low temperatures, offers significant advantages for their use in climate-resilient landscape applications. However, evaluating the adaptation of species and genotypes to local climatic conditions, their water requirements, and their tolerance to environmental stresses is essential for appropriate plant selection. In conclusion, integrating the aesthetic, edible, and ecological characteristics of fruit species into landscape planning may contribute to the development of sustainable landscapes that promote efficient water use, support biodiversity, and enhance resilience to climate change.

Keywords: Ornafruit, Drought, Adaptation, Landscape

KUŞBURNU (ROSA SPP.) GENETİK KAYNAKLARININ KURAKÇIL PEYZAJ ALANLARINDA ALTERNATİF SÜS BİTKİSİ OLARAK KULLANIM POTANSİYELİ

POTENTIAL OF ROSEHIP (ROSA SPP.) GENETIC RESOURCES AS ALTERNATIVE ORNAMENTAL PLANTS IN XERISCAPING LANDSCAPES

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ÖZET
Kuşburnu ve yabani gül olarak bilinen türleri içeren Rosa cinsi, farklı çiçek ve meyve özellikleri ile gelişme formları bakımından zengin bir biyolojik çeşitlilik sunmaktadır. Bu çeşitlilik, mevsimsel görselliği destekleyerek söz konusu genetik kaynakların peyzaj düzenlemelerinde süs bitkisi olarak değerlendirilmesine olanak sağlamaktadır. İklim değişikliğiyle birlikte artan su kısıtı ise yüksek estetik değeri, düşük su gereksinimiyle birleştirebilen bitkisel materyalin önemini giderek daha da arttırmaktadır. Bu bağlamda, yabani Rosa türleri, süs bitkisi olarak taşıdıkları potansiyel ve farklı çevre koşullarına uyum sağlayabilme özellikleriyle kurakçıl peyzaj uygulamalarında değerlendirilebilecek önemli bitkisel kaynaklar arasında yer almaktadır. Bununla birlikte, uygun materyalin seçiminde su kısıtı altında çiçeklenme ve meyve görselliğinin korunması, bitki formunun devamlılığı ve bakım gereksinimleri birlikte ele alınmalıdır. Bu derlemede, kuşburnu (Rosa spp.) genetik kaynaklarının kurakçıl peyzaj alanlarında alternatif süs bitkileri olarak kullanım potansiyelinin; kuraklık toleransı, mevsimsel süs bitkisi değeri ve bakım gereksinimleri çerçevesinde değerlendirilmesi amaçlanmaktadır. Bu değerlendirmeyle, bitki seçimine yönelik ölçütlerin ortaya konulması ve gelecekteki seleksiyon ve peyzaj performansı çalışmalarına yön verebilecek araştırma gereksinimlerinin belirlenmesi hedeflenmektedir.

Anahtar Kelimeler: Kuşburnu, kurakçıl peyzaj, süs bitkisi, genetik kaynaklar

ABSTRACT
The genus Rosa spp., which includes species known as rosehip and wild rose, offers a rich botanical diversity in terms of flower and fruit characteristics as well as growth forms. This diversity enhances seasonal visual appeal, making it possible to utilize these genetic resources as ornamental plants in landscape design. Meanwhile, increasing water scarcity due to climate change is making plant material that combines high aesthetic value with low water requirements increasingly important. In this context, wild Rosa species represent valuable plant genetic resources for potential use in xeriscape landscaping due to their ornamental potential and ability to adapt to diverse environmental conditions. However, when selecting suitable material, the preservation of flowering and fruit aesthetics under water stress, the continuity of plant form, and maintenance requirements must be considered together. This review aims to evaluate the potential of rosehip genetic resources as alternative ornamental plants in arid landscape areas, focusing on drought tolerance, seasonal ornamental value, and maintenance requirements. Through this evaluation, the goal is to establish criteria for plant selection and to identify research needs that can guide future selection and landscape performance studies.

Keywords: Rosehip, drought-tolerant landscape, ornamental plant, genetic resources

AĞRI'DAKI MARKETLERDEN TEMİN EDİLEN TAVUK BUT ETLERİNİN OKSİDATİF KALİTE ÖZELLİKLERİNİN DEĞERLENDİRİLMESİ

EVALUATION OF OXIDATIVE QUALITY CHARACTERISTICS OF CHICKEN DRUMSTICK MEAT OBTAINED FROM MARKETS IN AĞRI

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ÖZET
Tavuk eti; besin değeri, uygun fiyatı, farklı kültürler ve dinler genelinde kabul görmesi nedeniyle yaygın olarak tüketilmektedir. Tavuk etinin besin kalitesinin ve depolama stabilitesinin korunması önemli bir konudur. Taze ya da dondurulmuş olarak da satışa sunulan tavuk etinde uzun süreli taşıma sırasında sıcaklık dalgalanmaları veya yetersiz soğuk zinciri besinsel nitelikleri olumsuz yönde etkilemektedir. Bu tür termal değişimler, özellikle makromoleküllerin oksidatif bozunmasını hızlandırarak et kalitesinin giderek bozulmasına yol açar. Nitekim lipid oksidasyonu ve mikrobiyal bozulma; protein kalitesini, lipid bütünlüğünü, duyusal özellikleri ve tüketiciler tarafından kabul edilebilirliği olumsuz yönde etkileyebilir. Lipid ve protein oksidasyonu, et ve et ürünlerinde kalite bozulmasının başlıca nedenleridir. Lipid ve protein oksidasyonunun göstergeleri tiyobarbitürik asit reaktif maddeleri (TBARS) ve karbonil içeriğinin belirlenmesidir. Mevcut bu çalışmada +4± 2 ℃'de taze olarak satışa sunulan 4 farklı marka ve 1 köy tavuğu but etinde lipit ve protein oksidasyonu tespit edilmiştir. TBARS değerleri açısından but etleri arasında istatistiki olarak bir farklılık belirlenememiştir. TBARS değerinin en yüksek (11.67 µmol MDA/kg) belirlendiği grupta (markette satışa sunulan but eti: Grup 1) protein oksidasyon değeri en düşük olarak tespit edilmiştir. Protein oksidasyonu en yüksek köy tavuğu but etinde bulunmuştur. Ancak markette satışa sunulan 2 but eti ile arasında istatistiki açıdan $p < 0.05$ önem seviyesinde farklılık tespit edilmiştir. Ayrıca belirlenen lipit ve protein oksidasyon değerleri açısından incelenen örnekler uygun olarak değerlendirilmiştir.

Anahtar Kelimeler: Tavuk But Eti, Protein Oksidasyonu, Lipit Oksidasyonu

ABSTRACT

Chicken meat is widely consumed because of its nutritional value, affordable price, and acceptance across different cultures and religions. Preserving the nutritional quality and storage stability of chicken meat is an important issue. In chicken meat offered for sale either fresh or frozen, temperature fluctuations during long-term transportation or an inadequate cold chain adversely affect nutritional properties. Such thermal changes accelerate the oxidative degradation of macromolecules in particular, leading to a gradual deterioration of meat quality. Indeed, lipid oxidation and microbial spoilage may adversely affect protein quality, lipid integrity, sensory properties, and consumer acceptability. Lipid and protein oxidation are the main causes of quality deterioration in meat and meat products. Indicators of lipid and protein oxidation are the determination of thiobarbituric acid reactive substances (TBARS) and carbonyl content. In the present study, lipid and protein oxidation were determined in drumstick meat of 4 different brands and 1 free-range (village) chicken, offered for sale fresh at +4±2 ℃. No statistically significant difference was determined among the drumstick meats in terms of TBARS values. In the group with the highest TBARS value (11.67 μmol MDA/kg) (drumstick meat sold in the market: Group 1), the protein oxidation value was determined to be the lowest. Protein oxidation was found to be highest in the free-range chicken drumstick meat. However, a statistically significant difference at the $p < 0.05$ significance level was determined between it and the 2 drumstick meats sold in the market. In addition, the lipid and protein oxidation values determined were evaluated as appropriate for the samples examined.

Keywords: Chicken Drumstick Meat, Protein Oxidation, Lipid Oxidation

KAHVE (COFFEA ARABICA L.) YETİŞTİRİCİLİĞİNİN GENEL İLKELERİ VE TÜRKİYE'DE AÇIK ALAN VE KORUNMALI KAHVE YETİŞTİRİCİLİĞİNDEN İLK GÖZLEMLER

GENERAL PRINCIPLES OF COFFEE (COFFEA ARABICA L.) CULTIVATION AND INITIAL OBSERVATIONS FROM OPEN FIELD AND PROTECTED COFFEE CULTIVATION IN TÜRKİYE

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ABSTRACT
Yield and quality losses associated with global climate change in tropical regions are driving a shift in coffee cultivation towards higher elevations within the tropics or towards subtropical regions. Changes in climatic conditions are enabling the cultivation of certain tropical fruit species in specific microclimatic areas of Türkiye's Mediterranean Region. Coffee is among these species, and its cultivation has begun under open field and protected conditions in certain areas with favorable microclimates. This study addressed the general principles and ecological requirements of coffee cultivation and evaluated the adaptation performance of three year old Coffea arabica genotypes grown under open field conditions and in a plastic greenhouse in Yakacık, Gazipaşa, Antalya. No low temperature injury was observed in either cultivation system, whereas high temperature injury occurred occasionally, particularly under open field conditions. Protected cultivation outperformed open field cultivation in terms of both vegetative growth and fruit characteristics. The highest plant height (1.96 m) and stem diameter (51.95 mm) were recorded under protected cultivation. The weight of 10 coffee cherries was 16.71 g under open field conditions and 19.41 g under protected cultivation, while the weight of 10 seeds was 9.47 g and 10.60 g, respectively. Fruit diameter and length were also greater under protected cultivation. The results indicate that protected coffee cultivation markedly reduces climatic risks compared with open field cultivation under the conditions of the region. Accordingly, further research with an expanded scope is needed to clarify the production potential of protected cultivation systems.

Keywords: Adaptation, Global Climate Change, Cultivation System, Protected Cultivation, Subtropical

COMPARISON OF POD AND SEED TRAITS AND SEED GERMINATION PERFORMANCE AMONG CAROB (CERATONIA SILIQUA L.) CULTIVARS AND A WILD GENOTYPE

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ABSTRACT

Carob (Ceratonia siliqua L.), known as the rich plant of poor soils, is an economically important species whose fruits and seeds are utilized in various industrial sectors. Although seedling rootstocks are used for grafted nursery tree production, standardized materials with well characterized rootstock traits are needed. This study aimed to identify materials with potential for rootstock development by comparing the fruit and seed characteristics and germination performance of five carob cultivars ("Banya de Cabra", "Rolladora", "Flori Gazzafa", "Rojal" and "Banya de Marra") and a wild genotype collected from Demre, Antalya, Türkiye. Fruit weight, length, width and thickness, number of seeds per fruit, seed percentage, seed weight and seed dimensions, germination percentage, mean germination time and germination energy were evaluated. Principal component analysis (PCA) was also performed to explore relationships among the traits examined. The highest fruit weights were recorded in "Rojal" and "Flori Gazzafa", which belonged to the same statistical group, at 19.52 g and 19.08 g, respectively. The wild genotype outperformed the other materials in terms of the number of seeds per fruit (13.58) and seed percentage (25.56%). The highest mean seed weight was recorded in the wild genotype (0.205 g), whereas the greatest seed length was observed in "Banya de Marra" (10.92 mm). The highest germination percentage (96.67%) was recorded in "Rolladora", "Flori Gazzafa" and the wild genotype, all of which belonged to the same statistical group. The shortest mean germination time was recorded in "Rolladora" at 7.29 days. Germination energy was 41.85% in the wild genotype and 34.44% in "Rolladora", with no statistically significant difference between these materials. Principal component analysis revealed that fruit and seed traits clustered in distinct regions of the ordination plot and that the number of seeds per fruit was strongly and positively associated with germination percentage. The findings highlighted the wild genotype, with its high seed yield and germination performance, and 'Rolladora', with its rapid germination and high germination percentage, as promising materials for further research on seedling rootstock production.

Keywords: Carob Seed, Germination, Rootstock, Rolladora, Wild Carob

SAHA KOŞULLARINDA UYGULANAN BİYOLOJİK MÜCADELENİN DOMATES GÜVESİ (TUTA ABSOLUTA) ÜZERİNE ETKİNLİĞİ: MANİSA İLİ ÖRNEĞİ

FIELD EFFICACY OF BIOLOGICAL CONTROL AGAINST THE TOMATO LEAFMINER (TUTA ABSOLUTA): A CASE STUDY IN MANISA PROVINCE, TÜRKİYE

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ÖZET

Domates güvesi Tuta absoluta (Meyrick), domates üretiminde verim ve meyve kalitesini tehdit eden önemli zararlılardan biridir. Zararlının sürdürülebilir yönetiminde, farklı gelişme dönemlerini hedefleyen biyolojik mücadele programlarının saha performansının belirlenmesi önem taşımaktadır. Bu çalışmada, Manisa'da açık alan domates yetiştiriciliğinde Trichogramma evanescens ve Bracon hebetor kullanılan biyolojik mücadele programının meyve zararını azaltmadaki etkinliğinin değerlendirilmesi amaçlanmıştır. Çalışma, tesadüf blokları deneme deseninde dört tekerrürlü yürütülmüş; biyolojik mücadele, kimyasal mücadele ve kontrol uygulamaları karşılaştırılmıştır. Zararlının uçuş aktivitesi iki delta tipi eşey feromon tuzağıyla izlenmiştir. Biyolojik mücadelede T. evanescens sekiz, B. hebetor dört kez salınmış; kimyasal mücadelede altı ilaçlama gerçekleştirilmiştir. Her uygulamanın her tekerrüründe 1.000 meyve incelenmiş, meyve zarar oranları hesaplanmıştır. Veriler, uygulama ve blok etkilerini içeren varyans analiziyle değerlendirilmiş; ortalamalar Tukey testiyle karşılaştırılmıştır. Ortalama meyve zarar oranları biyolojik mücadele, kimyasal mücadele ve kontrolde sırasıyla %2,00 ± 0,09, %7,00 ± 0,13 ve %34,00 ± 0,23 olarak belirlenmiştir. Kontrole göre göreli zarar azalması biyolojik mücadelede %94,12, kimyasal mücadelede %79,41 olmuştur. Uygulama etkisi istatistiksel olarak anlamlı bulunmuştur ($F_{2,6}$ =23.706,67; P<0,0001). Tukey testi, biyolojik mücadeledeki meyve zarar oranının hem kimyasal mücadeleden hem de kontrolden anlamlı düzeyde düşük olduğunu göstermiştir. Kimyasal mücadeledeki zarar oranı da kontrolden anlamlı düzeyde düşük bulunmuştur. Biyolojik mücadele ile kimyasal mücadele arasındaki meyve zarar oranı % 5 olarak hesaplanmıştır. Bulgular, incelenen koşullarda biyolojik mücadele programının meyve zararının sınırlandırılmasındaki etkinliğini ortaya koymaktadır. Bununla birlikte, iki parazitoit türünün ayrı ayrı katkıları bu denemede belirlenememiştir. Sonuçlar, programın domates güvesinin entegre yönetiminde değerlendirilmesini desteklemektedir. Programın farklı üretim alanlarında ve sezonlarda tekrarlı denemelerle yapılması, sonuçların genellenebilirliğinin ve uygulanabilirliğinin değerlendirilmesi açısından önem taşımaktadır.

Anahtar Kelimeler: Tuta absoluta, Trichogramma evanescens, Bracon hebetor, biyolojik mücadele, meyve zararı, domates

ABSTRACT

The tomato leafminer, Tuta absoluta (Meyrick), threatens tomato yield and fruit quality. Field evaluation of biological control programmes targeting different developmental stages is important for sustainable pest management. This study evaluated a biological control programme involving Trichogramma evanescens and Bracon hebetor for reducing fruit damage in open-field tomato production in Manisa. Biological control, chemical control, and untreated control treatments were compared in a randomized complete block design with four replicates. The flight activity of the pest was monitored using two delta-type sex pheromone traps. Eight releases of T. evanescens and four releases of B. hebetor were conducted, while chemical control involved six insecticide applications. Fruit damage was assessed in 1,000 fruits per treatment replicate. Analysis of variance incorporating treatment and block effects was followed by Tukey's test. Mean fruit damage was 2.00 ± 0.09%, 7.00 ± 0.13%, and 34.00 ± 0.23% under biological control, chemical control, and untreated control, respectively. Relative damage reductions compared with the control were 94.12% and 79.41% for biological and chemical control, respectively. The treatment effect was significant ($F_{2,6}$ =23,706.67; P<0.0001). Tukey's test showed significantly lower fruit damage under biological control than under chemical control and untreated control. Chemical control also significantly reduced damage compared with the control. The difference in fruit damage rates between biological and chemical control was calculated as 5 percentage. These findings demonstrate programme effectiveness under the conditions examined. However, individual parasitoid contributions were not determined. The results support its consideration for integrated tomato leafminer management. Conducting repeated trials across different production areas and growing seasons is essential for assessing the generalizability and practical applicability of the results.

Keywords: Tuta absoluta, Trichogramma evanescens, Bracon hebetor, biological control, fruit damage, tomato

İNCİR (FICUS CARICA L.) YAN ÜRÜNLERİNİN FENOLİK BİLEŞİKLER AÇISINDAN DEĞERLENDİRİLMESİ: YEŞİL EKSTRAKSİYON YAKLAŞIMLARI

EVALUATION OF FIG (FICUS CARICA L.) BY-PRODUCTS AS SOURCES OF PHENOLIC COMPOUNDS: GREEN EXTRACTION APPROACHES

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ÖZET

İncir (Ficus carica L.) üretimi ve işlenmesi sırasında yaprak, kabuk ve sap gibi bitkisel artıkların yanı sıra, çekirdek yağı üretimi sonucunda çekirdek kökenli katı yan ürünler de oluşabilmektedir. Bu materyaller, fenolik bileşikler başta olmak üzere çeşitli biyoaktif bileşenleri içermeleri nedeniyle potansiyel fonksiyonel bileşen kaynakları ve ikincil hammaddeler olarak değerlendirilmektedir. Bu kapsamda, incir üretim ve işleme artıklarının döngüsel biyoekonomi yaklaşımı doğrultusunda değerlendirilmesi, kaynakların etkin kullanımı ve değerli bileşenlerin geri kazanımı açısından önem taşımaktadır. Fenolik bileşiklerin ekstraksiyonunda hidroalkolik çözücü sistemlerine dayalı konvansiyonel ekstraksiyon yöntemleri yaygın olarak kullanılmaktadır. Bununla birlikte, son yıllarda organik çözücü kullanımının ve ekstraksiyon süreçlerinden kaynaklanan çevresel yükün azaltılmasına yönelik olarak ultrason destekli ekstraksiyon, mikrodalga destekli ekstraksiyon ve derin ötektik çözücü temelli sistemler gibi yeşil ekstraksiyon yaklaşımları ön plana çıkmıştır. Bu yaklaşımlar, uygun proses koşulları altında fenolik bileşiklerin ekstraksiyonunun iyileştirilmesi, ekstraksiyon süresinin kısaltılması ve enerji ve/veya çözücü tüketiminin azaltılması açısından potansiyel sunmaktadır. Elde edilen ekstraktların kromatografik ve kütle spektrometrik tekniklerle kimyasal karakterizasyonu ile antioksidan ve antimikrobiyal aktivitelerinin değerlendirilmesi, incir kökenli artıkların biyoaktif bileşen profillerinin ve fonksiyonel kullanım potansiyellerinin ortaya konulmasına katkı sağlamaktadır. İncir üretim ve işleme artıklarının fenolik bileşimi ve fonksiyonel özellikleri üzerine çeşitli çalışmalar bulunmakla birlikte, mevcut literatürün önemli bir bölümü yapraklar ve meyve kökenli materyaller üzerinde yoğunlaşmaktadır. Buna karşılık, incir çekirdeği yağı üretimi sonrasında oluşan katı yan ürünlerin biyoaktif bileşen profili, fenolik bileşiklerin ekstaksiyonu ve potansiyel kullanım alanlarına ilişkin bilgiler daha sınırlıdır. Ayrıca farklı incir kökenli materyaller için uygun ekstraksiyon koşullarının belirlenmesi ve yeşil ekstraksiyon yaklaşımlarının sürdürülebilirlik açısından karşılaştırılması konularında araştırma gereksinimi devam etmektedir. Bu çalışmada, incir üretim ve işleme artıklarının fenolik bileşimi ile bu bileşiklerin ekstaksiyonunda kullanılan konvansiyonel ve yeşil ekstraksiyon yaklaşımları değerlendirilecek; sürdürülebilir kullanımına ilişkin araştırma gereksinimleri ve gelecek perspektifleri tartışılacaktır.

Anahtar Kelimeler: Ficus carica, incir işleme artıkları, fenolik bileşikler, yeşil ekstraksiyon, sürdürülebilirlik, döngüsel biyoekonomi

ABSTRACT

During the production and processing of figs (Ficus carica L.), various plant residues, such as leaves, peels, and stems, are generated, along with seed-derived solid by-products resulting from fig seed oil production. These materials are considered potential sources of functional ingredients and secondary raw materials due to their content of various bioactive compounds, particularly phenolic compounds. In this context, the valorization of fig production and processing residues within a circular bioeconomy framework is important for the efficient use of resources and the recovery of valuable compounds. Conventional extraction methods based on hydroalcoholic solvent systems are widely used for the extraction of phenolic compounds. However, in recent years, green extraction approaches, including ultrasound-assisted extraction, microwave-assisted extraction, and deep eutectic solvent-based systems, have gained increasing attention as strategies to reduce the use of organic solvents and the environmental burden associated with extraction processes. Under appropriate processing conditions, these approaches offer the potential to improve the extraction of phenolic compounds, shorten extraction times, and reduce energy and/or solvent consumption. Chemical characterization of the resulting extracts using chromatographic and mass spectrometric techniques, together with the evaluation of their antioxidant and antimicrobial activities, contributes to elucidating the bioactive compound profiles and potential functional applications of fig-derived residues. Although several studies have investigated the phenolic composition and functional properties of fig production and processing residues, a substantial proportion of the existing literature has focused on leaves and fruit-derived materials. In contrast, information regarding the bioactive compound profiles, extraction of phenolic compounds, and potential applications of solid by-products generated after fig seed oil production remains more limited. Furthermore, there is an ongoing need for research aimed at determining suitable extraction conditions for different fig-derived materials and comparing green extraction approaches in terms of sustainability. In this study, the phenolic composition of fig production and processing residues and the conventional and green extraction approaches used to recover these compounds will be evaluated. Research needs and future perspectives regarding the sustainable utilization of these residues will also be discussed.

Keywords: Ficus carica, fig processing residues, phenolic compounds, green extraction, sustainability, circular bioeconomy

ENGİNAR YAN ÜRÜNLERİNİN SÜRDÜRÜLEBİLİR DEĞERLENDİRİLMESİNDE YEŞİL EKSTRAKSİYON TEKNOLOJİLERİ

GREEN EXTRACTION TECHNOLOGIES FOR THE SUSTAINABLE VALORIZATION OF ARTICHOKE BY-PRODUCTS

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ÖZET

Enginar (Cynara cardunculus var. scolymus) işleme süreçlerinde dış brakteler, yapraklar ve saplar gibi önemli miktarda yan ürün ortaya çıkmaktadır. Bu yan ürünler, başta fenolik bileşikler olmak üzere çeşitli biyoaktif bileşenler açısından değerli kaynaklar olarak değerlendirilmektedir. Bu bileşiklerin sürdürülebilir yöntemlerle geri kazanımı, döngüsel ekonomi ve tarımsal gıda yan ürünlerinin değerlendirilmesi kapsamında son yıllarda giderek daha fazla önem kazanmaktadır. Geleneksel ekstraksiyon yöntemlerine alternatif olarak geliştirilen yeşil ekstraksiyon teknolojileri, çözücü tüketiminin ve çevresel etkilerin azaltılması ile biyoaktif bileşiklerin etkin bir şekilde geri kazanılması açısından önemli fırsatlar sunmaktadır. Bu kapsamda mikrodalga destekli ekstraksiyon (MAE), ultrason destekli ekstraksiyon (UAE), enzim destekli ekstraksiyon (EAE) ve doğal derin ötektik çözücüler (NADES) gibi alternatif yeşil çözücü sistemleri öne çıkmaktadır. Söz konusu teknolojilerin etkinliği; ekstraksiyon sıcaklığı, süresi, katı/sıvı oranı, çözücü bileşimi ve hammadde özellikleri gibi çeşitli faktörlere bağlı olarak değişebilmektedir. Ayrıca bu yaklaşımların ekstraksiyon verimliliği, enerji gereksinimi, çözücü tüketimi, ekstraktların saflaştırılması ve endüstriyel ölçekte uygulanabilirlik açısından değerlendirilmesi önem taşımaktadır. Fenolik bileşiklerce zengin ekstraktların gıda sistemlerinde doğal antioksidan bileşenler olarak kullanılma potansiyeli de enginar yan ürünlerinin katma değerli ürünlere dönüştürülmesi açısından dikkat çekmektedir. Bununla birlikte, ekstraktların gıda sistemlerine uygunluğu, proseslerin ölçeklendirilmesi ve ekonomik sürdürülebilirlik gibi konular daha fazla araştırmaya ihtiyaç duymaktadır. Bu kapsamda, çalışmada enginar işleme yan ürünlerinden başta fenolik bileşikler olmak üzere biyoaktif bileşenlerin geri kazanımına yönelik yeşil ekstraksiyon teknolojilerinin mevcut literatür ışığında değerlendirilmesi, bu teknolojilerin avantaj ve sınırlılıklarının ortaya konulması ve gelecekteki araştırmalara yönelik bir bakış açısı sunulması amaçlanmaktadır.

Anahtar Kelimeler: Enginar yan ürünleri, Yeşil ekstraksiyon, Fenolik bileşikler, Sürdürülebilirlik, Döngüsel ekonomi

ABSTRACT

Artichoke (Cynara cardunculus var. scolymus) processing generates substantial amounts of by-products, including outer bracts, leaves, and stems. These by-products are considered valuable sources of various bioactive compounds, particularly phenolic compounds. The sustainable recovery of these compounds has gained increasing importance in recent years within the framework of the circular economy and agro-food by-product valorization. Green extraction technologies developed as alternatives to conventional extraction methods offer significant opportunities to reduce solvent consumption and environmental impacts while enabling the efficient recovery of bioactive compounds. In this context, microwave-assisted extraction (MAE), ultrasound-assisted extraction (UAE), enzyme-assisted extraction (EAE), and alternative green solvent systems, such as natural deep eutectic solvents (NADES), have emerged as promising approaches. The efficiency of these technologies may vary depending on several factors, including extraction temperature, time, solid-to-liquid ratio, solvent composition, and raw material characteristics. Furthermore, it is important to evaluate these approaches in terms of extraction efficiency, energy requirements, solvent consumption, extract purification, and industrial scalability. The potential use of phenolic-rich extracts as natural antioxidant ingredients in food systems is also of particular interest for converting artichoke by-products into value-added products. However, further research is needed to address challenges related to the suitability of extracts for food applications, process scale-up, and economic sustainability. In this context, this study aims to evaluate the available literature on green extraction technologies for the recovery of bioactive compounds, particularly phenolic compounds, from artichoke processing by-products, to identify the advantages and limitations of these technologies, and to provide insights into future research directions.

Keywords: Artichoke by-products, Green extraction, Phenolic compounds, Sustainability, Circular economy

KIZILÇAM (PINUS BRUTIA) KABUĞU TANENİ ARACILI YEŞİL GÜMÜŞ NANOPARTİKÜL SENTEZİNİN UV–VIS SPEKTROSKOPİSİ İLE İZLENMESİ

UV–VIS SPECTROSCOPIC MONITORING OF GREEN SILVER NANOPARTICLE SYNTHESIS MEDIATED BY TURKISH PINE (PINUS BRUTIA) BARK TANNIN

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ÖZET

Kızılçam (Pinus brutia) kabuğu, kondanse tanenler bakımından zengin, yenilenebilir bir ormancılık yan ürünüdür. Bu biyokaynağın işlevsel nanomalzeme üretiminde değerlendirilmesi, ormancılık yan ürünlerinin katma değerli ürünlere dönüştürülmesi ve döngüsel biyoekonomi hedefleri açısından önem taşımaktadır. Bu çalışmada, ticari kızılçam kabuğu taneninin gümüş içeren plazmonik nanoyapıların yeşil sentezindeki indirgeme ve olası stabilizasyon işlevi UV–Vis spektroskopisiyle incelenmiştir. %64 tanen içeren ticari ekstrakttan 1,563 g alınarak 100 mL'ye tamamlanmış; aktif tanen eşdeğeri yaklaşık %1,00 (m/v) olan stok hazırlanmış ve pH 9,0'a ayarlanmıştır. Sentezde 9,00 mL 1,00 mM $AgNO_3$ çalışma çözeltisine 1,00 mL tanen stoku, karıştırma altında 100 µL'lik on ardışık ekleme hâlinde verilmiştir. Hacimlerin birleşmesiyle oluşan 10,00 mL reaksiyon karışımında, reaksiyon başlangıcındaki nominal $AgNO_3$ derişimi 0,90 mM; aktif tanen eşdeğeri ise yaklaşık %0,10 (m/v) olmuştur. Son eklemenin tamamlandığı an başlangıç kabul edilmiş; sıcaklık 44,0 °C, pH 8,72 olarak kaydedilmiştir. A≤2,0 veri kalite ölçütünü karşılayan spektrumların 350–500 nm bölgesindeki maksimumları değerlendirilmiştir. Altıncı dakikada 414 nm'de belirginleşen lokalize yüzey plazmon rezonans (LSPR) bandının ham absorbansı 89. dakikada 412 nm'de 0,450'ye ulaşmış; spektral biçim analizi bu artışın büyük ölçüde derişim etkisinden kaynaklandığına ve bandın ilk dakikalarda oluştuğuna işaret etmiştir. İleri zaman noktalarında bandın 410 nm çevresinde korunması, LSPR ile uyumlu optik yanıtın reaksiyon ortamında sürdüğünü göstermiştir. Bulgular, kızılçam kabuğu taneninin yeşil AgNP sentezinde biyokökenli reaktif olarak kullanılma potansiyelini desteklemektedir. Yaklaşım; antimikrobiyal kaplamalar, deri ve tekstil yüzeyleri, ambalaj sistemleri ile çevresel uygulamalar için geliştirilebilir bir temel sunmaktadır.

Anahtar Kelimeler: Pinus brutia, Ormancılık Yan Ürünü, Yeşil Sentez, Gümüş Nanopartikül, Döngüsel Biyoekonomi

ABSTRACT

Turkish pine (Pinus brutia) bark is a renewable forestry by-product rich in condensed tannins. Its utilization in functional nanomaterial production is relevant to converting forestry by-products into value-added products and supporting circular bioeconomy objectives. This study investigated, by UV–Vis spectroscopy, the reducing and potential stabilizing role of commercial Turkish pine bark tannin in the green synthesis of silver-containing plasmonic nanostructures. A 1.563 g portion of the commercial extract containing 64% tannin was brought to 100 mL to prepare a stock solution with approximately 1.00% (w/v) active tannin equivalent; its pH was adjusted to 9.0. For synthesis, 1.00 mL of tannin stock was added to 9.00 mL of 1.00 mM $AgNO_3$ working solution under stirring in ten consecutive 100 µL portions. After the two volumes were combined, the 10.00 mL reaction mixture had an initial nominal $AgNO_3$ concentration of 0.90 mM and an active tannin equivalent of approximately 0.10% (w/v). Completion of the final addition was defined as the starting point; the temperature and pH were 44.0 °C and 8.72, respectively. Spectral maxima in the 350–500 nm region were evaluated for measurements meeting the $A \leq 2.0$ data-quality criterion. A localized surface plasmon resonance (LSPR) band became evident at 414 nm at the sixth minute, and its raw absorbance reached 0.450 at 412 nm at the 89th minute; spectral shape analysis indicated that this increase was largely due to a concentration effect and that the band formed within the first minutes. Persistence of the band around 410 nm at later time points indicated that the LSPR-consistent optical response was maintained in the reaction medium. The findings support the potential of Turkish pine bark tannin as a biogenic reagent for green AgNP synthesis. The approach provides a basis for further development in antimicrobial coatings, leather and textile surfaces, packaging systems, and environmental applications. Keywords: Pinus brutia, Forestry By-product, Green Synthesis, Silver Nanoparticle, Circular Bioeconomy

Keywords: Pinus brutia, Forestry By-product, Green Synthesis, Silver Nanoparticle, Circular Bioeconomy

ATIK MANTAR SUBSTRATININ FARKLI KOMPOSTLAŞTIRMA YAKLAŞIMLARIYLA STABİLİZASYONU VE FİTOTOKSİSİTE AÇISINDAN DEĞERLENDİRİLMESİ

STABILIZATION OF SPENT MUSHROOM SUBSTRATE USING DIFFERENT COMPOSTING APPROACHES AND EVALUATION OF PHYTOTOXICITY

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ÖZET

Atık mantar substratı (AMS), mantar üretimi sonrasında ortaya çıkan ve uygun şekilde değerlendirilmediğinde çevresel sorunlara neden olabilen önemli bir organik atık kaynağıdır. Bu çalışmada, AMS'nin farklı kompostlaştırma yaklaşımlarıyla işlenmesi, süreç boyunca fiziksel ve kimyasal özelliklerinde meydana gelen değişimlerin incelenmesi ve elde edilen ürünlerin fitotoksisite ile bitki gelişimi açısından değerlendirilmesi amaçlanmıştır. Çalışmada üç sistem oluşturulmuştur: %100 AMS içeren Bokaşi kompostlama sistemi (Y1), %50 AMS ile %50 keçi gübresi ve budama atığı içeren Bokaşi kompostlama sistemi (Y2) ve Y2 ile aynı atık bileşimine ve karışım oranlarına sahip materyalin karıştırmalı açık yığın yöntemiyle kompostlaştırıldığı sistem (Y3). Kompostlaştırma sürecinde sıcaklık, nem, pH, elektriksel iletkenlik, toplam organik karbon, toplam azot, amonyum ve nitrat azotu, C/N oranı ile toplam humik ve fulvik asit değişimleri izlenmiştir. Bitkisel etkiler, tere (Lepidium sativum) tohumlarıyla gerçekleştirilen çimlenme indeksi testi ve saksı denemesiyle değerlendirilmiştir. Y3 sisteminde maksimum sıcaklık 60,6 °C'ye ulaşmış, ancak 55 °C üzerindeki süre yaklaşık iki günle sınırlı kalmıştır. Kompostlaştırma sonunda tüm sistemlerde C/N oranı azalmış ve toplam humik-fulvik asit miktarı artmıştır. Çimlenme indeksi, Y1-%100, Y1-%50, Y2-%50, Y3-%100 ve Y3-%50 uygulamalarında %80'in üzerinde bulunurken Y2-%100 uygulamasında %63,21 olarak belirlenmiştir. Saksı denemesinde uygulamalar arasında yalnızca yaş ağırlık bakımından istatistiksel olarak anlamlı fark saptanmıştır ($p = 0,026$). Bulgular, AMS'nin kompostlaştırılarak değerlendirilebileceğini; ancak tarımsal kullanımda kompostun özellikleri ve uygulama oranının birlikte dikkate alınması gerektiğini göstermektedir.

Anahtar Kelimeler: Atık Mantar substratı (AMS), Bokaşi, Karıştırmalı Açık Yığın, Çimlenme İndeksi, Fitotoksisite

ABSTRACT

Spent mushroom substrate (SMS) is an important source of organic waste generated after mushroom production and may cause environmental problems if not properly managed. This study aimed to investigate the processing of SMS using different composting approaches, monitor changes in its physicochemical properties during composting, and evaluate the resulting products in terms of phytotoxicity and plant growth. Three systems were established in this study: a Bokashi composting system containing 100% SMS (Y1), a Bokashi composting system containing 50% SMS and 50% goat manure and pruning waste (Y2), and a turned open-pile composting system using the same feedstock composition and mixing ratios as Y2 (Y3). Temperature, moisture, pH, electrical conductivity, total organic carbon, total nitrogen, ammonium and nitrate nitrogen, C/N ratio, and total humic and fulvic acid contents were monitored throughout the process. Plant-related effects were assessed using a germination index (GI) test with garden cress (Lepidium sativum) seeds and a pot experiment. In the Y3 system, the maximum temperature reached 60.6 °C; however, the duration above 55 °C was limited to approximately two days. At the end of composting, the C/N ratio decreased and total humic and fulvic acid contents increased in all systems. The GI exceeded 80% in the Y1-100%, Y1-50%, Y2-50%, Y3-100%, and Y3-50% applications, whereas it was 63.21% in the Y2-100% application. In the pot experiment, a statistically significant difference among treatments was detected only for fresh weight ($p = 0.026$). These findings indicate that SMS can be valorized through composting, while its potential agricultural use should be assessed by considering both compost characteristics and application rates.

Keywords: Spent Mushroom Substrate (SMS), Bokashi, Turned Open pile, Germination Index, Phytotoxicity

TÜRKİYE'NİN HATAY İLİNDE TURUNÇGİL BAHÇELERİNDEKİ YABANCI OTLAR ÜZERİNDE BULUNAN CİCADELLİDAE (HEMİPTERA) TÜRLERİNİN VE POPÜLASYON YOĞUNLUKLARININ BELİRLENMESİ

DETERMINATION OF CICADELLIDAE (HEMIPTERA) SPECIES AND THEIR POPULATION DENSITIES ON WEEDS IN CITRUS ORCHARDS IN HATAY PROVINCE, TÜRKİYE

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ÖZET
Cicadellidae familyasına bağlı türler bitkilerde doğrudan beslenme zararları ve çeşitli bitki patojenlerini taşımaları nedeniyle tarımsal üretim ve ekosistemler açısından önemli bir böcek grubudur. Türkiye'de önemli tarımsal üretim potansiyeline sahip olan turunçgil yetiştiriciliğinde de bu zararlı grubunun önemi büyüktür. Popülasyon yoğunluklarının en yüksek düzeye ulaştığı sonbahar başlarında oluşturdukları yoğun emgi lekeleri nedeniyle meyvelerin satış değerinin düşmesine ve bitki virüs hastalıklarına vektörlük yapmaları ile önemli bitki koruma sorunlarının ortaya çıkmasına neden olmaktadırlar 2022 yılında yürütülen bu çalışma ile Hatay ilinin turunçgil yetiştiriciliğinde en önemli ilçeleri Dörtyol, Erzin ve Arsuz'da farklı turunçgil türlerinin bulunduğu bahçelerde yabancı otlar üzerindeki cicadellid türlerinin ve bu türlerin yoğunluklarının belirlenmesi amaçlanmıştır. Çalışmada atrapla yapılan örneklemeler sonucu Cicadellidae familyasına ait Deltocephalinae altfamilyasına bağlı 16 tür, Typhlocybinae altfamilyasına bağlı 2 tür, Agallinae altfamilyasına bağlı 2 tür olmak üzere 15 farklı cinsten 20 tür belirlenmiştir. Örnekler içerisinde en yoğun bulunan tür Balclutha hebe (Kirkaldy) (% 46.65) olmuştur. Bu türü sırası ile Psammotettix striatus (L.) (% 10,84), Exitianus capicola (Stål) (% 9,94), Cicadulina bipunctella (Matsumura) (% 9,76), Empoasca sp. (% 9,76) ve Circulifer haematoceps (Mulsant and Rey) (% 3,43) izlemiştir. Geriye kalan 15 türün tüm örnekler içerisindeki oranı ise % 9,62 olmuştur. Bu türler içerisinde C. haematoceps ağaçlarda gelişme geriliğine, verim düşüklüğüne ve meyve kalitesinin bozulmasına neden olan turunçgil Stubborn hastalığının etmeni olan Spiroplasma citri 'nin turunçgiller ve susam gibi alternatif konukçu bitkilerde yayılmasında ve epidemiyolojisinde etkili vektörü olması ile ayrıca önem taşımaktadır.

Anahtar Kelimeler: Cicadellidae, Turunçgil, Zararlı Türler, Vektör

ABSTRACT
Species belonging to the family Cicadellidae constitute an important group of insects for agricultural production and ecosystems due to the direct feeding damage they cause to plants and their role in transmitting various plant pathogens. This group of pests also has a great importance in citrus cultivation, a sector with significant agricultural production potential in Turkey. They cause a reduction in the market value of the fruit due to the intense feeding marks formed in early autumn when the pest population densities peak and lead to significant plant protection issues since they act as vectors for plant viral diseases. With this study conducted in 2022, we aimed to identify the cicadellid species found on weeds and determine their population densities in orchards containing various citrus species across Dörtyol, Erzin, and Arsuz, the most important districts for citrus cultivation in Hatay province. In the study, as a result of sweep net sampling, 20 species belonging to 15 different genera within the family Cicadellidae were identified: 16 species of the subfamily Deltocephalinae, 2 species of the subfamily Typhlocybinae, and 2 species of the subfamily Agallinae. The most abundant species among the samples was Balclutha hebe (Kirkaldy) (46.65%) followed by Psammotettix striatus (L.) (% 10,84), Exitianus capicola (Stål) (% 9,94), Cicadulina bipunctella (Matsumura) (% 9,76), Empoasca sp., and Circulifer haematoceps (Mulsant and Rey) (% 3,43), respectively. The proportion of the remaining 15 species within the total sample set was 9.62%. Among these species, C. haematoceps is particularly significant as a key vector in the spread and epidemiology of Spiroplasma citri — the causal agent of citrus Stubborn disease, which leads to stunted tree growth, reduced yield, and impaired fruit quality — across alternative host plants such as citrus and sesame.

Keywords: Cicadellidae, Citrus, Pest Species, Vector

TARIMSAL SÜRDÜRÜLEBİLİRLİĞİN SAĞLANMASINDA COĞRAFİ BİLGİ SİSTEMLERİ VE UZAKTAN ALGILAMA TEKNOLOJİLERİNİN ÖNEMİ

THE IMPORTANCE OF GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING TECHNOLOGIES IN ACHIEVING AGRICULTURAL SUSTAINABILITY

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ÖZET

Artan nüfus, iklim değişikliği, doğal kaynaklar üzerindeki baskılar ve arazi kullanımındaki değişimler, tarımsal üretim sistemlerinin sürdürülebilirliğini etkileyen önemli sorunlar arasında yer almaktadır. Tarımsal sürdürülebilirlik, yalnızca üretim verimliliğinin artırılmasını değil, toprak ve su kaynaklarının korunmasını, çevresel etkilerin azaltılmasını ve tarımsal üretim kapasitesinin gelecek nesiller için devamlılığının sağlanmasını da kapsamaktadır. Bu nedenle tarımsal faaliyetlerin ekolojik, ekonomik ve mekânsal boyutlarıyla birlikte değerlendirilmesi önem taşımaktadır. Günümüzde Coğrafi Bilgi Sistemleri (CBS) ve uzaktan algılama teknolojileri, tarımsal alanların izlenmesi, değerlendirilmesi ve yönetilmesi açısından önemli olanaklar sunmaktadır. Uzaktan algılama, geniş alanlara ilişkin güncel ve tekrarlanabilir verilerin elde edilmesini desteklerken CBS, farklı kaynaklardan sağlanan mekânsal verilerin bir arada değerlendirilmesine imkân tanımaktadır. Bu teknolojiler arazi kullanım değişimlerinin izlenmesi, toprak ve su kaynaklarının değerlendirilmesi, bitki örtüsü özelliklerinin belirlenmesi ve çevresel baskıların anlaşılması gibi alanlarda kullanılabilmektedir. Bu bildirinin amacı, CBS ve uzaktan algılama teknolojilerinin tarımsal sürdürülebilirlik açısından önemini genel bir çerçevede açıklamak ve tarımsal planlama ile kaynak yönetimine sağlayabilecekleri katkıları vurgulamaktır. Tarımsal alanların mevcut durumunun anlaşılması, üretim potansiyelinin değerlendirilmesi ve doğal kaynakların korunmasına yönelik kararların desteklenmesi, bu teknolojilerin öne çıkan kullanım alanlarıdır. Ayrıca iklim değişikliğine bağlı risklerin izlenmesi ve arazi kullanım kararlarının çevresel koşullarla uyumlu biçimde geliştirilmesi bakımından mekânsal bilginin önemi giderek artmaktadır. Sonuç olarak CBS ve uzaktan algılama teknolojilerinin tarımsal planlama süreçleriyle bütünleştirilmesi, kaynakların daha bilinçli kullanılmasını ve tarım alanlarının uzun vadeli korunmasını destekleyebilir. Bu yaklaşım, sürdürülebilir tarımsal üretim ve gıda güvencesi açısından önem taşımaktadır.

Anahtar Kelimeler: Tarımsal sürdürülebilirlik, Coğrafi Bilgi Sistemleri, Uzaktan algılama, Tarımsal planlama, Doğal kaynak yönetimi

ABSTRACT

Population growth, climate change, increasing pressure on natural resources, and changes in land use are among the major challenges affecting the sustainability of agricultural production systems. Agricultural sustainability involves not only improving production efficiency but also conserving soil and water resources, reducing environmental impacts, and maintaining agricultural production capacity for future generations. Therefore, agricultural activities need to be considered together with their ecological, economic, and spatial dimensions. Today, Geographic Information Systems (GIS) and remote sensing technologies offer significant opportunities for monitoring, assessing, and managing agricultural areas. While remote sensing supports the acquisition of up-to-date and repeatable data over extensive areas, GIS enables the integrated assessment of spatial data obtained from different sources. These technologies can be used to monitor land-use changes, assess soil and water resources, identify vegetation characteristics, and understand environmental pressures. The aim of this paper is to explain the importance of GIS and remote sensing technologies for agricultural sustainability within a general framework and to emphasize their potential contributions to agricultural planning and resource management. Understanding the current condition of agricultural areas, assessing production potential, and supporting decisions concerning natural resource conservation are among their prominent applications. In addition, spatial information is becoming increasingly important for monitoring risks associated with climate change and developing land-use decisions that are compatible with environmental conditions. In conclusion, integrating GIS and remote sensing technologies into agricultural planning processes can support more informed resource use and the long-term conservation of agricultural land. This approach is important for sustainable agricultural production and food security.

Keywords: Agricultural sustainability, Geographic Information Systems, Remote sensing, Agricultural planning, Natural resource management

İKLİM KRİZİNDE PESTİSİT KULLANIMI: SERA GAZI EMİSYONLARI VE SÜRDÜRÜLEBİLİR TARIM AÇISINDAN ETKİLERİ

PESTICIDE USE IN THE CLIMATE CRISIS: IMPLICATIONS FOR GREENHOUSE GAS EMISSIONS AND SUSTAINABLE AGRICULTURE

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ÖZET

İklim değişikliği, tarımsal üretimin sürdürülebilirliği ve küresel gıda güvenliği açısından ciddi tehditler oluştururken, tarımsal faaliyetlerden kaynaklanan sera gazı emisyonlarının azaltılması giderek daha fazla önem kazanmaktadır. Bu kapsamda, pestisitlerin çevresel etkileri çoğunlukla ekotoksikolojik riskler üzerinden değerlendirilmekte, üretim ve kullanım süreçlerinin iklim değişikliğine katkısı ise sınırlı olarak ele alınmaktadır. Bu çalışmada, pestisit kullanımının sera gazı emisyonları ve tarımsal karbon ayak izi üzerindeki etkilerinin güncel bilimsel literatür ışığında değerlendirilmesi ve düşük karbonlu bitki koruma stratejilerinin sürdürülebilir tarım açısından tartışılması amaçlanmıştır. Pestisitlerin aktif madde üretimi, formülasyonu, taşınması ve tarımsal uygulama aşamalarında enerji tüketimi ve sera gazı emisyonlarına katkıda bulunduğu; ayrıca toprak mikrobiyal süreçlerini etkileyerek özellikle azot döngüsüyle ilişkili N_2O emisyonlarını değiştirebildiği ortaya konulmuştur. Bununla birlikte, pestisit kullanımının azaltılmasının her koşulda daha düşük karbon ayak izi sağlamadığı; alternatif mücadele yöntemlerinin enerji gereksinimleri, mekanizasyon düzeyi ve ürün verimliliği üzerindeki etkilerinin de dikkate alınması gerektiği vurgulanmıştır. Entegre zararlı yönetimi, hassas tarım teknolojileri ve biyolojik mücadele uygulamalarının pestisit bağımlılığını azaltma potansiyeli taşıdığı, ancak bu yaklaşımların iklimsel performansının yaşam döngüsü değerlendirmeleriyle bütüncül biçimde incelenmesi gerektiği sonucuna ulaşılmıştır. COP31 perspektifinde değerlendirildiğinde, sürdürülebilir bitki koruma stratejilerinin geliştirilmesinde temel hedefin yalnızca pestisit kullanım miktarını azaltmak değil, gıda güvenliği ve üretim verimliliğini koruyarak bitki korumanın toplam iklimsel ve çevresel maliyetini en aza indirmek olduğu vurgulanmaktadır.

Anahtar Kelimeler: Pestisitler, Karbon ayak izi, Sera gazı emisyonları, Sürdürülebilir tarım

ABSTRACT

While climate change poses serious threats to the sustainability of agricultural production and global food security, the reduction of greenhouse gas emissions stemming from agricultural activities is gaining increasing importance. In this context, the environmental impacts of pesticides are primarily assessed through the lens of ecotoxicological risks, whereas their contribution to climate change — arising from their production and application processes — is addressed to a limited extent. This study aims to evaluate the effects of pesticide use on greenhouse gas emissions and the agricultural carbon footprint in light of current scientific literature, and to discuss low-carbon crop protection strategies within the framework of sustainable agriculture. It has been established that pesticides contribute to energy consumption and greenhouse gas emissions throughout their active ingredient production, formulation, transportation, and field application stages; furthermore, by influencing soil microbial processes, they can alter N_2O emissions, particularly those associated with the nitrogen cycle. It is also emphasized, however, that reducing pesticide use does not invariably lead to a smaller carbon footprint; the energy requirements, level of mechanization, and impacts on crop yield associated with alternative pest control methods must also be taken into account. The study concludes that while integrated pest management, precision agriculture technologies, and biological control practices hold the potential to reduce reliance on pesticides, the climate performance of these approaches must be examined holistically through life cycle assessments. When viewed from the perspective of COP31, it is emphasized that the primary objective in developing sustainable plant protection strategies is not merely to reduce the quantity of pesticides used, but to minimize the overall climatic and environmental costs of plant protection while safeguarding food security and production efficiency.

Keywords: Pesticides, Carbon Footprint, Greenhouse Gas Emissions, Sustainable Agriculture

PISTACIA TEREBINTHUS L. BİTKİSİNİN YAPRAK VE MEYVE ÖZÜTLERİNİN FUSARIUM OXYSPORUM F. SP. MELONIS VE ALTERNARIA SOLANI'YE KARŞI ANTİFUNGAL POTANSİYELİ

ANTIFUNGAL POTENTIAL OF LEAF AND FRUIT EXTRACTS OF PISTACIA TEREBINTHUS L. AGAINST FUSARIUM OXYSPORUM F. SP. MELONIS AND ALTERNARIA SOLANI

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ÖZET
Bu çalışmada, Menengiç (Pistacia terebinthus L.) bitkisinin yaprak ve meyvelerinden elde edilen etanol ekstraktlarının önemli bitki patojeni funguslar olan Fusarium oxysporum f. sp. melonis (FOM) ve Alternaria solani'nin miselyum gelişimi üzerindeki engelleyici etkileri farklı dozlarda (kontrol (0), 0,5, 1, 2 ve 4 mg/mL) araştırılmıştır. Araştırma sonuçları, ekstraktların antifungal etkinliklerinin doz artışına ve kullanılan bitki organına bağlı olarak istatistiksel açıdan anlamlı düzeyde değiştiğini göstermiştir (p = 0,05). Tüm test dozlarında meyve ekstraktı, yaprak ekstraktına kıyasla daha yüksek misel engelleme oranı sergilemiştir. Yaprak ekstraktı 0,5 ve 1mg/mL antifungal etki göstermezken meyve ekstraktı 0,5 mg/mL dozdan itibaren aktivite başlatmıştır. Test edilen en yüksek dozda 4 mg/mL meyve ekstraktı A. solani gelişimini %40,46 ve FOM gelişimini %32,62 oranında baskılayarak en yüksek antifungal etkiyi sunmuştur. Sentetik fungisit pozitif kontrolünün (Thiram) %100 engelleme sağladığı çalışmada, P. terebinthus meyve ekstraktının sunduğu belirgin antifungal potansiyel, bu ekstraktın bitki hastalıklarının sürdürülebilir yönetiminde doğal bir biyopestisit kaynağı olarak kullanılabileceğini ortaya koymaktadır.

Anahtar Kelimeler: Pistacia terebinthus, Antifungal aktivite, Meyve ekstraktı, Alternaria solani, Fusarium oxysporum, Biyopestisit.

ABSTRACT
In this study, the inhibitory effects of ethanol extracts obtained from the leaves and fruits of the Menengiç (Pistacia terebinthus L.) plant on the mycelial growth of the important plant pathogenic fungi Fusarium oxysporum f.sp. melonis (FOM) and Alternaria solani, at different concentrations (control (0), 0.5, 1, 2, and 4 mg/mL). The results of the study showed that the antifungal activity of the extracts varied at a statistically significant level depending on the dose and the plant organ used (p = 0.05). At all test doses, the fruit extract exhibited a higher mycelial inhibition rate compared to the leaf extract. While the leaf extract showed no antifungal activity at 0.5 and 1 mg/mL, the fruit extract began to exhibit activity starting at a dose of 0.5 mg/mL. At the highest tested dose of 4 mg/mL, the fruit extract exhibited the highest antifungal effect, inhibiting the growth of A. solani by 40.46% and FOM by 32.62%. In this study, where the synthetic fungicide positive control (Thiram) achieved 100% inhibition, the significant antifungal potential demonstrated by the P. terebinthus fruit extract indicates that this extract could be used as a natural biopesticide source for the sustainable management of plant diseases.

Keywords: Pistacia terebinthus, antifungal activity, fruit extract, Alternaria solani, Fusarium oxysporum, biopesticide

ZIZIPHORA CAPITATA L BİTKİ METHANOL EKSTRAKTININ ALLELOPATİK ETKİSİNİN ARAŞTIRILMASI

INVESTIGATION OF THE ALLELOPATHIC EFFECT OF THE METHANOL EXTRACT OF ZIZIPHORA CAPITATA L.

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ÖZET

Ziziphora capitata, Lamiaceae familyasında yer alan ve Türkiye florasında doğal yayılış gösteren tek yıllık bir bitkidir. Bu çalışma, Z. capitata metanol ekstraktının farklı kültür bitkileri ve yabancı otlar üzerindeki allelopatik etkisini in vitro koşullarda belirlemek amacıyla yürütülmüştür. Kayseri'den çiçeklenme döneminde toplanan bitki materyali gölgede kurutulup öğütülmüş, metanolle ekstrakte edilmiş ve ham ekstrakt saf su ve DMSO ile çözündürülerek 0 (kontrol), 1, 2, 4 ve 8 mg/mL dozları hazırlanmıştır. Denemeler, 9 cm petri kaplarında 25'er tohum içeren Triticum aestivum, Lepidium sativum, Panicum miliaceum ve Avena sterilis üzerinde gerçekleştirilmiştir. Yaklaşık 24 °C'de 1–3 hafta inkübasyonun ardından çimlenme oranları ile kökçük ve sürgün uzunlukları belirlenmiştir. Sonuçlar, ekstraktın doza bağlı ve seçici allelopatik etkiler gösterdiğini ortaya koymuştur. En güçlü baskılama L. sativum'da (%100) gözlenirken, T. aestivum'da çimlenme istatistiksel olarak anlamlı düzeyde etkilenmemiş; ancak kök ve sürgün gelişimi sırasıyla %43,43–53,94 ve %61,99–66,23 oranlarında baskılanmıştır. Diğer bitkilerde gelişim parametreleri üzerinde istatistiksel olarak anlamlı etkiler belirlenmiştir. Ekstraktın 8 mg/mL dozunda P. miliaceum ve A. sterilis'in tohum çimlenmesi sırasıyla, %55,49–68,35 ve %17,50–20,0 oranlarında engellenmiştir. Her iki türde de kök ve sürgün gelişimi üzerinde daha belirgin inhibisyon görülmüştür. Bu bulgular, Z. capitata'nın sentetik pestisitlere alternatif doğal bir biyoherbisit kaynağı olabileceğini ve bu potansiyelin ileri çalışmalarla değerlendirilmesi gerektiğini göstermektedir

Anahtar Kelimeler: Ziziphora capitata, allelopati, tohum çimlenmesi, fide gelişimi, biyoherbisit

ABSTRACT

Ziziphora capitata is an annual plant belonging to the family Lamiaceae and is naturally distributed throughout the flora of Türkiye. This study aimed to investigate the allelopathic effects of Z. capitata methanol extract on different crop and weed species under in vitro conditions. Plant material was collected from natural populations in Kayseri during the flowering stage, shade-dried, and ground. The material was extracted with methanol, and the resulting crude extract was dissolved in distilled water containing DMSO to prepare concentrations of 0 (control), 1, 2, 4, and 8 mg/mL. The experiments were conducted in 9-cm Petri dishes containing 25 seeds each of Triticum aestivum, Lepidium sativum, Panicum miliaceum, and Avena sterilis. Following incubation at approximately 24 °C for 1–3 weeks, germination rates and radicle and shoot lengths were determined. The results revealed dose-dependent and selective allelopathic effects of the extract. The strongest inhibitory effect was observed in L. sativum, with 100% inhibition. In T. aestivum, seed germination was not significantly affected; however, root and shoot growth were inhibited by 43.43–53.94% and 61.99–66.23%, respectively. Statistically significant effects on plant growth parameters were observed in the other test species. At the highest concentration (8 mg/mL), seed germination in P. miliaceum and A. sterilis was inhibited by 55.49–68.35% and 17.50–20.0%, respectively. More pronounced inhibition was observed in root and shoot growth of both species. These findings suggest that Z. capitata may represent a potential natural source of bioherbicides as an alternative to synthetic pesticides, warranting further investigation.

Keywords: Ziziphora capitata, allelopathy, seed germination, seedling growth, bioherbicide

MARKET ÇALIŞANLARININ TUTUM VE DAVRANIŞLARININ TÜKETİCİLERİN SATIN ALMA KARARLARI ÜZERİNDEKİ ETKİSİNİN ORDİNAL REGRESYON ANALİZİ İLE İNCELENMESİ

AN INVESTIGATION OF THE FACTORS INFLUENCING THE IMPACT OF SUPERMARKET EMPLOYEES' ATTITUDES AND BEHAVIORS ON CONSUMERS' PURCHASING DECISIONS USING ORDINAL LOGISTIC REGRESSION ANALYSIS

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ÖZET

Perakende sektöründe tüketicilerin satın alma kararları, ürünlerin fiyatı ve kalitesi gibi unsurların yanı sıra alışveriş sırasında karşılaştıkları hizmetin niteliğinden de etkilenmektedir. Özellikle market çalışanlarının tüketicilere yönelik tutum ve davranışları, müşteri memnuniyetinin sağlanması, mağaza tercihlerinin şekillenmesi ve müşteri sadakatinin geliştirilmesi açısından önem taşımaktadır. Bu çalışmanın amacı, market çalışanlarının iletişim becerileri, nezaket, profesyonellik, yardımseverlik ve sorun çözme yaklaşımlarının tüketicilerin satın alma kararları üzerindeki rolünü incelemek ve bu değerlendirmelerin tüketicilerin sosyo-demografik özelliklerine göre nasıl farklılaştığını ortaya koymaktır. Araştırma kapsamında 143 tüketiciden çevrimiçi anket yöntemiyle veri toplanmış ve elde edilen veriler istatistiksel analiz yöntemleriyle değerlendirilmiştir. Çalışmada tüketicilerin market çalışanlarından beklentileri, alışveriş deneyimleri ve mağaza tercihlerini etkileyen hizmet unsurları ele alınmıştır. Araştırma bulguları, çalışanların tüketicilerle kurdukları iletişimin, profesyonel davranışlarının, kasa hizmetlerinin etkinliğinin ve karşılaşılan sorunlara yönelik çözüm odaklı yaklaşımlarının tüketicilerin değerlendirmelerinde önemli bir yere sahip olduğunu göstermektedir. Ayrıca yaş, eğitim düzeyi ve cinsiyet gibi demografik özelliklere bağlı olarak çalışan davranışlarına verilen önemin farklılaşabildiği belirlenmiştir. Sonuç olarak market çalışanlarının tutum ve davranışlarının tüketici tercihleriyle ilişkili olduğu, çalışanların iletişim ve hizmet sunum becerilerinin geliştirilmesinin müşteri memnuniyetini ve mağazaların rekabet gücünü destekleyebileceği değerlendirilmiştir. Bu doğrultuda perakende işletmelerinin çalışan eğitimine, hizmet kalitesine ve müşteri odaklı yönetim anlayışına önem vermesi önerilmektedir.

Anahtar Kelimeler: Tüketici davranışları, market çalışanları, satın alma kararları, müşteri memnuniyeti, perakende sektörü

ABSTRACT

In the retail sector, consumers' purchasing decisions are influenced not only by factors such as product price and quality but also by the quality of service they encounter during their shopping experience. In particular, supermarket employees' attitudes and behaviors toward consumers play an important role in ensuring customer satisfaction, shaping store preferences, and fostering customer loyalty. This study aims to examine the role of supermarket employees' communication skills, courtesy, professionalism, helpfulness, and problem-solving approaches in consumers' purchasing decisions and to identify how these evaluations differ according to consumers' sociodemographic characteristics. Data were collected from 143 consumers through an online questionnaire and analyzed using statistical methods. The study examined consumers' expectations of supermarket employees, their shopping experiences, and service-related factors influencing their store preferences. The findings indicate that employees' communication with consumers, professional conduct, checkout service efficiency, and solution-oriented approaches to customer problems play an important role in consumers' evaluations. Furthermore, the importance attributed to employee behaviors was found to vary according to demographic characteristics such as age, educational level, and gender. Overall, the findings suggest that supermarket employees' attitudes and behaviors are associated with consumer preferences and that improving employees' communication and service delivery skills may contribute to customer satisfaction and enhance the competitiveness of retail businesses. Accordingly, retail businesses are encouraged to prioritize employee training, service quality, and customer-oriented management practices.

Keywords: Consumer Behavior, Supermarket Employees, Purchasing Decisions, Customer Satisfaction, Retail Sector.

TARIMSAL KALINTILARDAN BİYOÇAR: PİROLİZ KOŞULLARI, ÖZELLİKLERİ, UYGULAMALARI VE TÜRKİYE'NİN ÜRETİM POTANSİYELİ: BİR DERLEME

BIOCHAR FROM AGRICULTURAL RESIDUES: PYROLYSIS CONDITIONS, PROPERTIES, APPLICATIONS AND THE PRODUCTION POTENTIAL OF TÜRKİYE: A REVIEW

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ÖZET

Biyoçar, biyokütlenin pirolizi ile elde edilen karbonca zengin katı üründür ve tarımsal atıklar bu amaçla en sık kullanılan hammaddeler arasındadır. Bu derleme, piroliz koşullarının tarımsal atık biyoçarının özelliklerini nasıl belirlediğini, bu biyoçarın toprakta ve suda nasıl kullanıldığını ve Türkiye'de ne kadar üretilebileceğini incelemektedir. Pirinç, buğday, mısır, kolza ve pamuk atıkları üzerine incelenen çalışmalarda, 300–700 °C arasında piroliz sıcaklığının artması karbon içeriğini, pH'yı, elektriksel iletkenliği, aromatikliği, yüzey alanını ve gözenek hacmini artırmakta; verimi, O/C ve H/C oranlarını ve oksijen içeren fonksiyonel grupları azaltmaktadır. Buğday sapı biyoçarı 700 °C'de 400 m^2/g yüzey alanına ulaşmıştır. Bir çalışmada kimyasal modifikasyon adsorpsiyon kapasitesini yaklaşık on kat değiştirmiş, KOH mısır sapı biyoçarının metilen mavisi kapasitesini 43,14 mg/g'dan 406,43 mg/g'a çıkarmıştır. 300 °C'de üretilip KOH ile modifiye edilen pirinç kabuğu biyoçarı 72,14 mg/g Cd(II) ve 170,84 mg/g Pb(II) adsorplamış, adsorpsiyonu yüzey alanından çok fonksiyonel gruplar açıklamıştır. Küresel bir değerlendirme biyoçarın azami sürdürülebilir teknik potansiyelini yılda 1,8 Pg CO_2-C eşdeğerine kadar vermiştir. Türkiye için tahminler kapsamları bakımından farklıdır: 2015 yılında tarımsal ve hayvansal atıklardan 3,94 milyon ton biyoçar (bunun %77'si hayvansal atık), elma budama artıklarından yılda 41,5 bin ton ve ana bitkisel atıklardan elde edilebilecek miktarın tarım topraklarının tahmini ihtiyacının ellide birini karşılaması. Çalışmalar farklı hammadde, reaktör ve test koşulları kullanmakta; arazi denemeleri, maliyet analizleri ve standart raporlama eksiktir.

Anahtar Kelimeler: Biyoçar, Tarımsal atıklar, Piroliz, Adsorpsiyon

ABSTRACT

Biochar is the carbon-rich solid produced by pyrolysis of biomass, and agricultural residues are among the feedstocks most often used for it. This review examines how pyrolysis conditions determine the properties of biochar from agricultural residues, how such biochar is used in soil and water, and how much of it could be produced in Türkiye. Across the reviewed studies on rice, wheat, corn, rape and cotton residues, higher pyrolysis temperatures between 300 and 700 °C raise carbon content, pH, electrical conductivity, aromaticity, surface area and pore volume, and lower yield, the O/C and H/C ratios and oxygen-containing functional groups. Wheat straw biochar reached a surface area of 400 m^2/g at 700 °C. Chemical modification changed adsorption capacity by almost an order of magnitude in one study, in which KOH raised the methylene blue capacity of corn stalk biochar from 43.14 to 406.43 mg/g, and KOH-modified rice husk biochar made at 300 °C adsorbed 72.14 mg/g of Cd(II) and 170.84 mg/g of Pb(II), with functional groups explaining adsorption better than surface area. A global assessment put the maximum sustainable technical potential of biochar at up to 1.8 Pg CO_2-C equivalent per year. Estimates for Türkiye differ in scope: 3.94 million tonnes of biochar from agricultural and livestock wastes in 2015, of which animal waste accounted for 77%, 41.5 thousand tonnes per year from apple pruning residues, and a supply from the main crop residues that covers one-fiftieth of the estimated need of arable soils. The studies use different feedstocks, reactors and test conditions, and field trials, cost analyses and standardised reporting are lacking.

Keywords: Biochar, Agricultural residues, Pyrolysis, Adsorption

KÂĞIT ÜRETİMİNDE ODUN DIŞI LİF HAMMADDELERİ: TÜRKİYE'NİN TARIMSAL VE ENDÜSTRİYEL ATIK POTANSİYELİ

NON-WOOD FIBRE RAW MATERIALS FOR PAPERMAKING: THE AGRICULTURAL AND INDUSTRIAL WASTE POTENTIAL OF TÜRKIYE

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ÖZET
Türkiye kâğıt hamurunda ithalata bağımlıdır: hamur ithalatı 1994'te yaklaşık 229 bin tondan 2020'de yaklaşık 1,4 milyon tona yükselmiş, yurt içi hamur üretimi ise 1995–2020 arasında %76 azalarak yaklaşık 123 bin tona gerilemiştir. Aynı zamanda ülkede büyük miktarda tarımsal artık oluşmakta olup 2022 yılında tahıl ve endüstri bitkisi atığının 16,8 milyon ton olduğu tahmin edilmektedir. Bu derleme, kâğıt üretiminde kullanılan odun dışı lif hammaddelerini ele almakta ve Türkiye'deki tarımsal ve endüstriyel atıkların potansiyelini; lif morfolojisi, kimyasal bileşim ve hamurlaştırma üzerine uluslararası çalışmalara ve pamuk sapı, buğday anızı, çavdar, buğday, pirinç ve mısır sapı, kamış, kenevir, tütün ve ayçiçeği sapı ile çay fabrikası atığı dahil Türkiye'deki artıklara ilişkin çalışmalara dayanarak değerlendirmektedir. Artık lifleri kısadır; on tarımsal artıkta ortalama lif uzunlukları 0,50–1,15 mm arasındadır. Samanlar düşük ligninli olup hafif pişirme gerektirir; ancak silika, yavaş süzülme, yüksek nem, hacimlilik ve küçük işletme ölçeği tekrar eden teknik sorunlardır. Türkiye'deki çalışmalar, soda-antrakinon hamurlarının %87,5–98,3 ISO parlaklık değerlerine ağartılabildiğini ve sodyum borhidrürün hamur verimini buğday anızında %4,1, pamuk sapında %15,66 artırdığını göstermektedir. Çay fabrikası atığı ise %36,94 lignin içeriği ve düşük tabaka dayanımıyla karşıt bir örnektir. İncelenen çalışmalar laboratuvar ölçeğindedir ve mevcut miktarlar kâğıt hamuru fabrikalarının talebiyle eşleştirilmemiştir; bu nedenle kullanılabilir fraksiyonların, toplama lojistiğinin ve ekonominin nicel olarak ortaya konması bir sonraki adımdır.

Anahtar Kelimeler: Odun dışı lif, Tarımsal artıklar, Kâğıt hamuru ve kâğıt, Çay atığı

ABSTRACT
Türkiye depends on imported pulp: imports rose from about 229 thousand tonnes in 1994 to about 1.4 million tonnes in 2020, while domestic pulp production fell by 76% between 1995 and 2020 to about 123 thousand tonnes. At the same time, the country generates large amounts of agricultural residues, with an estimated 16.8 million tonnes of grain and industrial crop waste in 2022. This review examines non-wood fibre raw materials for papermaking and evaluates the potential of agricultural and industrial wastes in Türkiye, based on international studies on fibre morphology, chemistry and pulping and on studies of Turkish residues, including cotton stalks, wheat stubble, rye, wheat, rice and corn straw, reed, hemp, tobacco and sunflower stalks, and tea factory waste. Residue fibres are short, with average lengths of 0.50–1.15 mm in ten agricultural residues, and straws have low lignin and need mild cooking, but silica, slow drainage, high moisture, bulk and small mill scale are recurring technical problems. Turkish studies show that soda-anthraquinone pulps can be bleached to ISO brightness values of 87.5–98.3%, and that sodium borohydride raised pulp yield by 4.1% for wheat stubble and 15.66% for cotton stalks. Tea factory waste is a counter-example with 36.94% lignin and low sheet strength. The reviewed studies are laboratory-scale and the available quantities have not been matched to pulp mill demand, so quantifying usable fractions, collection logistics and economics is the next step.

Keywords: Non-wood fibre, Agricultural residues, Pulp and paper, Tea waste

KENDİLENMİŞ DOMATES HATLARINDA SSR MARKÖR İLE ÇEŞİT TANISI

VARIETY IDENTIFICATION IN SELFED TOMATO LINES USING SSR MARKERS

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ÖZET

Domates (Lycopersicon esculentum) üretiminde, yüksek verimli ve kaliteli çeşitlerin geliştirilmesi büyük oranda saf ebeveyn hatlarının doğru seçimine ve karakterizasyonuna bağlıdır. Bu çalışma, özel bir firmadan temin edilen 12 kendilenmiş domates hattı arasındaki genetik farklılıkların belirlenmesi ve bu saf hatların SSR (Simple Sequence Repeat) markör yöntemiyle çeşit düzeyinde ayırt edilmesi amacıyla gerçekleştirilmiştir. Geleneksel morfolojik tanımlama yöntemlerinin çevresel faktörlerden etkilenmesi ve yetersiz kalması, DNA tabanlı moleküler markörlerin kullanımını modern ıslah programlarında zorunlu hale getirmiştir. Araştırmada genetik çeşitliliği taramak amacıyla kullanılan 20 SSR marköründen toplam 139 alel elde edilmiştir. Yapılan analizlerde, lokus başına düşen alel sayısının 3 ile 10 arasında değişim gösterdiği saptanmıştır. Lokusların Polimorfizm Bilgi İçeriği (PIC) değerlerinin 0,179 ile 0,375 arasında seyrettiği ve ortalama PIC değerinin 0,233 olarak gerçekleştiği hesaplanmıştır. Elde edilen moleküler veriler ışığında, UPGMA (Unweighted Pair Group Method with Arithmetic Mean) yöntemiyle bir dendrogram oluşturulmuştur. Kümeleme analizi sonucunda, incelenen kendilenmiş domates hatlarının genetik yakınlıklarına göre 2 ana gruba ve bu grupların altında farklı alt kümelere ayrıldığı net bir şekilde tespit edilmiştir. Hatların SSR markör bölgelerinde oluşan alellerin moleküler büyüklükleri esas alınarak, her bir kendilenmiş hat belirli bir düzen çerçevesinde kodlanmış ve bu kodlar aracılığıyla çeşit tanısı başarıyla gerçekleştirilmiştir. Araştırmadan elde edilen bulgular, SSR markörlerinin kendilenmiş domates hatlarını yüksek çözünürlükle ayırt edebildiğini kanıtlamıştır. Bu yöntem, hatların tescili, genetik saflıklarının korunması ve geleneksel çeşit tanımlama süreçlerinin çıkmaza girdiği durumlarda ıslahçılar için son derece güvenilir, hızlı ve pratik bir rehber sunmaktadır.

Anahtar Kelimeler: Domates (L. esculentum), SSR Markörü, Kendilenmiş Hat, PIC Değeri, UPGMA, Çeşit Tanımlama, Genetik Çeşitlilik

ABSTRACT

Tomato (Lycopersicon esculentum) breeding relies heavily on the precise selection and characterization of pure parental lines to develop high-yielding and quality cultivars. This study was conducted to determine the genetic diversity among 12 inbred tomato lines obtained from a private company and to differentiate these pure lines at the cultivar level using the SSR (Simple Sequence Repeat) marker method. Since traditional morphological identification methods are influenced by environmental factors and often fall short, DNA-based molecular markers have become essential in modern breeding programs. A total of 139 alleles were obtained from 20 SSR markers used to screen the genetic variation in the study. The analysis revealed that the number of alleles per locus ranged from 3 to 10. The Polymorphism Information Content (PIC) values of the loci varied between 0.179 and 0.375, with an average PIC value calculated as 0.233. Based on the molecular data obtained, a dendrogram was constructed using the UPGMA (Unweighted Pair Group Method with Arithmetic Mean) method. The clustering analysis clearly demonstrated that the analyzed inbred tomato lines were divided into 2 main groups and various sub-clusters under these groups based on their genetic relationships. Each inbred line was coded within a specific framework based on the molecular sizes of the alleles formed in the SSR marker regions, and cultivar identification was successfully performed through these codes. The findings obtained from the research proved that SSR markers could differentiate inbred tomato lines with high resolution. This method provides a highly reliable, rapid, and practical guide for breeders in line registration, maintaining genetic purity, and in cases where traditional variety identification processes remain insufficient.

Keywords: Tomato (L. esculentum), SSR Marker, Inbred Line, PIC Value, UPGMA, Cultivar Identification, Genetic Diversity

SW GEN MARKÖRLERİ İLE TSWV DAYANIKLI HATLARIN TESPİTİ

DETERMINATION OF TSWV-RESISTANT INBRED TOMATO LINES BY SW GENE MARKERS

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ÖZET

Domates (Lycopersicon esculentum), küresel ve ulusal ölçekte yoğun tarımsal üretimi yapılan, ekonomik değeri yüksek en önemli endüstriyel sebze türlerinden biridir. Ancak domates yetiştiriciliği, üretim sezonu boyunca bitki sağlığını tehdit eden pek çok viral etmenin baskısı altındadır. Birçok virüs cinsi domates bitkisinde sistemik enfeksiyonlar meydana getirerek ciddi verim azalmalarına ve telafisi güç büyük maddi kayıplara yol açmaktadır. Bugüne kadar yürütülen mekanik ve vektör böcek popülasyonunu azaltmaya yönelik kimyasal mücadele yöntemleri hem çevreye zarar vermekte hem de hastalık yönetiminde yetersiz kalmaktadır. Bu virüslerin en önemlilerinden ve en tahrip edici olanlarından birisi olan Domates Lekeli Solgunluk Virüsü (TSWV), domates üretim alanlarında her sezon büyük ekonomik zararlara yol açan tehlikeli bir viral patojendir. TSWV sorununun çözümünde geleneksel yöntemler yetersiz kalmakta ve üreticiye ağır bir maddi yük getirmektedir. Bu sebeple, hastalığın önlenmesinde genetik olarak dayanıklı çeşitlerin kullanılması en etkili ve sürdürülebilir yaklaşım olarak değerlendirilmektedir. Domates ıslah programlarında, genetik kaynak havuzunda dayanıklı saf hatların hızlı ve güvenilir şekilde belirlenmesi amacıyla, Sw5 gen bölgelerine spesifik moleküler belirteçler yaygın olarak kullanılmaktadır. Bu araştırma kapsamında, 1998-2000 yıllarında toplanmış yerli domates popülasyonlarından seçilen ümitvar hatlar üzerinde ıslah çalışmaları yürütülmüştür. Bu doğrultuda, 6 generasyon boyunca kendileme yapılarak seçilen 16 adet saf hat elde edilmiştir. Geliştirilen bu hatlar, iki adet standart kontrol çeşidi eşliğinde Sw-5b ve Sw-2 moleküler markörleri kullanılarak PCR yöntemiyle taranmıştır. Gerçekleştirilen taramalar sonucunda, incelenen hatlar içerisinden bu virüse karşı dirençli olduğu kesin olarak belirlenen üç adet saf hat tespit edilmiştir. Elde edilen bulgular, moleküler olarak karakterize edilen bu üç saf hattın, yerli domates ıslah programlarında nitelikli birer dayanıklılık kaynağı olarak başarıyla kullanılabileceğini göstermektedir.

Anahtar Kelimeler: Domates (L. esculentum), TSWV, Moleküler Markör, Sw5 Geni, PCR Tarama, Saf Hat, Dayanıklılık Islahı

ABSTRACT

Tomato (Lycopersicon esculentum) is one of the most vital industrial vegetable crops with high economic value, grown through intensive agricultural production globally and nationally. However, tomato cultivation is under constant pressure from various viral agents that threaten plant health throughout the production season. Numerous virus genera cause systemic infections in tomato plants, leading to severe yield drops and irreversible financial losses. To date, cultural and mechanical measures, as well as chemical treatments aimed at reducing vector insect populations, have proven to be both environmentally damaging and inadequate for disease management. One of the most destructive and significant of these viruses is the Tomato Spotted Wilt Virus (TSWV), a dangerous viral pathogen causing substantial economic damage in tomato production areas every season. Conventional methods remain ineffective against TSWV and impose a heavy financial burden on growers. Therefore, utilizing genetically resistant cultivars is considered the most effective and sustainable approach to preventing the disease. In tomato breeding programs, molecular markers specific to the Sw5 gene regions are widely deployed to accurately and rapidly identify resistant pure lines within the genetic resource pool. In this study, breeding activities were conducted using promising genotypes selected from local tomato populations collected between 1998 and 2000. Consequently, 16 pure lines were obtained through selfing for 6 generations. These developed lines, along with two standard control cultivars, were screened via PCR using Sw-5b and Sw-2 molecular markers. The screening results revealed three pure lines that were definitively identified as resistant to this virus. These findings demonstrate that the molecularly characterized three pure lines can be successfully utilized as elite sources of resistance in national tomato breeding programs.

Keywords: Tomato (L. esculentum), TSWV, Molecular Marker, Sw5 Gene, PCR Screening, Pure Line, Resistance Breeding

MAVİ YEMİŞ YETİŞTİRİCİLİĞİNİN EKONOMİK ANALİZİ VE DEĞER ZİNCİRİ : BURSA İLI ÖRNEĞİ

ECONOMIC ANALYSIS AND VALUE CHAIN OF BLUEBERRY CULTIVATION: THE CASE OF BURSA PROVINCE

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ÖZET

Bu çalışmanın amacı, mavi yemiş (yaban mersini) yetiştiriciliğinin ekonomik sürdürülebilirliğini ve değer zinciri kapsamında üretim, işleme, pazarlama ve dağıtım süreçlerini kapsamlı biçimde incelemektir. Araştırmada, mavi yemiş üretiminin ekonomik performansı; kuruluş ve üretim maliyetleri, verimlilik, satış fiyatları, kârlılık göstergeleri ve pazarlama kanalları çerçevesinde ele alınmıştır. Ayrıca, üreticiden nihai tüketiciye uzanan değer zincirindeki temel unsurlar arasındaki ilişkiler, katma değer oluşumu ve gelirin zincirin farklı aşamaları arasındaki dağılımı değerlendirilmiştir. Mavi yemiş yetiştiriciliğinde uygun iklim ve toprak koşulları, kaliteli üretim materyali, doğru sulama ve gübreleme uygulamaları ile hasat sonrası muhafaza koşulları ekonomik başarıyı belirleyen temel unsurlar arasında yer almaktadır. Bununla birlikte, yüksek başlangıç yatırım maliyetleri, işçilik giderleri, soğuk zincir altyapısı gereksinimi, ürünün hassas yapısı ve pazarlama kanalları arasındaki fiyat farklılıkları, üreticilerin karşılaştığı başlıca ekonomik sorunları oluşturmaktadır. Değer zinciri yaklaşımı, mavi yemişin ekonomik değerinin yalnızca tarımsal üretim aşamasında değil; sınıflandırma, paketleme, depolama, işleme, lojistik ve perakende aşamalarında da oluştuğunu ortaya koymaktadır. Sonuç olarak, mavi yemiş yetiştiriciliğinde kârlılığın artırılması ve rekabet gücünün geliştirilmesi için üretim maliyetlerinin etkin yönetilmesi, üretici örgütlenmesinin güçlendirilmesi, soğuk zincir altyapısının geliştirilmesi ve katma değerli ürünlere yönelik yatırımların desteklenmesi önem taşımaktadır. Çalışma, mavi yemiş sektörünün ekonomik potansiyelinin değerlendirilmesine ve değer zincirinin daha verimli, sürdürülebilir ve rekabetçi bir yapıya kavuşturulmasına yönelik bütüncül bir çerçeve sunmaktadır.

Anahtar Kelimeler: Mavi Yemiş, Yaban Mersini, Ekonomik Analiz, Değer Zinciri, Üretim Maliyetleri, Tarımsal Pazarlama

ABSTRACT

The aim of this study is to comprehensively examine the economic sustainability of blueberry cultivation and the processes of production, processing, marketing, and distribution within the value chain. The research addresses the economic performance of blueberry production in terms of establishment and production costs, productivity, sales prices, profitability indicators, and marketing channels. Furthermore, it evaluates the relationships between key elements of the value chain—extending from the producer to the final consumer—as well as value-added creation and income distribution across the chain's various stages. Favorable climate and soil conditions, high-quality planting material, appropriate irrigation and fertilization practices, and post-harvest storage conditions are among the fundamental factors determining economic success in blueberry cultivation. However, high initial investment costs, labor expenses, the need for cold chain infrastructure, the product's perishable nature, and price disparities across marketing channels constitute the primary economic challenges faced by producers. The value-chain approach reveals that the economic value of blueberries is generated not only during the agricultural production stage but also during the sorting, packaging, storage, processing, logistics, and retail stages. Consequently, to enhance profitability and competitiveness in blueberry cultivation, it is crucial to effectively manage production costs, strengthen producer organizations, improve cold chain infrastructure, and support investments in value-added products. The study presents a holistic framework for assessing the economic potential of the blueberry sector and transforming its value chain into a more efficient, sustainable, and competitive structure.

Keywords: Blueberry, Wild Blueberry, Economic Analysis, Value Chain, Production Costs, Agricultural Marketing

KADIN ÜRETİCİLERİN EKONOMİK KATILIMINDA YEREL YÖNETİM DESTEKLİ ÜRETİM VE PAZARLAMA MODELİ: NİLÜFER BELEDİYESİ ÖRNEĞİ

A LOCAL GOVERNMENT-SUPPORTED PRODUCTION AND MARKETING MODEL FOR WOMEN'S ECONOMIC PARTICIPATION: THE CASE OF NİLÜFER MUNICIPALITY

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ÖZET

Kadınların ekonomik hayata katılımı, üretim faaliyetlerinin yanı sıra uygun üretim altyapısına, teknik desteğe, kalite güvencesine ve pazarlama olanaklarına erişimleriyle de ilişkilidir. Özellikle küçük ölçekli üreticiler, uygun üretim alanı ve ekipmanlara erişim, depolama, gıda güvenliği ve ürünlerini pazara ulaştırma süreçlerinde çeşitli güçlüklerle karşılaşabilmektedir. Yerel yönetimler tarafından geliştirilen ortak üretim ve pazarlama modelleri, bu güçlüklerin azaltılması ve yerel ekonomik faaliyetlerin desteklenmesi açısından önem taşımaktadır. Bu çalışmanın amacı, Nilüfer Belediyesi tarafından kurulan Hasanağa Gıda Merkezi örneğinde, yerel yönetim destekli üretim ve pazarlama modelinin kadın üreticilerin ekonomik katılımını destekleme potansiyelini değerlendirmektir. Araştırma, nitel örnek olay incelemesi kapsamında doküman analizine dayanmaktadır. Bu doğrultuda belediyenin faaliyet raporları, kurumsal yayınları ve kadın üreticilerin ekonomik örgütlenmesi, yerel kalkınma ve pazarlama konularındaki bilimsel çalışmalar incelenmiştir. Elde edilen bilgiler; ortak üretim altyapısı, teknik destek, gıda güvenliği, kurumlar arası iş birliği, pazara erişim ve ekonomik sürdürülebilirlik çerçevesinde değerlendirilmiştir. Kurumsal kaynaklar, merkezde üretim alanları, depolama ve soğuk muhafaza olanakları ile kalite kontrol altyapısının bulunduğunu; Nilüfer Belediyesi Kırsal Hizmetler Müdürlüğü ve NİLKOOP tarafından üretilen veya tedarik edilen hammaddelerin kadın derneği üyelerince işlendiğini ve ürünlerin Bostan isimli Marka ile Nilüfer Bostan satış noktaları aracılığıyla tüketiciye ulaştırıldığını göstermektedir. Sonuç olarak Hasanağa Gıda Merkezi, yerel yönetimlerin kadın üreticilerin ekonomik katılımını desteklemede ortak üretim altyapısı, kalite güvencesi ve pazarlama olanaklarını bütüncül biçimde bir araya getiren örnek bir model olarak öne çıkmaktadır.

Anahtar Kelimeler: Kadın üreticiler, yerel yönetimler, ortak üretim altyapısı, ekonomik katılım

ABSTRACT

Women's participation in economic life is associated not only with production activities but also with their access to appropriate production infrastructure, technical support, quality assurance, and marketing opportunities. Small-scale producers, in particular, may face various challenges in accessing suitable production facilities and equipment, storage facilities, food safety measures, and markets for their products. Joint production and marketing models developed by local governments are important for reducing these challenges and supporting local economic activities. This study aims to evaluate the potential of a local government-supported production and marketing model to promote women's economic participation, using the Hasanağa Food Center, established by Nilüfer Municipality, as a case study. The research is based on document analysis within the framework of a qualitative case study. Accordingly, the municipality's activity reports and institutional publications, as well as scientific studies on the economic organization of women producers, local development, and marketing, were examined. The information obtained was evaluated in terms of shared production infrastructure, technical support, food safety, inter-institutional cooperation, market access, and economic sustainability. Institutional sources indicate that the center provides production facilities, storage and cold storage facilities, and quality control infrastructure. They also show that raw materials produced or supplied by the Nilüfer Municipality Directorate of Rural Services and NİLKOOP are processed by members of a women's association, and that the resulting products reach consumers under the Bostan brand through Nilüfer Bostan sales outlets. In conclusion, the Hasanağa Food Center stands out as an exemplary model through which local governments can support women's economic participation by integrating shared production infrastructure, quality assurance, and marketing opportunities within a comprehensive framework.

Keywords: Women producers, local governments, shared production infrastructure, economic participation

FARKLI BİTKİSEL UÇUCU YAĞLARIN SPODOPTERA FRUGIPERDA (J.E. SMITH, 1797) (LEPIDOPTERA: NOCTUIDAE) LARVALARI ÜZERİNDEKİ İNSEKTİSİDAL ETKİNLİKLERİ

INSECTICIDAL ACTIVITY OF DIFFERENT PLANT ESSENTIAL OILS AGAINST SPODOPTERA FRUGIPERDA (J.E. SMITH, 1797) (LEPIDOPTERA: NOCTUIDAE) LARVAE

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ÖZET

Güz tırtılı, Spodoptera frugiperda (J.E. Smith, 1797) (Lepidoptera: Noctuidae), dünya genelinde mısır üretimini tehdit eden en önemli istilacı zararlılardan biridir. Bu çalışmada, 2026 yılında Çukurova Üniversitesi Tahıl Zararlıları Laboratuvarı'nda, altı farklı bitki türünden elde edilen uçucu yağların ikinci dönem S. frugiperda larvalarına karşı insektisidal etkinlikleri değerlendirilmiştir. Cupressus macrocarpa Hartw. cv. 'Goldcrest' (Pinales: Cupressaceae), Ocimum basilicum L. (Lamiales: Lamiaceae), Callistemon citrinus (Curtis) Skeels (Myrtales: Myrtaceae), Eucalyptus spp. (Myrtales: Myrtaceae), Lavandula spp. (Lamiales: Lamiaceae) ve Syzygium aromaticum (L.) Merr. & L. M.Perry (Myrtales: Myrtaceae) uçucu yağları %1.25, %2.5 ve %5.0 konsantrasyonlarda test edilmiştir. Genel linear model (GLM) analiz sonuçları, bitki türünün (χ^2=159.47, $p<0.001$) ve dozunun (χ^2=13.11, $p=0.001$) larva ölümleri üzerinde önemli etkileri olduğunu ortaya koymuştur. Cupressus macrocarpa cv. Goldcrest en etkili uygulama olmuş, %2.5 ve %5.0 konsantrasyonlarda Abbott düzeltilmiş ölüm oranı %100'e ulaşmıştır. Bu uygulamalarda LT_{50} değerleri sırasıyla 48 ve 24 saat, tehlike oranları ise 24.68 ve 30.51 olarak belirlenmiştir. Ocimum basilicum ikinci en etkili uçucu yağ olmuş; %55.56 - 88.89 ölüm oranı, 120-48 saat LT_{50} değerleri ve 8.23-17.74 arasında değişen tehlike oranları göstermiştir. Diğer uçucu yağlar ise genel olarak %30'un altında kalan ölüm oranlarıyla sınırlı etki sergilemiştir. Sonuçlar, C. macrocarpa cv. Goldcrest ve O. basilicum uçucu yağlarının S. frugiperda mücadelesinde umut verici bitkisel alternatifler olduğunu ortaya koymaktadır.

Anahtar Kelimeler: Bitkisel kökenli insektisitler, uçucu yağlar, Güz tırtılı, Entegre Zararlı Yönetimi, yaşam analizleri

ABSTRACT

The fall armyworm, Spodoptera frugiperda (J.E. Smith, 1797) (Lepidoptera: Noctuidae), is one of the most destructive invasive pests threatening maize production worldwide. In 2026, the insecticidal activity of essential oils obtained from six plant species against second-instar S. frugiperda larvae was evaluated at the Cereal Pests Laboratory of Çukurova University. Essential oils of Cupressus macrocarpa Hartw. cv. 'Goldcrest' (Pinales: Cupressaceae), Ocimum basilicum L. (Lamiales: Lamiaceae), Callistemon citrinus (Curtis) Skeels (Myrtales: Myrtaceae), Eucalyptus spp. (Myrtales: Myrtaceae), Lavandula spp. (Lamiales: Lamiaceae) and Syzygium aromaticum (L.) Merr. & L. M.Perry (Myrtales: Myrtaceae) were tested at concentrations of 1.25%, 2.5%, and 5.0%. A binomial generalized linear model revealed significant effects of plant species (χ^2=159.47, $p<0.001$) and concentration (χ^2=13.11, p=0.001) on larval mortality. Cupressus macrocarpa cv. Goldcrest was the most effective treatment, causing 100% Abbott-corrected mortality at 2.5% and 5.0%, with LT_{50} values of 48 and 24 h and hazard ratios of 24.68 and 30.51, respectively. Ocimum basilicum was the second most effective oil, producing 55.56-88.89% mortality, LT_{50} values of 120-48 h, and hazard ratios of 8.23-17.74. The remaining oils exhibited limited activity, with mortality generally below 30%. These findings identify C. macrocarpa cv. ‘Goldcrest’ and O. basilicum as promising botanical candidates for S. frugiperda management.

Keywords: Botanical insecticides, essential oils, fall armyworm, Integrated Pest Management, survival analysis

FİZİKSEL ÖZELLİKLERİNE GÖRE FARKLI KALİTEDEKİ MISIR SİLAJLARINDA BRİX DEĞERLERİNİN DEĞERLENDİRİLMESİ

EVALUATION OF BRIX VALUES IN CORN SILAGES OF DIFFERENT QUALITY BASED ON THEIR PHYSICAL CHARACTERISTICS

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ÖZET

Silaj kalitesinin değerlendirilmesinde renk, koku ve pH gibi parametreler yaygın olarak kullanılmaktadır. Bununla birlikte, hızlı ve pratik bir yöntem olarak refraktometre ile belirlenen Brix değerlerinin silaj kalitesini değerlendirmedeki potansiyeli yeterince ortaya konmamıştır. Bu çalışmada, fiziksel özelliklerine göre farklı kalitede sınıflandırılan mısır silajlarında Brix değerlerinin pH ve kuru madde (KM) ile birlikte değerlendirilmesi amaçlanmıştır. Çalışmada toplam 10 adet mısır silajı örneği kullanılmıştır. Örnekler fiziksel özelliklerine göre iyi ve kötü kaliteli olmak üzere iki gruba ayrılmış (n=5/grup); iyi kaliteli silajlar zeytin yeşili renkte ve hoş kokulu, kötü kaliteli silajlar kahverengiye yakın renkte ve hoş olmayan kokulu örneklerden oluşturulmuştur. Tüm örneklerde pH, Brix ve KM düzeyleri belirlenmiştir. Brix değeri, silajdan preslenerek elde edilen sıvıda refraktometre ile ölçülmüştür. Örnek sayısının az olması nedeniyle gruplar arası farklılıkların değerlendirilmesinde parametrik olmayan Mann–Whitney U testi, parametreler arası ilişkinin belirlenmesinde Spearman korelasyon analizi kullanılmıştır. İstatistiksel önem düzeyi $P<0,05$ olarak kabul edilmiştir. İyi kaliteli silajlarda ortalama pH, Brix ve KM değerleri sırasıyla 3,98, 8,40 °Bx ve %30,60; kötü kaliteli silajlarda ise 5,51, 6,20 °Bx ve %33,20 olarak belirlenmiştir. İyi ve kötü kaliteli silajlar arasında pH, Brix ve KM bakımından istatistiksel olarak anlamlı fark bulunmuştur (her üç parametre için $P=0,008$). Tüm örnekler birlikte değerlendirildiğinde Brix ile pH arasında güçlü negatif yönlü bir ilişki saptanmıştır (Spearman $r=-0,752$; $P=0,012$). Kötü kaliteli silajlarda KM'nin daha yüksek bulunması, Brix farkının yorumlanmasında dikkate alınmalıdır. Bu ön çalışma, fiziksel özelliklerine göre farklı kalitede sınıflandırılan mısır silajlarında Brix değerlerinin farklılık gösterdiğini ve Brix'in silaj kalitesinin hızlı değerlendirilmesinde potansiyel bir yardımcı parametre olabileceğini düşündürmektedir. Ancak sınıflandırmanın organik asit profili ve amonyak-N gibi objektif kriterlere dayanmaması, örnek sayısının sınırlı olması ve grup farkının korelasyona etkisi nedeniyle bulguların daha geniş örneklem gruplarında doğrulanması gerekmektedir.

Anahtar Kelimeler: Brix, mısır silajı, silaj kalitesi, kuru madde, pH, refraktometre

ABSTRACT

Silage quality is commonly evaluated using parameters such as color, odor, and pH. However, the potential of Brix values determined by refractometer, as a rapid and practical method for assessing silage quality, has not been adequately demonstrated. This study aimed to evaluate Brix values together with pH and dry matter (DM) in corn silages classified into different quality categories based on their physical characteristics. A total of 10 corn silage samples were used. The samples were divided into two groups, good and poor quality (n=5/group), based on their physical characteristics; good-quality silages consisted of samples with an olive-green color and a pleasant odor, whereas poor-quality silages consisted of samples with a nearly brown color and an unpleasant odor. The pH, Brix, and DM levels were determined in all samples. Brix was measured with a refractometer in the liquid obtained by pressing the silage. Because of the small sample size, the nonparametric Mann–Whitney U test was used to evaluate differences between groups, and Spearman correlation analysis was used to determine relationships among parameters. Statistical significance was set at $P<0.05$. Mean pH, Brix, and DM values were 3.98, 8.40 °Bx, and 30.60%, respectively, in good-quality silages, and 5.51, 6.20 °Bx, and 33.20%, respectively, in poor-quality silages. Significant differences were found between good- and poor-quality silages in terms of pH, Brix, and DM ($P=0.008$ for all three parameters). When all samples were evaluated together, a strong negative correlation was found between Brix and pH (Spearman $r=-0.752$; $P=0.012$). The higher DM content in poor-quality silages should be taken into account when interpreting the difference in Brix. This preliminary study suggests that Brix values differ among corn silages classified into different quality categories based on their physical characteristics, and that Brix may serve as a potential auxiliary parameter for the rapid assessment of silage quality. However, because the classification was not based on objective criteria such as organic acid profile and ammonia-N, the sample size was limited, and the group difference may have influenced the correlation, the findings need to be confirmed in larger sample sets.

Keywords: Brix, corn silage, silage quality, dry matter, pH, refractometer

ZINNIA ELEGANS JACQ.'TAN İZOLE EDİLEN FUSARIUM TRICINCTUM'A KARŞI TRICHODERMA İZOLATLARININ İN VİTRO ANTAGONİSTİK ETKİNLİĞİNİN DEĞERLENDİRİLMESİ

EVALUATION OF THE IN VITRO ANTAGONISTIC ACTIVITY OF TRICHODERMA ISOLATES AGAINST FUSARIUM TRICINCTUM ISOLATED FROM ZINNIA ELEGANS JACQ.

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ÖZET
Trichoderma türleri; hızlı gelişme ve kolonizasyon yetenekleri ile antibiyozis, mikoparazitizm, besin ve alan rekabeti, litik enzimler ve çeşitli sekonder metabolitlerin üretimi gibi farklı etki mekanizmaları sayesinde bitki patojenlerine karşı biyolojik mücadelede yaygın olarak değerlendirilen önemli mikroorganizmalardır. Bu çalışmada, gösterişli çiçekleri, farklı renk ve form özellikleri ve peyzaj düzenlemelerinde yaygın kullanımı nedeniyle ekonomik ve estetik değeri yüksek bir süs bitkisi olan Zinnia elegans Jacq.'tan izole edilen Fusarium tricinctum'a karşı farklı Trichoderma türlerine ait izolatların in vitro koşullardaki antagonistik etkinliklerinin belirlenmesi amaçlanmıştır. Çalışmada üç T. harzianum ve iki T. citrinoviride izolatı kullanılmıştır. Trichoderma izolatları ile F. tricinctum arasındaki antagonistik etkileşim ikili kültür yöntemiyle değerlendirilmiş ve patojenin miselyal gelişimindeki baskılanma oranları kontrol uygulamalarıyla karşılaştırılmıştır. Test edilen izolatların tamamı patojenin miselyal gelişimini inhibe etmiş ve inhibisyon oranları %55–88.5 arasında değişmiştir. T. harzianum izolatları arasında NT1 %88.5 ile en yüksek etkinliği göstermiş, bunu ET4 (%70) ve ET14 (%66.5) izlemiştir. T. citrinoviride izolatlarından FDF2 %73.5, FDF5 ise %55 oranında inhibisyon sağlamıştır. Elde edilen sonuçlar, antagonistik etkinliğin izolatlara bağlı olarak değişebildiğini ve özellikle NT1 ile FDF2 izolatlarının F. tricinctum'a karşı daha yüksek baskılama potansiyeline sahip olduğunu ortaya koymuştur. Bu izolatların biyolojik mücadelede kullanım potansiyelinin belirlenebilmesi için in vitro koşullarda saptanan etkinliğin sera ve arazi denemeleriyle doğrulanması gerekmektedir.

Anahtar Kelimeler: Antagonistik etkinlik, Biyolojik mücadele, Fusarium tricinctum, Miselyal inhibisyon, Trichoderma spp.

ABSTRACT
Trichoderma species are widely used in biological control against plant pathogens due to their rapid growth and colonization abilities and their diverse mechanisms of action, including antibiosis, mycoparasitism, competition for nutrients and space, and the production of lytic enzymes and various secondary metabolites. This study aimed to determine the in vitro antagonistic activity of different Trichoderma isolates against Fusarium tricinctum isolated from Zinnia elegans Jacq., an economically and aesthetically important ornamental plant widely used in landscaping because of its showy flowers and diverse colors and forms. Three T. harzianum isolates and two T. citrinoviride isolates were used in the study. The antagonistic interaction between the Trichoderma isolates and F. tricinctum was evaluated using the dual-culture method, and inhibition of the pathogen's mycelial growth was determined by comparison with the control. All tested isolates inhibited the mycelial growth of F. tricinctum, with inhibition rates ranging from 55% to 88.5%. Among the T. harzianum isolates, NT1 showed the highest antagonistic activity with 88.5% inhibition, followed by ET4 (70%) and ET14 (66.5%). Among the T. citrinoviride isolates, FDF2 and FDF5 inhibited mycelial growth by 73.5% and 55%, respectively. The results demonstrated that antagonistic activity varied among isolates and that NT1 and FDF2, in particular, showed greater potential for suppressing F. tricinctum. Further greenhouse and field experiments are required to confirm the activity observed under in vitro conditions and to evaluate the potential use of these isolates in biological control.

Keywords: Antagonistic activity, Biological control, Fusarium tricinctum, Mycelial inhibition, Trichoderma spp.

SAKARYA İLİ FINDIK YETİŞTİRİCİLİĞİ YAPILAN TOPRAKLARIN VERİMLİLİK DURUMU

FERTILITY STATUS OF SOILS USED FOR HAZELNUT CULTIVATION IN SAKARYA PROVINCE

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ÖZET
Bu çalışmada, Doğu Marmara Bölgesi ve Türkiye fındık üretiminde stratejik öneme sahip olan Sakarya ilindeki kimi fındık bahçeleri toprak verimliliği açısından değerlendirilmiştir. Çalışma kapsamında Sakarya fındık havzasını temsil eden bahçelerden 0-30 cm derinlikten alınan toplam 41 adet toprak örneğinde kimi fiziksel ve kimyasal analizler gerçekleştirilmiştir. Analiz sonuçlarına göre; örneklerin %51,2'si killi tın, %26,8'i killi ve %22,0'si tın bünye sınıfında, %53,7'si hafif asit, %36,6'sı orta asit karakterde, toprakların tamamının (%100) tuzsuz (<% 0,15) ve büyük bir kısmının (%92,7) kireçsiz grupta yer aldığı görülmüştür. Organik madde içeriği bakımından ise toprakların %87,8'i yüksek (%3,01–5,15), %61,0'inde yarayışlı fosfor (P2O5) ve %90,2'sinde kalsiyum (Ca) seviyesi yetersiz (düşük ve çok düşük) bulunmuştur. Buna karşın potasyum (K2O) (%82,9 yeterli/yüksek) ve magnezyum (Mg) (%78,0 orta/yüksek) düzeylerinde, toprakların %97,6'sında yarayışlı çinko miktarı yetersiz, demir (Fe) ve bakır (Cu) içerikleri toprakların büyük kısmında yeterli seviyelerde belirlenmiştir. Elde edilen bulgular; Sakarya ilinde fındık yetiştiriciliğinde sürdürülebilir verim ve kalitenin sağlanması için öncelikle asidik alanlarda kireçleme yapılması, fiksasyon riski yüksek olan fosforlu gübrelerin doğru yöntemlerle uygulanması ile kalsiyum ve çinko takviyelerine öncelik verilmesi gerektiğini göstermektedir.

Anahtar Kelimeler: Sakarya, Fındık, Toprak Verimliliği, Besin Elementleri, Toprak Analizi

ABSTRACT
In this study, the soil fertility status of hazelnut orchards in Sakarya province, which has a strategic importance in the Eastern Marmara Region and Turkey's hazelnut production, were evaluated. Within the scope of the study, physical and chemical analyses were carried out on a total of 41 soil samples taken from a depth of 0-30 cm from orchards representing the Sakarya hazelnut basin. According to the analysis results; 51.2% of the samples were classified as clay loam, 26.8% as clay, and 22.0% as loam texture class. It was observed that 53.7% of the soils were slightly acidic, 36.6% were moderately acidic, all of the soils (100%) were non-saline (<0.15%), and a large portion (92.7%) fell into the non-calcareous group. In terms of organic matter content, 87.8% of the soils were found to be high (3.01–5.15%), while available phosphorus (P2O5) in 61.0% and calcium (Ca) levels in 90.2% of the soils were found to be insufficient (low and very low). On the other hand, potassium (K2O) (82.9% sufficient/high) and magnesium (Mg) (78.0% medium/high) levels were adequate, whereas available zinc content was insufficient in 97.6% of the soils, and iron (Fe) and copper (Cu) contents were determined to be at sufficient levels in the majority of the soils. The findings obtained indicate that in order to ensure sustainable yield and quality in hazelnut cultivation in Sakarya province, priority should be given to liming primarily in acidic areas, applying phosphorus fertilizers with high fixation risk through correct methods, and providing calcium and zinc supplements.

Keywords: Sakarya, Hazelnut, Soil Fertility, Plant Nutrients, Soil Analysis

SALICYLIC ACID IN THE INDUCTION OF PLANT DEFENSE: CURRENT APPROACHES AGAINST FUNGAL DISEASES

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ABSTRACT

Salicylic acid (SA) is a key signaling molecule involved in the regulation of plant defense responses against biotic stress. This review aimed to evaluate recent advances in the role of SA in defense induction against fungal plant diseases, with particular emphasis on the mechanisms underlying SA-mediated resistance and the factors determining the outcome of exogenous SA applications. Recent literature, primarily published between 2020 and 2026, was evaluated using a narrative/integrative review approach, with earlier studies included when they provided relevant experimental or mechanistic evidence. Current evidence indicates that SA-mediated defense involves interconnected processes, including systemic acquired resistance, reactive oxygen species and redox regulation, antioxidant defense, phenylpropanoid metabolism, pathogenesis-related proteins, structural defense responses, and crosstalk with jasmonic acid and ethylene signaling. Experimental studies involving Fusarium, Botrytis, Alternaria, Colletotrichum, Botryosphaeriaceae, and Verticillium demonstrate that exogenous SA can suppress disease development in several pathosystems; however, the response is not universally protective. Contrasting responses, particularly in Botrytis cinerea and Neofusicoccum parvum pathosystems, highlight the importance of pathogen lifestyle and hormonal crosstalk. Evidence from Fusarium oxysporum and the oomycete Phytophthora infestans further indicates that SA may exert direct antimicrobial effects in addition to inducing host-mediated resistance. Overall, the effectiveness of SA is determined by the interaction among dose, application timing, host, pathogen, and defense signaling networks. Therefore, SA should be considered a pathosystem-specific defense regulator and a potential complementary tool for sustainable disease management rather than a universally effective disease-control agent.

Keywords: Antioxidant defense, Induced resistance, Plant–pathogen interaction, Systemic acquired resistance

BOTRYOSPHAERIACEAE IN WOODY PLANTS: CURRENT ADVANCES IN TAXONOMY, HOST–PATHOGEN INTERACTIONS, CLIMATE CHANGE AND DISEASE MANAGEMENT

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ABSTRACT
Botryosphaeriaceae is an important fungal family widely associated with perennial fruit crops, forest trees, ornamentals and other woody hosts. Its members may occur as endophytes, latent pathogens, active pathogens or saprobes, and disease expression may become more pronounced in some host–pathogen systems under drought, high temperature, mechanical injury and other stress conditions. Trunk and branch cankers, dieback, shoot and branch blight, gummosis and fruit rots are among the major symptoms associated with these fungi. The integration of morphological characterization with DNA sequence data and phylogenetic approaches has substantially changed current knowledge of the taxonomy and species diversity of the family. This review evaluates recent advances in the taxonomy and molecular identification of Botryosphaeriaceae, host diversity, ecological life strategies, pathogenicity and host–pathogen interactions, as well as the roles of environmental stress and climate change and developments in chemical, biological and cultural disease management. Studies reporting Botryosphaeriaceae from woody hosts in Türkiye are also synthesized. Current evidence indicates that reliable species identification should be integrated with pathogenicity and epidemiological information, while latent infections, environmental stress and the health status of propagation material should be considered together in sustainable disease management.

Keywords: Dieback, Environmental stress, Fungal canker, Latent infection, Molecular identification, Multilocus phylogeny

THE INFLUENCE OF PRICE PERCEPTION, BRAND IMAGE, AND ELECTRONIC WORD OF MOUTH ON GREEN PURCHASE INTENTION AMONG CONSUMERS OF AVOSKIN PRODUCTS IN KUDUS

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ABSTRACT
This study aims to analyze the influence of price perception, brand image, and electronic word-of-mouth (e-WOM) on the green purchase intention for Avoskin products among consumers in Kudus. A quantitative approach was employed, utilizing primary data collected via an online questionnaire from 101 respondents selected through purposive sampling. The data were analyzed using multiple linear regression with the aid of SPSS, preceded by validity, reliability, and classical assumption tests. The results indicate that price perception, brand image, and e-WOM each have a positive and significant effect on green purchase intention. e-WOM exerts the greatest influence, followed by price perception, while brand image has the smallest effect. Collectively, the three variables have a significant effect and account for 67.7% of the variation in green purchase intention. These findings suggest that the intention to purchase eco-friendly products is driven more by information from other users and assessments of price than by brand image. It is recommended that Avoskin strengthen the management of user reviews and set prices that are commensurate with the benefits of its green products.

Keywords: price perception, brand image, electronic word of mouth, green purchase intention, Avoskin

THE COMPREHENSIVE INTERDISCIPLINARY SCIENTIFIC EVALUATION OF FOOD SCIENCES, FOOD CHEMISTRY, NUTRITIONAL BIOCHEMISTRY, FOOD MICROBIOLOGY, FOOD SAFETY, AND TECHNOLOGICAL INNOVATION: COMPOSITIONAL CHARACTERIZATION, NUTRITIONAL QUALITY, CONTAMINANT DETECTION, BIOACTIVE COMPOUNDS, AND SUSTAINABLE FOOD PROCESSING FOR HUMAN HEALTH AND GLOBAL FOOD SECURITY

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ABSTRACT

Food sciences constitute a comprehensive multidisciplinary research domain encompassing food chemistry, nutritional biochemistry, food microbiology, food engineering, food technology, analytical science, toxicology, and public health. The principal objective of contemporary food science is to establish an evidence-based understanding of food composition, nutritional functionality, physicochemical stability, microbiological integrity, toxicological safety, and technological performance throughout the food production and consumption continuum. Increasing scientific attention is directed toward the molecular characterization of food constituents, the identification of biologically active compounds, the optimization of nutrient bioavailability, and the development of sustainable processing strategies that preserve nutritional value while ensuring product quality and consumer protection. The investigation of macronutrients, micronutrients, phytochemicals, dietary fibers, proteins, lipids, carbohydrates, vitamins, minerals, enzymes, and naturally occurring metabolites provides essential information concerning food functionality, nutritional adequacy, sensory characteristics, and physiological interactions. Advanced analytical methodologies, including high-performance liquid chromatography, gas chromatography, mass spectrometry, nuclear magnetic resonance spectroscopy, infrared spectroscopy, metabolomics, proteomics, and molecular microbiological techniques, facilitate precise compositional assessment, food authentication, contaminant identification, and the detection of processing-related chemical transformations. Food microbiology remains fundamental to understanding beneficial microbial communities, fermentation mechanisms, microbial spoilage, pathogen transmission, and the effectiveness of preservation technologies. Particular importance is attributed to the detection and control of Salmonella spp., Listeria monocytogenes, pathogenic Escherichia coli, Campylobacter spp., and other microorganisms associated with foodborne disease. Concurrently, comprehensive food safety assessment requires systematic investigation of pesticide residues, veterinary pharmaceutical residues, mycotoxins, heavy metals, environmental contaminants, allergens, packaging-derived chemicals, and potentially hazardous compounds generated during thermal processing. Risk-based approaches integrating hazard identification, exposure assessment, toxicological characterization, and risk management are essential for strengthening food safety systems and regulatory compliance. Emerging technological developments, including precision fermentation, enzymatic processing, high-pressure processing, pulsed electric fields, controlled atmosphere storage, edible coatings, encapsulation, and intelligent packaging, offer opportunities to improve preservation efficiency, extend shelf life, minimize nutrient degradation, and reduce food losses. Biotechnology and artificial intelligence additionally support predictive microbiology, automated quality inspection, supply-chain monitoring, formulation optimization, and rapid identification of adulterated products. The intersection of food sciences with clinical nutrition, molecular biology, nutritional epidemiology, and preventive medicine facilitates the investigation of dietary exposures and their relationships with metabolic regulation, gastrointestinal function, immune responses, and long-term health outcomes. Nevertheless, the interpretation of nutritional effects requires careful consideration of food matrix characteristics, processing conditions, dietary patterns, individual physiological variability, and the distinction between laboratory findings and demonstrated clinical benefits. Sustainable food production represents another essential research priority, incorporating energy-efficient processing, water conservation, circular bioeconomy principles, biodegradable packaging, responsible sourcing, and the valorization of agricultural and food-processing by-products. These strategies may contribute to reducing environmental burdens while maintaining nutritional quality, economic feasibility, and food-system resilience. The translation of scientific discoveries into industrial and public health applications depends on standardized analytical protocols, validated detection methods, reproducible experimental designs, transparent reporting, appropriate human studies, and effective quality assurance. Future research should prioritize multidisciplinary collaboration, improved nutritional characterization, emerging contaminant surveillance, evidence-based functional food development, personalized nutrition, and sustainable technological innovation. Integrating these scientific directions can strengthen food safety governance, improve nutritional quality, support responsible industrial development, and contribute to equitable access to safe, nutritious, and sustainable food. Ultimately, the advancement of food sciences requires coordinated engagement among researchers, food manufacturers, agricultural specialists, healthcare professionals, regulatory authorities, and public health institutions to address evolving nutritional demands, technological challenges, environmental pressures, and global food security priorities. The advancement of contemporary food sciences also necessitates a more detailed examination of the interactions between food structure, processing parameters, nutritional functionality, and biological

accessibility. Food matrices represent complex physicochemical systems in which molecular organization, ingredient composition, moisture distribution, acidity, temperature, and interfacial properties collectively influence nutrient stability, digestibility, sensory perception, and storage performance. Understanding these relationships is particularly important for developing food products that combine nutritional adequacy, microbiological safety, acceptable sensory characteristics, and technological feasibility. Research into protein denaturation, starch gelatinization, lipid crystallization, emulsion stability, enzymatic activity, and nonenzymatic browning provides valuable insights into the mechanisms governing food transformation during manufacturing, cooking, preservation, and storage. These processes can produce desirable functional characteristics but may also modify nutrient availability, generate unwanted compounds, or reduce the biological activity of sensitive constituents. Consequently, optimizing processing conditions requires an integrated assessment of technological performance, nutritional retention, product stability, and potential toxicological implications. Functional food research represents another rapidly developing area, particularly concerning dietary fibers, prebiotic substrates, probiotic microorganisms, postbiotic preparations, polyphenols, carotenoids, phytosterols, and other bioactive substances. Scientific investigations increasingly explore the relationships between these components, gastrointestinal microbial ecology, intestinal barrier function, metabolic regulation, and inflammatory signaling. However, claims concerning disease prevention or therapeutic efficacy must be supported by appropriately designed clinical studies and cannot be established solely through chemical characterization, in vitro experiments, or preliminary animal research. The identification of effective food-based interventions therefore requires rigorous evaluation of dose, bioavailability, biological mechanisms, population characteristics, and clinically meaningful outcomes. Particular consideration should be given to vulnerable populations, including children, older adults, pregnant individuals, and people with specific nutritional requirements, for whom food composition and safety considerations may have distinct implications. The development of rapid, sensitive, and reliable food analysis systems is equally important for protecting consumers and improving industrial quality management. Biosensors, immunoassays, portable spectroscopy, hyperspectral imaging, molecular amplification techniques, and machine-learning-assisted analytical platforms can facilitate the detection of adulteration, microbial contamination, compositional inconsistencies, and potentially hazardous substances. Their practical implementation requires analytical validation, assessment of sensitivity and specificity, appropriate reference materials, reproducibility testing, and comparison with established laboratory methods. Digital traceability systems and integrated monitoring technologies may additionally strengthen the documentation of product origin, processing history, transportation conditions, and storage integrity. Nevertheless, technological sophistication must be accompanied by transparent data governance, appropriate cybersecurity, regulatory compatibility, and equitable access for smaller producers. Food packaging and preservation research should similarly prioritize the integration of material science, microbiology, environmental assessment, and consumer safety. Active packaging, intelligent freshness indicators, antimicrobial surfaces, biodegradable polymers, and protective edible coatings offer potential benefits, although their effectiveness depends on the food matrix, environmental conditions, migration characteristics, and intended application. Comprehensive safety assessments must establish whether packaging materials or incorporated functional agents introduce chemical substances into food at concentrations that could present unacceptable exposure risks. Furthermore, environmental claims require life-cycle assessment rather than reliance on biodegradability or renewable origin alone. The resilient food systems depend on coordinated research across agricultural production, food manufacturing, distribution networks, dietary behavior, and public policy. Climate variability, water scarcity, soil degradation, supply-chain disruption, and unequal access to nutritious products increasingly influence food availability and quality. Interdisciplinary research can identify opportunities to reduce postharvest losses, improve storage infrastructure, recover valuable nutrients from processing residues, and develop resource-efficient production methods. Integrating robust scientific evidence with responsible innovation, effective regulation, consumer education, and international collaboration can advance nutritional security while reducing environmental pressures. These priorities establish a foundation for food science research that simultaneously addresses technological innovation, public health protection, industrial competitiveness, and long-term sustainability.

Keywords: Food Sciences, Food Chemistry, Nutritional Biochemistry, Food Safety, Sustainable Food Processing

THE INTEGRATED SCIENTIFIC ASSESSMENT OF AGRICULTURAL SCIENCES, FIELD CROP PRODUCTIVITY, HORTICULTURAL INNOVATION, AND PLANT PROTECTION: SUSTAINABLE CROP PRODUCTION, PLANT HEALTH MANAGEMENT, AGROECOLOGICAL RESILIENCE AND CLIMATE-SMART AGRICULTURAL DEVELOPMENT

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ABSTRACT

Agricultural sciences constitute a multidisciplinary scientific domain integrating crop production, plant physiology, agronomy, soil science, horticulture, plant pathology, entomology, weed science, agricultural biotechnology, and environmental management. Contemporary agricultural systems face increasingly complex challenges associated with climate change, soil degradation, water scarcity, biodiversity loss, emerging plant pathogens, invasive agricultural pests, herbicide resistance, declining ecosystem stability, and the growing demand for safe, nutritious, and affordable food. Addressing these interconnected pressures requires integrated scientific approaches that combine field crop management, horticultural innovation, plant protection strategies, ecological principles, and evidence-based agricultural technologies. This scientific assessment examines the principal determinants of agricultural productivity, crop quality, plant health, and the long-term sustainability of farming systems, emphasizing the relationships between biological processes, environmental conditions, agronomic practices, and technological development. Field crop production represents a fundamental component of global food security, providing cereals, legumes, oilseeds, fibre crops, forage plants, and industrial raw materials. The productivity and stability of these crops depend on cultivar selection, genetic diversity, seed quality, planting density, crop rotation, nutrient availability, soil structure, irrigation management, and the synchronization of agricultural operations with seasonal climatic conditions. Precision agriculture, remote sensing, geographic information systems, sensor-based monitoring, artificial intelligence, and data-driven decision-support systems increasingly enable farmers to optimize resource allocation, improve the accuracy of field management, reduce production losses, and enhance operational efficiency. Nevertheless, technological implementation must be adapted to local agroecological conditions, farm size, economic resources, infrastructure, and the practical requirements of agricultural producers. Horticulture contributes substantially to nutritional diversity, agricultural diversification, rural employment, and the economic value of agricultural production. Fruit, vegetable, ornamental, medicinal, and aromatic plant cultivation requires specialized knowledge of plant propagation, varietal characteristics, reproductive biology, pollination, canopy architecture, nutrient management, water relations, and postharvest physiology. Sustainable horticultural development depends on maintaining soil fertility, improving irrigation efficiency, protecting pollinators, minimizing pesticide residues, and reducing postharvest losses throughout production, storage, transportation, and distribution. Protected cultivation, integrated greenhouse management, climate-adaptive cultivars, and improved propagation technologies offer opportunities to increase production efficiency while reducing environmental pressures when implemented under appropriate conditions. Plant protection is essential for maintaining crop health, agricultural productivity, and the quality of harvested commodities. Plant diseases caused by fungi, bacteria, viruses, and other pathogenic organisms, together with insect pests, mites, nematodes, and competitive weeds, can substantially compromise crop establishment, physiological functioning, reproductive development, and yield formation. Integrated pest management provides a coordinated framework incorporating preventive agronomic practices, biological control, resistant cultivars, pest surveillance, ecological interventions, and the judicious use of chemical pesticides when necessary. Effective plant protection additionally requires accurate diagnosis, understanding of pathogen and pest biology, assessment of economic injury thresholds, resistance monitoring, and compliance with pesticide registration requirements and environmental safety standards. Particular attention should be directed toward pesticide resistance, non-target organisms, beneficial insects, soil microorganisms, aquatic ecosystems, and occupational exposure among agricultural workers. The integration of field crop science, horticultural production, and plant protection provides a foundation for developing resilient agricultural systems capable of responding to environmental variability and emerging biological threats. Climate-smart agriculture, conservation practices, diversified cropping systems, agroforestry, integrated nutrient management, and improved water stewardship can contribute to resource conservation and climate adaptation. However, the effectiveness of these approaches depends on measurable outcomes, including yield stability, input-use efficiency, soil organic carbon, water productivity, pest suppression, crop quality, biodiversity, profitability, and greenhouse gas emissions. Scientific validation through controlled experiments, long-term field trials, participatory research, and interdisciplinary assessment is therefore necessary to distinguish context-specific benefits from generalized assumptions. The sustainable agricultural development requires stronger integration between fundamental plant sciences, applied agronomy, horticultural research, phytosanitary surveillance, agricultural engineering, environmental science, and

socioeconomic analysis. Strengthening agricultural education, extension services, research infrastructure, seed systems, digital accessibility, and collaboration among scientists, farmers, policymakers, and industry stakeholders can accelerate the translation of scientific advances into practical agricultural improvements. An integrated, evidence-based approach offers a strategic pathway toward enhanced crop productivity, effective plant health management, reduced environmental impacts, improved agricultural resilience, and more reliable food systems under changing climatic and socioeconomic conditions.

Keywords: Agricultural Sciences, Field Crop Productivity, Horticultural Innovation, Integrated Plant Protection, Sustainable Agriculture

CREDIT UTILIZATION AND REPAYMENT PERFORMANCE BY COOPERATIVES AND INDIVIDUAL FARMERS IN DELTA STATE, NIGERIA

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ABSTRACT

The study examined the credit utilization and repayment performance by cooperatives and individual farmers in Delta state, Nigeria. The research described the socioeconomic characteristics of cooperatives and individual farmers; identified and compared the source of credit, amount demanded and obtained between the cooperatives and individual farmers; examined determinants of repayment performance by cooperatives and individual farmers and identified constraints affecting the utilization of credit from financial institutions by cooperatives and individual farmers in the study area. Eighty respondents were sampled from the area using multi-stage technique (40 cooperative farmers and 40 individual farmers). Results on credit sources revealed individual farmers to have had greater percentage (25%) sourced from indigenous lenders, 12.5% from commercial banks, while only 7.5% sourced from cooperative banks. The result of the t-test shows that the t-calculated value was significant at 0.000 significant levels. This implies that there is a significant difference between the amount of loan received and the amount repaid by the cooperative and individual farmers. Probit regression analysis showed three coefficients (marital status, education and ease of access) to have significantly affected repayment at 10%, 5% and 1% respectively. It was observed that short repayment period (M=3.3) exorbitant collaterals (M=3.7), not lending enough money (M= 4.6), were serious constraints of farmers in the study area. It is therefore recommended that credit agencies should always endeavor to draw a more convenient disbursement and amortization schedule to conform to economic needs. That is, loan must be adapted to the peculiar needs of the cooperators and repayment condition should be flexible to allow for variation and uncertainties in cooperative income.

Keywords: Credit, Utilization, Repayment Performance, Cooperatives, Nigeria

GENDER DIFFERENTIAL IN CASSAVA PRODUCTION AND PROCESSING IN OKENE LOCAL GOVERNMENT AREA, KOGI STATE, NIGERIA

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ABSTRACT
Gender differential in the production and processing of cassava in Okene Local Government Area of Kogi State was assessed in this study. Multistage sampling procedure was utilized for collecting sample of 120 respondents. Data were collected using a structured questionnaire and were analyzed using descriptive statistics, t-test and multiple linear regression. The results showed that 87.5% of cassava production activities were dominated by men and 66.67% of cassava processing activities were dominated by women. The t-test results showed that there was significant difference between the extents of involvement of male and female farmers and processors. Farming experience and land ownership were the two factors that influenced the productivity of cassava farmers in the study area. It is recommended that female cassava farmers should be given more access to land to encourage them to be fully involved in cassava farming. Also, male processor should be given incentives in the form of modern processing technologies to encourage them to participate fully in cassava processing.

Keywords: Gender, differential, Processing, Production, Linear Regression

EFFECT OF INSECT MEAL BASED DIET ON ANTIOXIDANT ACTIVITY OF PANGASSIUS HYPOPHTHALMUS FINGERLING

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ABSTRACT

This study examined that how substituting fishmeal with insect-based protein could help sustainability in aquaculture and how it might affect the growth, feed efficiency, and the oxidative stress in Pangasius hypophthalamus fingerling. We composed four experimental diets comprising of a control diet with 100% fishmeal (Diet I), second with 7.5% insect protein additions, third 15% and Fourth 22.5% (Diet IV) which evaluated the fish protein. During the feeding trial, we appraised the glutathione-S-transferase (GST), oxidative biomarkers lipid peroxidase breakdown (LPO), superoxide dismutase(SOP), GPx (glutathione peroxidase) enzyme, catalase (CAT) and (the reduced form of glutathione) (GSH). In their antioxidant defense systems, partial integration of fishmeal with insect meal had a prominent impact especially at 15% inclusion, where there were increased CAT, GST and GPx activities, and decreased LPO levels which advise a positive influence on the stress from oxidation. On the other hand, in fourth diet in which higher levels of full substitution (22.5%) occurred in poor nutrient consumption and only moderate oxidative stress. The study (ANOVA with Tukey's HSD) suggested that Diet three had the most antioxidant activity compared to the other diets. This research indicates that moderate use of insect meal enhance the health and growth of P. hypophthalmus while decreasing the use of fishmeal, which is a limited resource. This study also indicates that the potential of insect meal as a viable protein source for aqua feed.

Keywords: Pangasius fingerlings, insect meal, antioxidant biomarker, sustainable aquaculture, oxidative stress

MORPHOLOGICAL VARIABILITY AND PRINCIPAL COMPONENT ANALYSIS OF WILD WHEAT RELATIVES (AEGILOPS SPECIES)

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ABSTRACT

A total of 214 accessions representing six Aegilops species were evaluated using ten quantitative agronomic traits. Substantial phenotypic variability was observed, with the highest coefficients of variation recorded for 1000-spikelet weight (CV = 32.86%), flag leaf length (CV = 32.22%), sub-flag leaf length (CV = 31.72%) and awnless spike length (CV = 30.55%). Among species, the greatest variation in flag leaf length was observed in Ae. geniculata (CV = 41.06%), while Ae. triuncialis showed the highest variability in spike weight (CV = 32.12%). Mean 1000-spikelet weight ranged from 42.40 g in Ae. cylindrica to 96.82 g in Ae. neglecta. Shannon diversity analysis confirmed substantial phenotypic diversity, with the highest index recorded for sub-flag leaf length (H = 2.019). PCA revealed complex relationships among the studied traits. PC1 explained 55.42% and PC2 18.77% of the total variation, accounting together for 74.19%. PC1 was positively associated with leaf and spike dimensions, number of spikelets and plant height, while 1000-spikelet weight showed a negative association. PC2 was mainly associated with spike weight. The results demonstrate considerable phenotypic diversity within the Aegilops collection, particularly for leaf morphology, spike dimensions and spikelet weight, highlighting their value for accession characterization and differentiation.

Keywords: Aegilops, Phenotypic diversity, Agromorphological traits, Shannon diversity index, PCA

MORPHOLOGICAL VARIABILITY AND PRINCIPAL COMPONENT ANALYSIS OF WILD WHEAT RELATIVES (AEGILOPS SPECIES)

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ABSTRACT
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Keywords: Aegilops, phenotypic diversity, agromorphological traits, Shannon diversity index, PCA

THE ROLE OF ABIOTIC FACTORS ON DISEASES OF THE SILKWORM

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ABSTRACT

Our research focuses on the impact of temperature fluctuations on the development of silkworm larvae. To this end, silkworm eggs were incubated at 23°C with a relative humidity of 65–75%. Upon hatching, the temperature was raised to 24°C. Subsequently, we induced "jaundice" (a viral disease) by subjecting the larvae to cold, which activates latent viruses. Specifically, on the third day of the fourth larval instar, the larvae were exposed to a temperature of +2°C for 24 hours. Alternatively, jaundice was induced by heat stress: on the third day of the fourth instar, the larvae were placed in an incubator at +42°C for 6 hours. Following these temperature treatments, the larvae were returned to standard rearing conditions and monitored for 10 days. We recorded the number of larvae that became ill or died from jaundice, using the survival rate to determine the degree of resistance to the disease. The cooling and heating methods revealed an incubation period of 5–8 days for the cold-induced disease and 6–10 days for the heat-induced version. In both cases, the mortality rate among the larvae was relatively low; this is likely because the disease only manifests in individuals already harboring a latent virus. We concluded that inducing jaundice through cooling or heating is not an effective method for assessing overall resistance to the disease. Among the techniques tested, exposing fourth-instar larvae to +2°C for 24 hours is the most viable approach for identifying carriers of the latent virus.

Keywords: abiotic factors, silkworm eggs, jaundice

CANINE DISTEMPER VIRUS IN DIAGNOSTIC SAMPLES

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ABSTRACT

We present data on the prevalence, clinical manifestations, and risk factors for canine distemper virus infection in dogs admitted to a veterinary clinic. The prevalence of the disease among animals admitted to the clinic was 25%, with a 95% confidence interval of 17.3% to 32.7%. The most frequent clinical presentations were the respiratory (36.0%) and gastrointestinal (30.6%) forms. Alterations in blood cell counts (leukopenia or leukocytosis) were observed in 70.5% of affected dogs, while the majority (63.4%) maintained a normal body temperature. Although 60.3% of cases occurred during the colder months, no statistically significant correlation was found between disease incidence and season ($P > 0.05$); the seasonal factor accounted for only 1.9% of the variability in incidence ($P > 0.05$). The likelihood of contracting the disease decreased with age. Vaccination status accounted for 4% of the variability in incidence; the risk of developing the disease was higher in unvaccinated dogs compared to vaccinated ones (OR: 3.45; $P < 0.01$). The majority of cases (61.1%) occurred in purebred dogs, with the breed factor accounting for 3.2% of the variability in incidence. The likelihood of disease was higher in mixed-breed dogs than in purebred dogs (OR: 1.3; $P > 0.05$). No statistically significant correlation was found between disease incidence and the animals' living environment ($P > 0.05$). In 80% of cases, an improvement in the animals' condition was observed following treatment. Logistic analysis showed that age, sex, and vaccination status have a significant impact on the incidence of the disease, whereas breed, season, and housing environment do not have a substantial effect. Given that the age and sex of the dogs are background variables, vaccination efforts should be intensified as a means of controlling and preventing canine distemper.

Keywords: Canine distemper, infectious disease, diagnosis

ASSOCIATIVE INFECTION OF BABESIA OVIS AND MONIEZIA EXPANSA IN SHEEP OF THE GUBA-KHACHMAZ ECONOMIC REGION: EPIZOOTIOLOGICAL CHARACTERISTICS, IMPACT ON HEMATO-BIOCHEMICAL PARAMETERS, AND ECONOMIC EVALUATION

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ABSTRACT

The main objective of this study was to comprehensively evaluate the prevalence of joint blood protozoan and helminth infections in sheep across the Guba-Khachmaz economic region of Azerbaijan (Siyazan, Shabran, Khachmaz, Guba, Gusar) during 2016–2023, focusing on the epizootiological patterns of Babesia ovis and Moniezia expansa associative infection, its pathomorphological impact on the hemato-biochemical profile of the organism, and the resulting economic losses. Peripheral blood smears were collected from a total of 3,435 sheep across 5 administrative districts of the region, stained using the Giemsa method, and subjected to microscopic examination. Animals testing positive for blood parasites underwent coprological examinations (Fülleborn/Vishnyauskas methods). Hematological and biochemical parameters of blood (hemoglobin, PCV, albumin, AST, ALT) were determined using standard laboratory methods, and the statistical reliability of the results was confirmed ($p < 0.05$). Out of 3,435 examined sheep, blood protozoa were detected in 1,996 heads (58.1%), with Babesia ovis identified as the dominant species. Coprological examinations revealed an associative infection with Moniezia expansa in 1,320 of these animals (66.1%), representing 38.4% of the total study population. Piroplasmid infection rates varied by age: 80.5% in lambs under 1 year (peaking at 54.8% during summer), 61.9% in 1–2-year-old sheep, and 25.5% in animals over 2 years old. Associative infection rates across the corresponding age groups were 53.2%, 40.9%, and 16.9%, respectively. The most severe clinical course and highest mortality occurred in lambs aged 4–5 months. Compared to healthy controls, sheep with associative B. ovis + M. expansa infection exhibited reductions in hemoglobin by 64.5%, PCV by 44.6%, and albumin by 78.7%, alongside increases in AST by 71.5% and ALT by 51.9% ($p < 0.05$). These pathological alterations were proven to be significantly more severe than those in B. ovis mono-infection. Economic losses were composed of animal mortality, loss of live weight and wool, decreased milk productivity, and treatment-prevention expenses; a conservative evaluation per 1,000 sheep estimated annual losses to be at least 1,920 kg of live weight and 268.8 kg of wool.

Keywords: Babesia ovis, Moniezia expansa, Associative infection, Epizootiology, Economic loss

PATHOGENETIC SNERGISM MECHANISMS AND EPIDEMIOLOGICAL DYNAMICS OF ASSOCIATIVE EIMERIA AND HELMINTH INFECTIONS IN DOMESTIC CHICKENS

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ABSTRACT

This study investigates the epidemiological features, mechanisms of pathogenetic synergism, and age/seasonal dynamics of mixed infections caused by Eimeria species and various helminths in domestic chickens (Gallus gallus domesticus) across semi-intensive and backyard farms in four regions of Azerbaijan (Gobustan, Agsu, Shamakhi, and Ismayilli). Parasitological analysis of 2340 coprological samples revealed that associative infections dominate the parasite community structure, exhibiting an overall extensity of infection (EI) of 74.7%. Co-infection leads to pathogenetic synergism characterized by severe destruction of the intestinal mucosa, malabsorption, and immunological imbalance involving altered T-lymphocyte activity, eosinophilia, and elevated IgY levels. Age-dependent dynamics demonstrated that 3–4-month-old chicks are most susceptible to associative infections (EI 70,2–81,0%) due to an underdeveloped immune system and high infection pressure. In older birds (8 months and above), partial acquired immunity against Eimeria reduces associative infection rates (EI 56.5–66.3%), while helminth monoinfections increase (EI 20.6–29.5%) owing to the persistent and accumulative nature of helminths. Seasonally, peak infection rates were recorded during spring (EI 45.9–61.7%) and autumn (EI 48.1–65.8%), driven by favorable microclimatic conditions for parasite propagation, whereas the lowest rates occurred in winter (EI 11.3–23.6%). The analysis of coprological studies has shown that the reproductive activity of pathogens changes during associative (mixed) infections. In 3–4-month-old chicks, along with helminth egg intensity (ranging between EPG 150-510), the excretion of Eimeria oocysts reached its maximum level (OPG 15.000-50.000). In older birds (8 months old), due to the development of specific immunity, the Eimeria OPG value sharply decreased (500-3.000), whereas the EPG value of certain helminths (particularly T. tenuis) increased to 520, establishing dominance. These findings underscore the critical need for integrated antiparasitic control strategies targeting both coccidia and helminths, particularly during early growth stages and vulnerable seasonal periods.

Keywords: Eimeria, Helminths, Associative infection, Parasitocenosis, Pathogenetic synergism

DESIGN, FABRICATION AND PERFORMANCE ANALYSIS OF A MANUAL SPIKED-ROLLER SOIL AERATOR FOR SMALLHOLDER FARMS

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ABSTRACT

Soil compaction restricts water infiltration, gas exchange and root development, and it is a recurring problem on smallholder farms, lawns and nurseries where tractor-drawn aerators are unaffordable or impractical. This paper presents the design, fabrication and performance analysis of a manual, spiked-roller soil aerator. The machine consists of a 300 mm diameter, 500 mm long hollow steel drum fitted with 40 staggered mild-steel spikes (10 mm diameter, 40 mm working projection), supported on a tubular frame with two pneumatic wheels and a T-grip handle. Design equations were used to size the drum, spike density, axle and handle, and to estimate the vertical load required for spike penetration, the operator push force, and the field capacity. The roller weighs approximately 24 kg and delivers about 85 perforations per square metre. The analysis shows that the unballasted machine can penetrate soils with a cone index up to about 0.6 MPa, and up to about 0.86 MPa when the drum is ballasted with 10 kg of sand, at an estimated push force of 61–87 N and an effective field capacity of about 0.09 ha/h. The machine is simple, low-cost to build with local workshop skills, and requires no fuel, making it suitable for small-scale farmers. A field test protocol for validating the predicted values is also presented.

Keywords: soil aeration, soil compaction, spiked roller, manual implement, agricultural mechanization, appropriate technology

DESIGN, CONSTRUCTION AND PERFORMANCE ANALYSIS OF A COMBINED CHARCOAL OVEN AND STOVE FOR HOUSEHOLD AND SMALL-SCALE USE

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ABSTRACT

Many households and small food vendors in Nigeria depend on charcoal for cooking and baking, yet the available equipment is usually an open stove that cannot bake and wastes much of the fuel's heat. This paper presents the design, construction and performance analysis of a combined charcoal oven and stove made from locally available sheet steel. The unit is a freestanding rectangular cabinet of about 400 mm × 400 mm × 750 mm on four legs. It has a combustion chamber with a grate and a ducted air inlet at the bottom, an oven chamber above it with a side door and viewing window, and a flat top plate that serves as a cooking surface. Heat-balance equations were used to size the fuel charge, air inlet and structure. The analysis indicates a heat requirement of about 4.2 MJ for a one-hour bake of 3 kg of dough at 200 °C, a fuel consumption of about 0.32 kg of charcoal per batch at an average fire power of about 2.6 kW, an air-inlet area of about 30 cm², and a fuel requirement of about 0.19 kg to boil 2 L of water on the top plate. The unit weighs about 24 kg, uses no electricity or gas, and can be made in a small workshop. Test procedures for validating the predicted values and measures to improve insulation and safety are presented.

Keywords: charcoal oven, charcoal stove, biomass cooking, baking, thermal efficiency, appropriate technology

EFFECT OF FARM MECHANIZATION ON SOIL PHYSICAL PROPERTIES AND ORGANIC CARBON SEQUESTRATION AT THE AGRICULTURAL AND RURAL MANAGEMENT TRAINING INSTITUTE (ARMTI) TRAINING AND DEMONSTRATION FARM, ILORIN, NIGERIA

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ABSTRACT

A field experiment was conducted at the training and demonstration farm of the Agricultural and Rural Management Training Institute (ARMTI), along Km 18, Ilorin–Ajase-Ipo Highway, Ilorin, to evaluate the effects of different farm mechanization practices, represented by selected tillage systems, on soil physical properties and soil organic carbon sequestration, using zero tillage as the control treatment. The study was carried out on sandy loam soils using five treatments: Zero tillage as the control (T_1), Conventional ploughing (T_2), Harrowing (T_3), Chisel tillage (T_4) and Minimum tillage (T_5). The treatments were arranged in a Randomized Complete Block Design (RCBD) with four replications. Soil properties evaluated included saturation capacity, field capacity, permanent wilting point, available water content, bulk density, Particle density, dispersion ratio, total porosity, micro- and macro-porosity, and soil organic carbon. The data collected were subjected to analysis of variance at 5% level of significance to determine the effects of tillage practices on soil physical properties and soil organic carbon stocks. Results revealed that, comparable to T_2, T_3 and T_4, the T_5 significantly increased saturation capacity (70.2%), field capacity (66.4%), available water content (67.3%), and permanent wilting point (70.4%). It also reduced bulk density (42.9%) and dispersion ratio (30.9%), while increasing total porosity (60.2%) and microporosity (65.1%). T_1 and T_5 similarly improved macroporosity by 60.4% and 57.1%, soil organic carbon storage by 82.7% and 80.8% respectively, compared with the T_2, T_3 and T_4 ($P \leq 0.05$). Largely, T_1 and T_5 maintained more favourable soil physical properties and soil organic carbon stocks than the other three selected tillage practices. These findings highlight that T_1 and T_5 tillage practice provides the most favourable balance between soil physical conditions and organic carbon storage.

Keywords: farm mechanization, tillage practices, soil physical properties, soil organic carbon sequestration, soil degradation

EFFECT OF HORTICULTURAL LAND-USE SYSTEMS ON SOIL MOISTURE, SELECTED SOIL PHYSICAL AND CHEMICAL INDICATORS AT OHIANA IN OKENE, KOGI STATE

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ABSTRACT

A field experiment was conducted at the horticultural sites and rice field of Ohiana rural community in Okene, Kogi State along Km 3, Okene – Benin Highway to determine the effect of horticultural land-use systems on soil moisture, selected soil physical and chemical indicators. The study was carried out on clay loam and sandy loam soils using four land-use systems: forest plantation, Duranta garden, grass land and a rice field (control). The treatments were arranged in a Completely Randomized Design (CRD) with four replications. Soil properties evaluated included saturation capacity, field capacity, permanent wilting point, available water content, bulk density, dispersion ratio, total porosity, micro- and macro-porosity, soil organic carbon and total nitrogen. Data were subjected to analysis of variance at the 5% level of significance. Results showed that, relative to the rice field, the forest plantation significantly increased saturation capacity (61.7%), field capacity (63.7%), available water content (60.2%), and permanent wilting point (66.8%). It also reduced bulk density (44.6%) and dispersion ratio (34.5%), while increasing total porosity (56.9%) and microporosity (63.7%). Forest plantation and Duranta garden similarly enhanced macroporosity by 57.6% and 54.4%, soil organic carbon by 71.8% and 64.3%, and total nitrogen by 98.3% and 77.7%, respectively, compared with the rice field ($P \leq 0.05$). Overall, forest plantation proved to be the most effective land-use system for improving soil physical and chemical properties, thereby enhancing soil conservation and water management. These findings highlight the importance of perennial horticultural vegetation in promoting sustainable soil management and long-term ecosystem productivity.

Keywords: Horticulture, soil conservation, water management, soil organic carbon and total nitrogen

THE INVISIBLE FRACTION: NANOPLASTICS IN AQUATIC ENVIRONMENTS, FROM DETECTION AND FATE TO ECOLOGICAL RISK

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ABSTRACT

Plastic pollution doesn't stop at the pieces we can see. As bottles, bags and fishing gear weather under sunlight, waves and microbes, they keep breaking into smaller fragments, and at the far end of that process are nanoplastics, particles below about 100 nm that behave very differently from the plastics they came from. Because they are so hard to isolate and identify, they remain far less studied than microplastics. This review follows nanoplastics through the aquatic environment, from where they originate to what they may do to living organisms. We first cover how they are defined and formed, then the tools used to find and characterise them: electron and atomic force microscopy, Raman and FT-IR spectroscopy, thermal analysis, and newer approaches such as nanotechnology-based sensors and AI-assisted imaging. We then look at reported occurrence in freshwater, seawater, wastewater and drinking water. At this size, surface chemistry matters more than gravity. Nanoplastics clump together, settle, pick up organic matter and biofilms, and carry other pollutants with them, and their fate shifts with pH, salinity and temperature. They can be taken up by organisms from algae to fish and passed along food webs. Evidence from the studies reviewed points mostly to gradual, sublethal harm rather than sudden death: oxidative stress, immune disruption, DNA damage, hormonal interference, and reproductive and developmental problems. Progress is held back by inconsistent sampling methods, limited field data, and lab experiments that use concentrations far above those found in nature. We argue for standardised detection methods, long-term and multigenerational exposure studies at realistic doses, omics approaches, better fate models, and stronger monitoring, regulation and prevention.

Keywords: nanoplastics, aquatic environment, analytical techniques, trophic transfer, ecotoxicity

MOBILITY TRANSITIONS, DIASPORA RETURN AND CIRCULATORY LIVING BETWEEN ALBANIA, GREECE AND NORTH MACEDONIA

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ABSTRACT

European mountain regions are changing because of complex forms of mobility that challenge conventional understandings of settlement, migration, and territorial decline. This paper examines the Korçë cross-border mountain region in southeastern Albania as a space of seasonal and translocal inhabitation structured by circular migration, diaspora return, tourism mobility, and cross-border living practices. Located between Albania, Greece, and North Macedonia, the Korçë region has historically functioned as one of the principal mobility corridors of the Western Balkans, characterized by labor migration, remittance economies, and fragmented family geographies. The paper introduces the concept of seasonal re-inhabitation, where people come back to their villages through temporary return migration, ritual gatherings, summer tourism, and multilocal dwelling practices. The study combines an innovative mixed-method combining longitudinal demographic analysis (1990–2025), mobility calendars documenting annual circulation patterns, GIS-based seasonal population mapping, semi-structured interviews, and participant observation during seasonal return events and tourism periods. The findings reveal that while permanent out-migration contributes to ageing and shrinking populations, temporary returns, diaspora investments, and tourism mobilities sustain local economies, preserve built heritage, and reactivate social life during summer and religious festivities. The Korçë case demonstrates that mountain regions should also be understood as dynamic territories increasingly sustained through cyclical and transnational forms of inhabitation. The paper contributes to current debates on mountain mobilities, multilocal dwelling, and territorial resilience by proposing “seasonal re-inhabitation” as a new framework for understanding demographic and socio-spatial transformations in European mountain areas.

Keywords: circular mountain territoriality, translocal living, cross-border mobility, seasonal re-inhabitation, diaspora return, mobility calendars

SUSTAINABLE UNDERGROUND AGROTOURISM DEVELOPMENT THROUGH PERMACULTURE PRINCIPLES: A CASE STUDY KORÇA REGION, ALBANIA

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ABSTRACT

Tourism is an important driver of rural development in Albania, especially in areas where natural landscapes, agriculture, and cultural heritage coexist. This study proposes an innovative agrotourism model in Korça region, Albania, based on permaculture and ecological sustainability. The 18.3-hectare site along the Korça–Ersekë national road integrates traditional agriculture, biodiversity conservation, landscape design, and rural tourism into a multifunctional and economically viable system. The landscape design aims to improve agricultural productivity and resilience through diverse, integrated plant communities. Organic food production is combined with protection against hazards such as wildfires, strong winds, and drought. A multilayered vegetation system of herbs, shrubs, and trees creates a stable microclimate by providing shade, fixing nitrogen, retaining moisture, and reducing climatic stress. This vegetation also protects soil from rainfall and solar exposure, supports groundwater accumulation, and reduces irrigation needs. The research uses landscape analysis, functional zoning, questionnaires, field interviews, and design software to develop a sustainable strategy. The project aims to support local economic development, environmental protection, biodiversity, and agri-food production while remaining suitable as a manageable family business. An innovative underground agrotourism concept is also proposed to improve land-use efficiency, ecological performance, and long-term maintenance.

Keywords: landscape architecture, permaculture, ecosystem sustainability, guesthouse, agrotourism, rural development, Korça

INNOVATIVE BIOTECHNOLOGICAL STRATEGIES FOR ENHANCING AQUACULTURE PRODUCTIVITY AND SUSTAINABILITY

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ABSTRACT

Aquaculture is the fastest-growing food-producing sector worldwide, yet it faces persistent challenges including disease outbreaks, slow growth, genetic deterioration, dependence on fishmeal, and environmental pressure. This study reviews the biotechnological techniques used in aquaculture and highlights recent advances reported in the literature. Key approaches include selective breeding supported by genomic and marker-assisted selection, chromosome-set manipulation such as polyploidy and sex control, transgenesis, and CRISPR/Cas9 genome editing to improve growth, disease resistance, and sterility. Advances in vaccine biotechnology, including recombinant, DNA, and oral vaccines, as well as probiotics, immunostimulants, and bacteriophage therapy, are discussed as alternatives to antibiotics. Molecular diagnostics such as PCR, qPCR, LAMP, and biosensors enable rapid pathogen detection, while environmental DNA (eDNA) monitoring supports health and biodiversity surveillance. In nutrition, single-cell proteins, microalgae, insect meals, and enzyme supplementation provide sustainable alternatives to fishmeal and fish oil. Biofloc technology and microbiome manipulation further improve water quality and feed efficiency, and cryopreservation and in vitro gametogenesis support broodstock management and conservation. Together, these tools are reshaping hatchery practices, health management, and feed formulation across finfish, shellfish, and crustacean production systems. Overall, integrating omics tools, gene editing, and bioprocess technologies offers considerable potential for sustainable, productive, and disease-resilient aquaculture, although regulatory, ethical, biosafety, and public acceptance issues must be addressed before wide commercial application.

Keywords: Aquaculture, Biotechnology, Genome Editing, Molecular Diagnostics, Probiotics

SEAWEED- BASED BIOPLASTICS: A RENEWABLE SOLUTION FOR REDUCING PLASTIC USE AND ADVANCING CIRCULARITY IN AQUACULTURE

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ABSTRACT

Bioplastics derived from seaweed present a promising alternative to petroleum-based plastics and can strengthen circular aquaculture systems. Marine macroalgae are rich in film-forming polysaccharides, including alginate, carrageenan, agar, and ulvan, which can be converted into renewable and biodegradable materials. This review assesses seaweed as a raw material for bioplastic manufacture and examines its contribution to sustainable aquaculture. The mechanical, barrier, and functional properties of these materials can be adjusted using plasticizers, reinforcing polymers, and other additives, giving rise to smart features such as pH sensitivity, controlled release, and antimicrobial action. Seaweed-based films also degrade readily in the environment. In addition, seaweed cultivation can capture nutrients from aquaculture effluents and aligns with circular bioeconomy principles, since it does not require arable land. Such materials are therefore well suited to replace single-use packaging, feed-handling equipment, and other disposable items used on farms. However, wider commercial uptake is constrained by challenges in scaling up production, the energy-intensive extraction and drying steps, seasonal and species-related variability in biomass quality, competing demand from the food, cosmetic, and biofuel industries, and the lack of clear standards and regulations. Life-cycle assessments show that processing methods and end-of-life routes largely determine environmental performance. We conclude that seaweed bioplastics are a realistic means of curbing plastic pollution and advancing circular, sustainable aquaculture, provided that joint research, industry, and policy efforts address the remaining barriers of cost, consistency, and regulation.

Keywords: Seaweed bioplastics, Biopolymers, Polysaccharides, Circular aquaculture, Plastic pollution

AMELIORATIVE POTENTIAL OF CORIANDER SEED EXTRACT (CSE) AGAINST TANNERY EFFLUENT-INDUCED TOXICITY IN CATLA CATLA

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ABSTRACT

Aim of current research was to investigate the ameliorative effect of coriander seed extract (CSE) on Catla catla against tannery effluent induced toxicity. The research was conducted in two phases. In the first phase median lethal concentration (LC50) of tannery effluent was determined for the C. catla (Amjad et al., 2026). In the second phase the induced toxicity was mitigated with the supplementation of varying level of CSE sunflower meal based diet. For the mitigation of tannery effluent toxicity fingerlings were divided into eight groups where group T0-PC; T0-NC served as the control positive and control negative whereas other six groups were supplemented with varying levels of CSE, sunflower meal-based diet. C. catla fingerlings were fed 5% of their body weight twice a day for the duration of 60 days. The results indicated 1% supplementation of CSE significantly ($p< 0.05$) increased the growth performance, body composition, blood profile, immune response and antioxidant activity. When the results were compared with the other supplemental levels, it was observed that 3% supplementation of CSE improved all parameters at lowest level. Overall, the current research indicated that 1% supplementation of CSE is an optimal level of supplementation to mitigate the detrimental impacts of tannery effluent on C. catla.

Keywords: Coriander Seed Extract, C. catla, Growth Performance, Tannery Effluent

IMPORTANCE OF BIOACTIVE FEED ADDITIVES IN AQUACULTURE

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ABSTRACT
Aquaculture accounts for a large share of aquatic food products and is critical to global food security and livelihoods. However, factors such as feed efficiency, intestinal health, incidence of disease and environmental influences make it difficult to sustain intensive methods of production. Dietary supplementation with bioactive compounds has been widely investigated as a nutritional strategy for improving fish production and health. This review discusses some bioactive feed additives namely organic acids, phytase, thyme, probiotics and prebiotics. Probiotics can enhance growth, feed intake, immunological response, disease resistance and gut microbial balance while prebiotics increase the beneficial gut microorganisms and improve gut health and immunity. They can also contribute to the control of pathogenic microorganisms, improving digestion and nutrient uptake depending on the fish species and the organic acid. Phytase, an enzyme that degrades the phytate found in plant materials makes phosphorus and other minerals more available to fish, lowers nutrient excretion and improving the utility of plant-based feed. Thyme is a phytogenic feed additive that may have beneficial effects on fish health due to its antibacterial, antioxidant and immunomodulatory effects. Bioactive feed additives have a broad potential to improve fish health, growth, feed efficiency and aquaculture sustainability. However, their efficiency is affected by different factors such as fish species, dosage, diet composition and culture conditions. Additional research is required to establish the optimal dosages to elucidate the mechanisms of action and to evaluate the use in commercial aquaculture systems.

Keywords: Aquaculture, bioactive feed additives, probiotics, prebiotics, organic acids

MICROPLASTICS AND FISH HEALTH. OXIDATIVE STRESS, IMMUNE DYSFUNCTION, AND ORGAN DAMAGE

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ABSTRACT

Micro-plastic pollution is increasingly recognized as global threat to fishes and aquatic organisms. Mp,s are widespread abundantly in both marine and fresh water environment and major risk for fish health .This review explore the effects of micro-plastics on fish body organ to cellular level through gastrointestinal effect, oxidative stress, immune responses, growth effect, reproductive and endocrine effects in aquatic fishes. Once inside the body, these micro-plastics enters in gut and gills, penetrate in bloodstream exposure leads to intestinal and hepatic damage and also effects to gastric enzymatic activity and causes digestive tract disturbance. Plastics cause hyperpelsia and impares oxygen exchange in gills. Small particles enter in bloodstream causing cardiotoxicity and alter the blood chemical composition. Upon entrance in nervous system cause neurotoxicity, oxidative stress and cellular damage that can lead to inflammatory reactions. The effect of damage depends upon the size and quality of microplastics. This review aims to understanding of microplastics effects in fishes and providing the future ecological assessment.

Keywords: Gastrointestinal; Hepatic damage; Neurotoxicity; Cardiotoxicity;Oxidative srtess;

A REVIEW: PLANT FOLIAGE AS A LOW-COST PROTEIN RESOURCE FOR FRESHWATER FISH

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ABSTRACT

The aims of this review article to evaluate the nutritional of selected plant leaves that are conventionally and commonly available. Rapidly increase food materials prices make it difficult to produce enough quantity of protein to complete the nutritional demand of human effectively and in fish farmer spend one half of fish expenditure on fish formulated feed. Selection of fish feed ingredients and preparation of diet mainly depend on nutrient digestibility, taste and dietary acceptance by aquatic life. Increasing costs of fish feed forced to find alternative effective, easily accessible such as plants leaves utilize as protein resources. Traditionally, present common plant have good source of high protein factors, dietary fiber, minerals and vitamins that play vital role in fisheries growth and development. On the other side in plant leaves have anti nutritional ingredients such as oxalates, phytates, tannins, saponins, cynagenic glycosidase, and nitrates. By replacing fish ingredient with plant leaves nutrients resources diminish the overall expenditures. Different technique are used to reduce the harmful effect of plant leaves for example blanching, fermentation, soaking, boiling and leaf protein concentrate. Purpose, this review highlight that the replacement of fish meal by plant leaves protein sources is a thinkable, feasible and practical option for sustainable aquaculture feed formulation.

Keywords: Anti-nutritional, Leaf protein concentrate, cyanogenic glycosidase, blanching, feed formulation

NON-FOOD INFLATION IN ROMANIA: TRANSMISSION MECHANISMS, EXTERNAL DEPENDENCIES, AND PRICE RIGIDITIES

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ABSTRACT

Non-food inflation represents a significant component of consumer price dynamics, reflecting the interplay between international market developments, the structure of domestic production, and household consumption behavior. This paper investigates the determinants and persistence mechanisms of non-food inflation in Romania, focusing on import dependency, exposure to energy cost fluctuations, and the specificities of price formation across various product categories. The central research question concerns the extent to which external shocks are amplified or mitigated by the structural characteristics of the Romanian economy. The proposed methodological approach combines a disaggregated analysis of consumer price indices with an examination of industrial producer prices, exchange rate dynamics, and foreign trade indicators. Data from the National Institute of Statistics and Eurostat allow for the investigation of differences between product categories and the contextualization of national developments against European trends, while accounting for the specificities of the statistical classifications employed. Particular attention is given to the heterogeneity between energy and non-energy goods, as well as the distinctions between durable goods and non-durable consumer goods. The analysis examines the role of production and distribution costs, changes in indirect taxation, and demand adjustments in the transmission of inflationary pressures. Furthermore, the research examines potential asymmetries between price increases and decreases, as well as their implications for inflation persistence and for decisions regarding whether to purchase goods or defer consumption. The proposed contribution consists of developing an explanatory framework that distinguishes the influence of cyclical factors from that of structural vulnerabilities. This perspective provides a basis for assessing the complementarity between monetary policy, fiscal predictability, the strengthening of competition, and the diversification of domestic productive capacities, with the aim of reducing the Romanian economy's exposure to price shocks.

Keywords: non-food product inflation, import dependency, price rigidity, consumer goods, monetary policy

FOOD INFLATION IN ROMANIA: STRUCTURAL DETERMINANTS AND DISTRIBUTIVE IMPLICATIONS

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ABSTRACT

Food inflation represents a key dimension of price instability, given its impact on purchasing power, food security, and socioeconomic inequalities. This paper aims to examine the mechanisms driving the formation and persistence of food inflation in Romania by integrating macroeconomic determinants with the structural characteristics of the agri-food sector. The central research question concerns how external shocks interact with domestic vulnerabilities to produce differentiated effects on consumers. The proposed methodological approach combines an analysis of consumer price index dynamics—including harmonized indices—with an examination of production costs, agricultural producer prices, and import dependency. By utilizing data from the National Institute of Statistics and Eurostat, the study establishes a comparative framework between Romania and the European Union. The analysis explores the relationships between energy costs, agricultural inputs, logistics expenses, exchange rate fluctuations, and final prices, with a particular focus on time lags and potential asymmetries in price transmission throughout the agri-food supply chain. The distributive component examines the varying degrees to which households are exposed to rising food prices, based on factors such as income levels, consumption patterns, and place of residence. In this context, the study investigates the distinction between a slowdown in the rate of inflation and the restoration of food affordability—two processes with distinct implications for the well-being of the population. The proposed contribution consists of articulating an integrated perspective on food inflation, which links shock transmission mechanisms with supply-side rigidities and social vulnerability. The analytical framework provides a basis for assessing the complementarity between monetary policy, targeted fiscal interventions, and structural measures aimed at strengthening production capacity, distribution efficiency, and the resilience of the Romanian agri-food sector.

Keywords: food inflation, supply shocks, purchasing power, distributive effects

PHYSICS-INFORMED GRAPH NEURAL NETWORKS FOR PREDICTING CASCADING INFRASTRUCTURE FAILURES IN URBAN DIGITAL TWINS

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ABSTRACT

Modern urban infrastructure is deeply interconnected, meaning a single natural disaster can trigger a chain reaction of systemic failures. Traditional artificial intelligence models often struggle to predict these cascading effects because they ignore the underlying physical laws of the infrastructure. This study introduces a novel Physics-Informed Graph Neural Network (PI-GNN) framework integrated with an Urban Digital Twin to predict and mitigate cascading failures during extreme weather events. We modeled a city's power, water, and transportation networks as a multi-layer graph. Unlike standard data-driven models, our PI-GNN embeds physical conservation laws directly into the neural network's loss function, ensuring predictions remain physically realistic. The model was trained and validated using historical disaster data and simulated extreme flood scenarios. The findings demonstrate that the PI-GNN reduces the prediction error for cascading infrastructure failures by 27% compared to traditional deep learning approaches. Furthermore, it identifies critical network "choke points" 40% faster, allowing for proactive intervention. While the model requires significant computational resources for initial training, its inference speed is fast enough for real-time emergency decision-making. We conclude that embedding physical laws into AI models significantly enhances their reliability for disaster management. This research provides emergency responders with a robust, interpretable tool to prioritize resource allocation, ultimately preventing systemic urban collapse and saving lives during natural disasters.

Keywords: Physics-Informed Neural Networks, Digital Twin, Cascading Failures, Graph Neural Networks, Disaster Management

INNOVATION DRIVERS OF PROFITABILITY ENHANCEMENT IN UKRAINIAN AGRICULTURAL ENTERPRISES

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ABSTRACT

The study aims to identify the key innovation drivers of profitability in Ukrainian agricultural enterprises and explain how they can contribute to cost optimization, revenue growth, and business resilience. The study focuses on four interconnected groups of innovation: technological solutions in precision farming, biological and breeding advances, digital management tools, and energy and environmental technologies. The discussion draws on established approaches to agricultural innovation and illustrates potential applications through examples associated with Ukrainian agribusiness companies. Precision-farming technologies, including GPS navigation, satellite data, variable-rate application, and unmanned aerial vehicles, can improve the allocation of seeds, fertilizers, crop-protection products, and fuel. Biological innovations, such as drought-tolerant crop varieties and microbial preparations, can help farms adapt to changing climatic conditions and use production inputs more efficiently. Digital platforms and enterprise resource planning systems integrate operational, weather, machinery, and inventory data, supporting more transparent resource management and faster managerial decision-making. Energy-related innovations, including biogas facilities, biomass-based heating, and solar generation, can reduce exposure to external energy markets while creating opportunities to reuse agricultural by-products. Examples involving Kernel, MHP, and IMC illustrate different approaches to digital farming, bioenergy, circular resource use, and precision agriculture. These cases are considered as illustrations of possible mechanisms rather than as directly comparable measurements of economic impact. The study concludes that innovation is most likely to strengthen profitability when technologies are selected according to enterprise-specific conditions and implemented as a coordinated system. Practical decisions should therefore be supported by an assessment of implementation costs, expected economic benefits, payback periods, and relevant production risks. Such an approach can improve resource efficiency, managerial effectiveness, and the long-term competitiveness of agricultural enterprises.

Keywords: Agricultural Enterprises, Profitability, Innovation, Precision Farming, Digital Transformation

BLOW UP TIME ESTIMATES FOR SOLUTIONS TO HYPERBOLIC WAVE EQUATIONS WITH SOURCE TERMS

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ABSTRACT
In this work, we investigate the finite-time blow-up of solutions to a hyperbolic wave equation involving a (p)-Laplacian operator and nonlinear source terms, subject to homogeneous Dirichlet boundary conditions. The problem is considered in a bounded domain with a sufficiently smooth boundary, where the source term satisfies suitable growth assumptions. Our main objective is to establish sufficient conditions ensuring that solutions cannot exist globally in time and instead develop a blow-up in a finite time. By employing energy methods, Sobolev embedding inequalities, and an appropriate differential inequality, we derive blow-up criteria for solutions corresponding to both positive and negative initial energy. The analysis highlights the role of the initial energy, the nonlinear source term, and the diffusion operator in determining the evolution of solutions. In particular, the results provide conditions under which the energy associated with the solution exhibits an unbounded growth in finite time. These findings contribute to the qualitative understanding of nonlinear hyperbolic equations and provide further insight into the influence of nonlinearities on the long-time behavior of their solutions.

Keywords: Blow up, Source Terms, Initial Energy, Hyperbolic Equation, p-Laplacian Operator

COMPUTER VISION AND AGENTIC AI FOR SOIL FOOD WEB AND NUTRIENT CYCLING OPTIMIZATION: A REVIEW OF EMERGING APPROACHES AND RESEARCH GAPS

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ABSTRACT

Soil food webs are rich and diverse ecosystems composed of interacting communities of microorganisms, nematodes, microarthropods and roots, and they play a central role in soil health and nutrient cycling. Recent advances in computer vision and artificial intelligence (AI) have created new opportunities for monitoring these biological communities and supporting more data-driven soil management. However, these developments have largely progressed as separate research areas. This review synthesizes this divergent literature into a coherent narrative on the emerging applications of computer vision and agentic AI in soil food-web monitoring and nutrient management, with particular emphasis on whether and how these approaches connect. Existing studies have demonstrated the use of computer vision and deep learning to identify soil organisms, including nematodes, and to analyze root systems and soil-related properties. In parallel, machine learning models and newer agentic AI systems have been applied to soil property prediction, nutrient management and fertilizer decision-making. However, the reviewed literature indicates that these approaches have not yet been connected into automated systems in which observations of soil biological communities directly inform AI-driven nutrient management decisions. The review also identifies key challenges, including limited labeled datasets for soil organisms, difficulties in observing microbial communities with conventional computer vision, limited field validation, geographic biases in available data, and limited model interpretability and generalization. The few studies that combine biological data with decision-making report mixed results; in one case, adding soil biological indicators did not improve the accuracy of fertilizer recommendations over standard chemical soil tests. These limitations point to a clear research gap: integrated systems that combine biological observations with environmental and soil data and intelligent decision-support mechanisms. Such systems would help establish whether this integration yields measurable improvements in real-world nutrient management.

Keywords: Artificial Intelligence, Precision Agriculture, Soil Ecology, Soil Health, Sustainable Nutrient Management

WOODY AND SHRUBBY SPECIES LIFE FORMS ANALYSIS ON DISTURBED LANDS IN THE UKRAINE KRYVYI RIH REGION

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ABSTRACT
The life forms analysis of woody and shrubby species growing on the technogenic lands of the Kryvyi Rih region revealed that, within the study sites, trees are represented by 38 species (70.4%), while shrubs comprise 16 species (29.6%). Among the trees, deciduous plants predominate, accounting for 37 species (98.15%). Evergreen trees are represented by only a single species (1.85%) – Pinus pallasiana D. Don. Common shrub species include Syringa vulgaris L., Rosa canina L., Ligustrum vulgare L., Viburnum opulus L., and others. A conservation-focused analysis of the woody flora in man-made (technogenic) areas revealed no species listed in the Red Book of Ukraine. The presence of Crataegus pentagyna Waldst. et Kit. – a species included in the official list of regionally rare plants for administrative territories of Ukraine – was confirmed. Among the species listed in the IUCN Red List, Armeniaca vulgaris Lam. and Juglans regia L. are present. Given that moisture is the limiting factor for the distribution of species in the technogenic territories, four groups of hygromorphs have been identified: xerophytes, mesophytes, mesoxerophytes, and xeromesophytes. Mesoxerophytes constitute the largest group in terms of the species number, accounting for 37% of the total, followed by xeromesophytes (31.5%), mesophytes (27.8%), and another category of mesophytes (3.7%). Thus, our woody and shrubby species analysis has shown that the plant communities in the man-made landscapes of the Kryvyi Rih region contain species belonging to transitional hygromorph forms; these species have adapted to the local conditions and are characterized by active regeneration from seeds.

Keywords: technogenic territories, sozological analysis of dendroflora, life forms of woody and shrubby species, hygromorphs, seed regeneration

ANALYSIS OF SOIL TEMPERATURE VARIABILITY AT DIFFERENT DEPTHS DURING THE 2023 VEGETATION PERIOD AT THE MITROVICA METEOROLOGICAL STATION

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ABSTRACT

The study examines the thermal regime of air and soil at different depths (2, 5, 10, 20, 30, 50, and 100 cm) during the 2023 vegetation period (April–September) at the Mitrovica meteorological station. Daily and monthly data were analyzed using statistical methods and summarized through key statistical indicators, including the mean, maximum, minimum, range, standard deviation (SD), coefficient of variation (CV), and correlation coefficient. The findings indicate that air and soil temperatures follow a distinct seasonal pattern and are strongly correlated, particularly in the shallow soil layers. In contrast, deeper soil layers are less influenced by temperature fluctuations occurring near the surface. Throughout the vegetation period, air and surface soil layers exhibit higher mean temperatures, temperature ranges, standard deviations, and coefficients of variation, while these indicators generally decrease with increasing soil depth. The study is of practical significance for understanding the thermal dynamics of air and soil and provides useful information for applications in agriculture and other fields concerned with environmental thermal conditions.

Keywords: soil thermal regime, soil temperature, statistical indicators, Kosova

EVALUATING YEAST-ENRICHED ORGANIC FERTILIZERS ON THE LETTUCE GROWTH AND BIOMASS PRODUCTION

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ABSTRACT

Organic fertilizers made from biodegradable waste materials are rising in popularity for being environmental friendly and sustainable. This study investigates the effect of organic fertilizers made from potato (PPP) and banana peel powders (BPP), boosted with baking yeast (Saccharomyces cerevisiae), on the growth and yield of lettuce (Lactuca sativa L.) The main objective of this study is to identify the best ratio of yeast and organic fertilizers that aids in lettuce growth and yield. A pot experiment was carried out for a period of 90 days with two separate treatments. One group was treated individually with banana and potato peel powder as soil amendment and with 5% yeast as foliar spray only. Other group of plants was provided with a combination of variable concentrations of both peel powders and 5% yeast foliar spray. It was found that out of all the individual treatments, 30g of PPL produced the most noticeable increase in plant height (22.8cm), number of leaves (29 per plant), Leaf area index (2.33cm²) and other biochemical parameters such as chlorophyll content (1.67g), carotenoid content (1.3g). The combined application of 10g BPP, 30g of PPP, and 5% yeast solution exhibited significantly improved morphological parameters: plant height (28.1cm), number of leaves (36 per plant), leaf area index (4cm²) and biochemical parameters: total chlorophyll (2.6g), carotenoid content (1.9g). This study suggests that in combination treatment can lead to an increased and healthy yield of lettuce. This highlights the use of selected organic fertilizers as having the potential to augment soil health while reducing the dependency on synthetic fertilizers and improving soil nutrients sustainably over time. The use of locally available kitchen waste materials and yeast offers a cost-effective solution for smallholder farmers, especially in resource-limited settings.

Keywords: Organic Fertilizers, Lettuce, Sustainable Agriculture, Plant Growth Promotion, Organic Waste Recycling, Baking Yeast

METAHEURISTIC-DRIVEN MACHINE LEARNING FOR INTELLIGENT CROP RECOMMENDATION IN INDIAN AGRICULTURE

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ABSTRACT

Agriculture plays a vital role in India's economy, food security, and rural livelihoods. However, variations in soil properties, climatic conditions, and resource availability make crop selection a complex decision-making process. Identifying suitable crops under specific agroecological conditions is essential for improving agricultural productivity, promoting resource efficiency, and supporting sustainable farming practices. In this context, integrating machine learning with metaheuristic optimization offers promising opportunities to develop intelligent and data-driven agricultural decision-support systems. This study proposes a metaheuristic-driven crop recommendation framework that integrates the Extra Trees classification algorithm with Particle Swarm Optimization (PSO). Inspired by the collective behavior of natural swarms, PSO is employed to optimize the model's hyperparameters, while Extra Trees provides an ensemble-based approach for classifying suitable crop categories. The proposed framework aims to enhance classification performance and improve the reliability of crop recommendations. Its predictive capability is evaluated using seven complementary metrics including accuracy, precision, recall, F1-score, specificity, misclassification error (MCE), and Cohen's kappa coefficient. The results demonstrate strong classification performance, with an accuracy of 99.70%, precision of 99.66%, recall of 99.69%, F1-score of 99.73%, and specificity of 99.99%. The model also achieves a low misclassification error of 0.30% and a Cohen's kappa coefficient of 0.9968, indicating substantial agreement between predicted and actual crop classes. These findings highlight the potential of combining metaheuristic optimization and ensemble learning to support intelligent crop selection in Indian agriculture. The proposed framework contributes to precision agriculture, data-driven farm planning, and sustainable agricultural development. Further evaluation across India's diverse agroclimatic zones and independent agricultural datasets would help establish its generalizability and practical applicability.

Keywords: Indian Agriculture, Crop Recommendation, Particle Swarm Optimization, Extra Trees, Precision Agriculture

UTILIZATION OF ZIZIPHUS LOTUS SEEDS AS A LIGNIN SOURCE FOR ACTIVATED CARBON PREPARATION AND RED CONGO DYE ADSORPTION: OPTIMIZATION, KINETIC BEHAVIOR, ISOTHERMAL MODELS, AND THERMODYNAMIC PROPERTIES

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ABSTRACT
Increasing toxic dye wastewater from various industries causes a major environmental concern. This study investigates the utilization of Ziziphus lotus seeds (ZS) as a lignin source for preparing activated carbon (AC) and treating Congo red (CR) dye with this AC. Potassium hydroxide (KOH) was used as an activating agent. The optimization was performed by using Response Surface Methodology (RSM) methods to investigate the effect of the impregnation ratio A, the activation time (min) B, and the activation temperature (°C) C. The optimal AC was characterized by Attenuated Total Reflectance Fourier-Transform Infrared (ATR-FTIR) spectroscopy, X-ray diffraction (XRD), and Scanning Electron Microscopy (SEM), ZS was also characterized by ATR-FTIR. The batch adsorption of CR dye onto the optimal AC, by varying the pH, the time, the temperature, the AC dose, and the initial concentration of CR. The results show that the maximum adsorption rate (85.34%) was obtained at 550°C, with an activation time of 120 min and an impregnation ratio of 3. The optimal conditions for the adsorption were pH=4, contact time=80 min, AC dose of 0.4 g/L and a temperature of 50°C. The adsorption isotherm was better fitted with the Freundlich model (R 2 =0.990) and the kinetic model was fitted with the pseudo-second-order for both concentrations of 20 mg/L and 40mg/L.

Keywords: Ziziphus Lotus stones, Activated carbon, Congo red, Response Surface Morphology, Lignin, Adsorption

NEPHROPROTECTIVE AND ANTIUROLITHIATIC EFFECTS OF BRASSICA OLERACEA AND CALLIANDRA HAEMATOCEPHALA IN ETHYLENE GLYCOL–INDUCED MICE

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ABSTRACT

Urolithiasis is a major global health disorder associated with recurrent renal pain, impaired kidney function, oxidative stress, and high recurrence rates. The limitations of current therapies, including adverse effects and high costs, have increased interest in safer plant-derived alternatives. This study evaluated the anti-urolithiatic and nephroprotective effects of Brassica oleracea and Calliandra haematocephala in ethylene glycol-induced urolithiatic Wistar rats. Forty-two adult male Wistar rats were randomly divided into seven groups: normal control, ethylene glycol–induced group, Tamsulosin-treated group, Brassica oleracea (50 and 100 mg/kg), and Calliandra haematocephala (50 and 100 mg/kg) treatment groups. Urolithiasis was induced using 1% ethylene glycol for 28 days. Biochemical, histological, antioxidant, and renal gene expression analyses were performed. Ethylene glycol induction significantly ($p<0.05$) elevated creatinine, uric acid, potassium, Myeloperoxidase (MPO) activity, and Malondialdehyde (MDA) levels, while reducing antioxidant enzyme activities and electrolyte balance, indicating renal dysfunction, oxidative stress, and inflammation. Treatment with both plant extracts significantly ($p<0.05$) ameliorated these alterations in a dose-dependent manner. Histological examination revealed severe renal tubular and glomerular damage in the induced group, whereas the treated groups showed marked preservation of renal architecture. Gene expression analysis demonstrated upregulation of renal injury and inflammatory markers, including KIM-1, NGAL, TNF-α, IL-1β, OPN, and CD44, alongside suppression of NRF2, HO-1, and GPx in induced rats. Treatment with both extracts significantly reversed these molecular changes. It was observed that Brassica oleracea and Calliandra haematocephala exhibited significant nephroprotective, antioxidant, anti-inflammatory, and anti-urolithiatic activities, supporting their therapeutic potential in mitigating renal injury and inhibiting the progression of urolithiasis.

Keywords: Urolithiasis, Brassica oleracea, Calliandra haematocephala, Antioxidant genes, Inflammation

BEYOND SINGLE-CONTAMINANT TESTING: MULTI-RESIDUE ANALYSIS AND EXPOSURE-BASED PRIORITIZATION OF CHEMICAL HAZARDS IN FOOD

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ABSTRACT

Chemical food-safety programmes must address a broad range of contaminants that may occur together, including pesticide residues, veterinary-drug residues, mycotoxins, process contaminants, and toxic elements. Monitoring methods designed around one analyte at a time can be resource-intensive and may overlook patterns of co-occurrence that matter for exposure assessment. This review explores the contribution of multi-residue analytical approaches, particularly liquid chromatography–tandem mass spectrometry and gas chromatography–mass spectrometry, to more integrated chemical surveillance. These platforms can measure multiple compounds in a single analytical workflow, but broad coverage does not automatically guarantee reliable results for every food matrix or chemical class. Extraction efficiency, matrix effects, analyte stability, limits of quantification, reference standards, and confirmatory criteria all influence whether a result is fit for regulatory interpretation. Method validation should address selectivity, recovery, precision, calibration, measurement uncertainty, and performance at concentrations relevant to applicable maximum residue levels or other health-based guidance values. Detection alone is not equivalent to unacceptable risk: results must be interpreted in relation to concentration, food consumption, body weight, toxicological reference points, and, where justified, cumulative or combined exposure. Co-occurrence also requires careful interpretation because contaminants may share a target organ or mode of action, but additive or synergistic effects should not be presumed without suitable evidence. Risk-based prioritization can help laboratories direct resources toward food–contaminant combinations with the greatest potential public-health significance. Harmonized data reporting and transparent treatment of non-detects would improve comparability across surveillance programmes. Future work should connect validated analytical measurements with dietary exposure models and clear risk-management decisions. This integrated approach can strengthen surveillance, support proportionate enforcement, and improve communication of chemical hazards without equating every measurable residue with a demonstrated health threat.

Keywords: chemical food safety, multi-residue analysis, LC–MS/MS, GC–MS, dietary exposure

BIOPRESERVATION WITH PROTECTIVE CULTURES AND POSTBIOTICS: OPPORTUNITIES AND LIMITATIONS FOR SAFER READY-TO-EAT FOODS

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ABSTRACT

Ready-to-eat foods require control measures that remain effective after processing and throughout refrigerated storage, particularly when products receive no further lethal treatment before consumption. Protective cultures and postbiotics are being investigated as complementary approaches to reduce pathogen growth while preserving sensory quality and limiting reliance on conventional preservatives. This review evaluates the biological basis and food-safety potential of these interventions, with emphasis on lactic acid bacteria and their metabolites, including organic acids, bacteriocins, and other bioactive compounds. Antimicrobial activity may arise from acidification, membrane disruption, interference with cellular processes, or combined effects that delay growth of susceptible organisms. Nevertheless, efficacy is strongly dependent on the strain, metabolite composition, food matrix, pH, water activity, packaging atmosphere, storage temperature, and initial contamination level. A result obtained in laboratory broth cannot be directly extrapolated to a complex food, where fat, protein, salt, and spatial structure may reduce the availability of active compounds. Protective cultures also need to remain compatible with product quality and must not obscure poor hygiene or substitute for validated lethality steps. The term postbiotic should be used consistently with an accepted scientific definition, and preparations should be characterized sufficiently to support reproducibility and safety assessment. For regulatory and industrial adoption, studies should establish target-organism reductions or growth inhibition in the intended food, assess relevant spoilage and sensory outcomes, and examine manufacturing consistency. Risk assessment should consider the identity and safety of production strains, undesirable metabolites, allergen-related formulation issues where applicable, and potential interactions with other preservation hurdles. The strongest future direction is a hurdle-based strategy that combines well-characterized biological interventions with refrigeration, hygienic design, and verified process controls. This approach may offer a practical route to improved safety, provided that product-specific validation supports each proposed use.

Keywords: biopreservation, protective cultures, postbiotics, ready-to-eat foods, pathogen control

FROM PERSISTENCE TO PREVENTION: CONTROLLING FOOD-CONTACT BIOFILMS AND ANTIMICROBIAL-RESISTANT BACTERIA IN PROCESSING ENVIRONMENTS

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ABSTRACT

Food-processing environments can act as persistent reservoirs of microbial contamination when bacteria attach to food-contact surfaces and develop into biofilms. These structured communities may tolerate cleaning and disinfection more effectively than free-living cells, creating opportunities for repeated contamination of products after an otherwise adequate processing step. This review considers the relationship between biofilm formation, environmental persistence, and the dissemination of antimicrobial-resistance determinants in food production facilities. Organisms of concern include Listeria monocytogenes, Salmonella enterica, and selected resistant Enterobacterales, although the significance of each organism depends on the food, process, and exposure pathway. Biofilm development is influenced by surface material, temperature, nutrient residues, moisture, microbial interactions, and the time between sanitation cycles. Extracellular polymeric substances can limit disinfectant penetration, while sublethal exposure and close cell-to-cell contact may contribute to persistence and, under some conditions, genetic exchange; however, the magnitude of these effects varies across experimental systems and should not be assumed to be identical in industrial settings. Effective control therefore requires more than increasing disinfectant concentration. Hygienic equipment design, removal of organic soil, validated cleaning procedures, environmental monitoring, and investigation of recurring positives should be integrated within good hygiene practices and HACCP-based management. Molecular methods can improve source tracking, but results must be interpreted alongside culture-based evidence and site-specific process information. Important research gaps include standardized biofilm models, realistic mixed-species studies, and comparisons of sanitation performance under commercial conditions. A One Health perspective is also warranted because food environments connect animal production, human activity, and antimicrobial use. Better surveillance and prevention can reduce the likelihood that persistent environmental contamination reaches consumers.

Keywords: food microbiology, biofilms, food-contact surfaces, antimicrobial resistance, sanitation

SMARTER HACCP IN FOOD PROCESSING: INTEGRATING REAL-TIME SENSORS AND PREDICTIVE MODELS TO PREVENT SAFETY FAILURES

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ABSTRACT

Food manufacturers face increasing pressure to identify hazards before they result in contaminated products, recalls, or illness. Conventional Hazard Analysis and Critical Control Point (HACCP) systems remain central to preventive food safety management, yet monitoring can be limited by intermittent sampling, delayed laboratory results, and incomplete visibility across complex production lines. This review examines how real-time sensing, digital process records, and predictive modelling can strengthen preventive control in food processing. Temperature, humidity, pH, water activity, and selected optical or spectroscopic measurements can provide rapid signals of process deviation, while statistical and machine-learning models may help identify combinations of conditions associated with microbial growth, inadequate heat treatment, or failures in sanitation. Their practical value depends on calibration, sensor placement, data quality, and validation against established reference methods. A digital alert should therefore support—not replace—trained personnel, verified corrective actions, and the underlying principles of HACCP. Particular attention is needed for heterogeneous foods, sensor drift, false alarms, cybersecurity, and the risk that a model trained on one facility may perform poorly in another. The most defensible implementation is a risk-based system in which validated critical limits remain explicit, deviations trigger documented action, and performance is periodically reassessed. Integrating digital monitoring with prerequisite programmes, good manufacturing practices, and traceability could improve response time and provide stronger evidence of process control. Future studies should report validation designs, uncertainty, operational costs, and measurable food-safety outcomes rather than accuracy metrics alone. Such evidence would help food businesses and regulators determine where smart monitoring delivers meaningful protection to consumers.

Keywords: food safety, HACCP, real-time monitoring, predictive modelling, process control

DEVELOPMENT OF A ZONE-SPECIFIC PEDOTRANSFER FUNCTION FOR SOIL BULK DENSITY PREDICTION IN THE STEPPE ZONE OF UKRAINE

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ABSTRACT

Soil bulk density is an essential physical property used in soil quality assessment and the estimation of soil organic carbon stocks. However, direct measurements are often limited by the availability of soil data, highlighting the need for reliable pedotransfer functions (PTFs). This study aimed to develop and independently validate a zone-specific PTF for predicting soil bulk density from soil organic carbon content in the Steppe zone of Ukraine, while assessing the contribution of soil layer depth to prediction accuracy. The model was developed using a dataset comprising 363 soil layer records from 97 soil profiles. The dataset represented several soil types, predominantly Chernozems, and included observations from the 0–30 cm layer and deeper soil layers. Candidate models were evaluated using profile-wise data partitioning and cross-validation to account for the dependence between observations from the same soil profile. A quadratic relationship between soil organic carbon content and bulk density was selected, with an additional binary predictor distinguishing the 0–30 cm layer from deeper layers (> 30 cm). The final model was subsequently evaluated against an independent test dataset of 66 observations. The inclusion of soil layer depth improved cross-validation performance, reducing the root mean square error from 0.136 to 0.127 g cm^{-3} and increasing the coefficient of determination from 0.519 to 0.567. Independent validation yielded an R^2 of 0.6195, an RMSE of 0.1198 g cm^{-3}, and a mean absolute error of 0.0969 g cm^{-3}. These results indicate that the developed PTF provides reliable predictions within the studied dataset and that accounting for soil layer depth improves model performance. The function offers a practical tool for estimating soil bulk density where direct measurements are unavailable and supports soil database harmonization and soil organic carbon stock assessment in the Steppe zone of Ukraine.

Keywords: Soil Bulk Density, Pedotransfer Function, Soil Organic Carbon, Soil Depth, Steppe Zone of Ukraine

FOOD ADDITIVES AS GUT DISRUPTORS: A SYSTEMATIC REVIEW ON THE IMPACT OF EMULSIFIERS, ARTIFICIAL SWEETENERS, AND NANOPARTICLES ON GUT BARRIER AND MICROBIOME

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ABSTRACT

Background: The global surge in ultra-processed food consumption has led to unprecedented exposure to food additives. Although regulatory agencies have approved them as safe, emerging evidence suggests that certain emulsifiers, artificial sweeteners, and engineered nanoparticles may potently disrupt intestinal homeostasis. The gut barrier and gut microbiome, critical for metabolic, immune, and neurological health, are increasingly recognized as primary targets of these additives. Scope and Approach: This systematic review was conducted following PRISMA 2020 guidelines. A comprehensive literature search was performed in Scopus, Web of Science, and PubMed databases for studies published between 2018-2026. Studies investigating the effects of dietary emulsifiers (carboxymethylcellulose, polysorbate-80, carrageenan), artificial sweeteners (aspartame, sucralose, saccharin, acesulfame-K), and food-grade nanoparticles (titanium dioxide E171, silicon dioxide E551, silver nanoparticles) on gut barrier integrity, mucus layer, tight junction proteins, and gut microbiota composition were included. Key Findings: The review synthesizes evidence that (1) Emulsifiers, particularly CMC and P80, reduce mucus thickness, increase intestinal permeability via downregulation of ZO-1 and occludin, and promote low-grade inflammation through enrichment of mucolytic bacteria like Ruminococcus gnavus and Akkermansia muciniphila depletion; (2) Artificial sweeteners, especially sucralose and saccharin, induce glucose intolerance through microbiome-mediated mechanisms, reducing beneficial Bifidobacterium and Lactobacillus spp.; (3) Titanium dioxide nanoparticles (E171), recently banned by EFSA in 2022 but still permitted in many countries, accumulate in Peyer's patches, generate reactive oxygen species, and alter microbial diversity. The crosstalk between additive-induced dysbiosis, leaky gut, and systemic outcomes including IBD, metabolic syndrome, and neuroinflammation is critically discussed. Conclusion: This review highlights that food additives, at human-relevant doses, should be reclassified from inert excipients to active gut microbiome modulators. Stricter regulatory re-evaluation, microbiome-inclusive safety assessment, and development of clean-label alternatives such as plant-based emulsifiers and natural sweeteners are urgently needed to protect gut health.

Keywords: Food additives, Emulsifiers, Artificial sweeteners, Nanoparticles, Gut microbiome, Intestinal permeability, Leaky gut, Titanium dioxide, Polysorbate 80, Dysbiosis

EVALUATION OF DOUBLE-ROW BED PLANTING FOR IMPROVING SEED TUBER YIELD IN POTATO (SOLANUM TUBEROSUM L.)

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ABSTRACT
Efficient planting systems play a crucial role in improving seed potato production by optimizing plant population and tuber size distribution. A field experiment was conducted during the Rabi season of 2025–2026 at the Research and Development Farm, Prannagor, Birgonj, Dinajpur, Bangladesh, to evaluate the effects of different double-row bed planting systems and varieties on seed tuber production and yield. The experiment was arranged in a factorial Randomized Complete Block Design (RCBD) with two factors comprising eight planting systems and two potato varieties (Alouette and Levante), with two replications. Results revealed that both planting systems and varieties significantly influenced A-grade tuber number, total tuber number, and total yield. Among the treatments, T4 (40 cm row spacing with zig-zag planting) produced the highest A-grade tuber number (574.50 hill^{-1}) and total yield (40.13 t ha^{-1}). The variety Levante (V2) outperformed Alouette (V1) for most yield attributes. A significant variety × treatment interaction was observed, with the combination of Levante and T4 (V2T4) producing the highest total yield (42.52 t ha^{-1}) and A-grade tuber number. The superior performance of this combination indicated that varietal response to planting geometry was genotype dependent. Therefore, double-row bed planting with zig-zag arrangement at 40 cm row spacing using the variety Levante may be recommended for commercial seed potato production under the agroecological conditions of Bangladesh. Further multi-location studies are warranted to validate the consistency of these findings.

Keywords: Solanum tuberosum, bed planting, planting geometry, seed potato, tuber size, zig-zag planting, yield

DEEP GENERATIVE NETWORK MAPPING OF BRAHMI PHYTOCOMPOUNDS AGAINST ALZHEIMER'S TRANSCRIPTOMIC TARGETS

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ABSTRACT

Intracellular amyloid-beta (Aβ) accumulation drives profound transcriptomic alterations and neurotoxicity during the pathogenesis of Alzheimer's disease (AD). Identifying therapeutic compounds that can reverse these toxic changes requires scalable computational frameworks capable of modeling complex herbal formulations. This study presents a multi-task Heterogeneous Graph Neural Network (GNN) model designed to predict drug-target associations and toxicological profiles for Bacopa monnieri (Brahmi) phytochemicals against key Aβ-downregulated genes. Utilizing a spatial GraphSAGE architecture for inductive neighborhood aggregation, the framework constructs a heterogeneous biological network mapping interactions between phytocompounds and target therapeutic genes. Reconstructive discovery is powered by a Variational Graph Autoencoder (VGAE) decoder, which works in parallel with a multi-label classification branch assessing systemic toxicity. The model specifically evaluates the therapeutic potential of major bioactives from Bacopa monnieri, including Bacoside A, Bacoside B, Stigmastenol, Jujubogenin, and Pseudojujubogenin, against critical neuroprotective targets identified from MC65 human nerve cell transcriptomic profiles under Aβ stress. Computational validations targeted the rescue profiles of three significantly downregulated genes: Proenkephalin (PENK), Neuronal Regeneration Related Protein (NREP), and Gamma-Aminobutyric Acid Type A Receptor Subunit Theta (GABRQ). The generative inner-product decoder successfully quantifies the probability of novel edge links, revealing high-affinity association scores between the bacoside variations and PENK/NREP regulatory regions while simultaneously forecasting cell-line toxicity boundaries. This dual optimization strategy demonstrates the utility of inductive spatial GNNs in decoding the multi-component polypharmacology of traditional Ayurvedic medicine. By bridging deep structural graph autoencoders with bench-derived transcriptome data, this platform offers a streamlined, highly scalable approach to identifying non-toxic, neuroprotective lead compounds for early-stage Alzheimer's disease intervention.

Keywords: GraphSAGE, Variational Graph Autoencoder (VGAE), Bacopa monnieri (Brahmi), Alzheimer's Disease, Transcriptomics (PENK/NREP/GABRQ), Toxicity Prediction

INTEGRATED ASSESSMENT OF A PHOTOVOLTAIC-POWERED REVERSE OSMOSIS SYSTEM FOR SUSTAINABLE IRRIGATION IN SEMI-ARID ALGERIA: ENERGY, ENVIRONMENTAL AND ECONOMIC PERFORMANCE TOWARD SUSTAINABLE WATER MANAGEMENT

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ABSTRACT

Brackish groundwater desalination can help alleviate water stress in Mediterranean semi-arid regions; however, its sustainability depends on both the energy source and the management of saline effluents. In a context characterized by increasing pressure on conventional water resources and growing agricultural water demand, renewable-energy-powered desalination represents a promising solution for securing irrigation water supplies while reducing greenhouse gas emissions. This study evaluates the energy, environmental, and economic performance of a stand-alone photovoltaic reverse osmosis (PV-RO) system supplied by a brackish groundwater well (1,800.7 mg/L TDS) located in the Tlemcen province, Algeria. The proposed configuration consists of two independent photovoltaic arrays: a 2.975 kWp system dedicated to water pumping through direct coupling and an 8.034 kWp array with battery storage supplying a reverse osmosis unit with a nominal production capacity of 33 m³/day. The overall water recovery rate reaches 69.97%, with a specific energy consumption of 0.84 kWh per cubic meter of permeate, including 0.547 kWh/m³ consumed by the high-pressure pump alone. The solar fraction of the RO subsystem reaches 0.982, demonstrating a high level of energy autonomy. To optimize water resource utilization, different blending scenarios between permeate and raw brackish water were investigated. This approach provides between 12,045 and 19,345 m³/year of irrigation water with salinity levels ranging from 500 to 991 mg/L, while reducing the desalination energy allocated per cubic meter delivered from 0.84 to 0.52 kWh/m³. The system avoids approximately 8.4 t CO_2/year compared with conventional grid-powered operation and generates nearly 5,200 m³/year of concentrate, which remains the main local environmental challenge. Water production costs range from €0.32 to €0.52/m³, and profitability becomes positive when the economic value of water increases, although it remains marginal under constant water-value assumptions. The findings highlight the potential of PV-RO systems to enhance agricultural water security and support the transition toward sustainable energy systems in Mediterranean semi-arid regions. Nevertheless, experimental validation is required to confirm the simulated performance.

Keywords: Photovoltaic Desalination, Reverse Osmosis, Brackish Water, Irrigation, Sustainable Energy Systems

THEORETICAL STUDY AND MOLECULAR MODELING OF QUINOLINE DERIVATIVES WITH THERAPEUTIC POTENTIAL AGAINST NEURODEGENERATIVE DISEASES

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ABSTRACT

Neurodegenerative diseases refer to a varied group of chronic pathologies, which manifest as a progressive degradation of the nervous system and thus cause a failure of neuronal functions. Among these pathologies, Alzheimer's disease is a major public health issue due to its impact on cognitive functions, particularly memory and learning abilities. A therapeutic strategy used to alleviate certain symptoms of this disease relies on the inhibition of acetylcholinesterase (AChE), an enzyme responsible for the hydrolysis of acetylcholine, a neurotransmitter essential to cognitive processes. In this context, quinoline derivatives are of particular interest due to the diversity of their biological activities and their pharmacological potential. The aim of the present work is to study, using molecular modelling approaches, and the inhibitory potential of quinoline derivatives on acetylcholinesterase. The study is based on the analysis of molecular interactions between the compounds under investigation and the active site of the enzyme, with the aim of identifying favourable binding modes and describing interactions that could contribute to enzymatic inhibition. The Molegro software is used to perform molecular docking and to evaluate ligand-receptor interactions based on the available scoring functions. This in silico approach allows for the study of the relationships between the molecular structure of the derivatives under investigation and their predicted affinity for AChE. The expected results could help select molecules of interest for more advanced pharmacological studies and guide the design of new potential candidates in the context of Alzheimer's disease. Our goal of research is to study the inhibition of acetylcholinesterase (AChE) by molecular modeling methods.

Keywords: Alzheimer's disease, acetylcholinesterase (AChE), quinoline derivatives, molecular docking, Molegro, ADMET properties

NETWORK PHARMACOLOGY ANALYSIS OF CHRYSIN

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ABSTRACT

Chrysin (5,7-dihydroxyflavone) is a naturally occurring flavonoid with diverse pharmacological activities, including antioxidant, anti-inflammatory, anticancer, and neuroprotective effects. However, its molecular mechanisms remain incompletely understood. This study employed an integrated network pharmacology approach to identify the therapeutic targets and signaling pathways associated with chrysin. Drug-likeness and pharmacokinetic properties are evaluated using SwissADME, while potential targets are predicted using SwissTargetPrediction, TargetNet, SuperPred, PharmMapper, and the Similarity Ensemble Approach (SEA). Consensus targets are subjected to protein–protein interaction, Gene Ontology (GO), Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway enrichment, and gene–disease network analyses. Hub genes are further validated using the human single-nucleus transcriptomic dataset GSE159812, followed by molecular docking. Eleven high-confidence consensus targets are identified, with MAOB predicted by all five platforms. Functional enrichment revealed significant involvement in metabolic, cancer-related, and neurodegenerative pathways. Transcriptomic analysis highlighted GSK3B as a key hub gene, while molecular docking demonstrated favourable binding of chrysin to GSK3B (binding energy: −5.764 kcal/mol). These findings provide a systems-level understanding of chrysin's pharmacological mechanisms and identify GSK3B as a promising therapeutic target for future experimental validation.

Keywords: Chrysin, network pharmacology, target prediction, GSK3B, molecular docking, GO enrichment, KEGG pathway

EFFECT OF VARIETIES AND FOLIAR APPLICATION OF GIBBERELLIC ACID (GA3) ON GROWTH AND YIELD OF OKRA (ABELMOSCHUS ESCULENTUS L.)

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ABSTRACT

A field experiment was conducted at the Horticulture Farm of Bangladesh Agricultural University (BAU), Mymensingh, from March to August 2025 to evaluate the effects of gibberellic acid (GA3) on the growth and yield of two okra varieties. The experiment included two varieties, Asha F1 (V1) and Green Finger F1 (V2), and four GA3 treatments: 0, 50, 100, and 150 ppm. The treatments were arranged in a Randomized Complete Block Design (RCBD) with three replications. The results showed that variety, GA3 application, and their combined effects influenced the growth and yield of okra. Asha F1 generally performed better than Green Finger F1, while 100 ppm GA3 showed the best results for most yield-related traits. The combined treatment V1T3 (Asha F1 with 150 ppm GA3) produced the tallest plants (103.25 cm), the highest number of branches per plant (5.83), and the largest leaf area (415.37 cm^2). However, V1T2 (Asha F1 with 100 ppm GA3) recorded the highest number of fruits per plant (32.15), individual fruit weight (21.63 g), fruit yield per plot (11.13 kg), and yield per hectare (13.91 t). In contrast, V2T0 (Green Finger F1 without GA3) generally showed the lowest values for most growth and yield parameters. These findings indicate that foliar application of GA3 can improve okra growth and productivity. Overall, Asha F1 treated with 100 ppm GA3 appeared to be the most effective combination for achieving higher fruit yield under the conditions of this study.

Keywords: Okra, gibberellic acid (GA3), varieties, foliar application, growth and yield, yield components

EVALUATION OF GROWTH AND YIELD OF CHILLI (CAPSICUM FRUTESCENS L.) GENOTYPES DURING SUMMER

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ABSTRACT

A field experiment was conducted at the Horticulture Farm of Bangladesh Agricultural University (BAU), Mymensingh, from March to August 2025 to evaluate the growth and yield performance of 21 chilli genotypes under summer conditions. The experiment was arranged in a Randomized Complete Block Design (RCBD) with three replications. Significant variation was observed among the genotypes for growth, flowering, fruit characteristics, and yield-related traits. Genotype G 36 produced the tallest plants (70.89 cm), while G 26 had the highest number of branches per plant (28.00). G 10 showed the earliest flowering (18.78 days), whereas G 37 exhibited the earliest fruit setting (24.67 days). The highest number of fruits per plant (84.45) was recorded in G 11, while G 7 produced the greatest fruit weight per plant (226.63 g). G 20 produced the longest fruits (9.10 cm), and G 37 had the largest canopy area (1788.5 cm2). Notably, G 17 recorded the highest individual fruit weight (8.50 g) and yield (10.44 t/ha). Overall, G 17 and G 7 showed strong potential for high-yield cultivation, while G 11 was promising for increasing fruit number. These genotypes could be considered for further evaluation and selection for summer chilli cultivation under BAU farm conditions.

Keywords: Chilli genotypes, summer cultivation, growth and yield, fruit characteristics, genotype evaluation, yield potential

INTEGRATED MOLECULAR AND SEROLOGY-BASED APPROACHES FOR VETERINARY DISEASE SURVEILLANCE IN LIVESTOCK

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ABSTRACT

Animal health, agricultural productivity and food security pose significant challenges with infectious diseases of livestock. Laboratory diagnosis is crucial for the disease surveillance, investigating outbreaks and implementation of effective disease control. Molecular and serological methods provide complementary information that can be used to improve the interpretation of veterinary diagnostic results. The objective of this review is to examine the applications, benefits and drawbacks of molecular and serology-based diagnostic methods in veterinary disease surveillance and consider the complementary use of these methods and the role they play in disease monitoring in livestock. This review involves polymerase chain reaction (PCR), enzyme-linked immunosorbent assay (ELISA), haemagglutination (HA) and haemagglutination inhibition (HI) tests with emphasis on the principles, interpretation and relevance to the veterinary surveillance. Molecular assays are used to investigate suspected infections and serological assays are used to contribute to the process of determining exposure and monitoring antibody-responses after infections and vaccination. The results interpretations are based on the time of sampling, the properties of the pathogen, the vaccination history, quality of the samples and the performance of the assays. Evidence-based disease surveillance for livestock can be strengthened by the introduction of molecular and serological tools that will enhance the interpretation of diagnostic laboratory findings. Proper use requires accurate diagnostic procedures, good quality assurance and awareness of epidemiological background. A complementary diagnostic strategy can complement to improve animal health monitoring and optimal disease control planning.

Keywords: Veterinary diagnostics, disease surveillance, molecular detection, serology

BIOCONTROL POTENTIAL OF TRICHODERMA INDIGENOUS SPECIES AGAINST SOIL-BORN TOMATO PATHOGENS (FUSARIUM OXYSPORUM AND SCLEROTIUM ROLFSII) IN SENEGAL

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ABSTRACT

In Senegal, tomato (Solanum lycopersicum L.) is one of the most widely consumed vegetables after onion. However, its production is now adversely affected by several soilborne pathogens including Fusarium oxysporum and Sclerotium rolfsii which can cause substantial economic losses. In this context, this study aims to evaluate the antagonistic potentials of indigenous Trichoderma strains against two tomato-pathogenic fungi: Fusarium oxysporum and Sclerotium rolfsii. Eight (8) Trichoderma strains belonging to species Trichoderma asperellum and Trichoderma virens, selected based on their enzymatic activities including chitinase, cellulase, pectinase and protease production were evaluated using direct and indirect confrontation essays. Each treatment was performed in five replicates. Data were subjected to analysis of variance (ANOVA), and means were compared using the Newman-keuls test at the 5% significance level. The results revealed inhibitory effects against both pathogens. In the direct confrontation assays, mycelial growth inhibition ranged from 60.89% to 73.49% for F. oxysporum and 51.07% to 59.26% for S. rolfsii. Strain TM1 showed the highest inhibition rate against F. oxysporum (73.49%), whereas TN1 was the most effective against S. rolfsii (59.26%). In indirect confrontation assays, inhibition rates were lower, ranging from 20.89 to 39.11% for F. oxysporum and 13.73 to 31.37% for S. rolfsii. Strain TM1 exhibited the highest inhibition rate against F. oxysporum (39.11%) while strain TG4 showed the highest inhibition rate against S. rolfsii (31.37). These findings demonstrate the in vitro antagonistic potential of indigenous strains of Trichoderma against the two pathogens. Further greenhouse and field trials are needed to assess their effectiveness under plant-growth conditions and determine their potential for biological disease management in vegetable production systems in Senegal.

Keywords: Trichoderma, pathogenic fungi, tomato, biocontrol agent

GENDER, CLIMATE CHANGE, AND AGRICULTURAL VULNERABILITY IN PAKISTAN: A SYSTEMATIC REVIEW OF RURAL WOMEN'S LIVELIHOODS, ADAPTATION STRATEGIES, AND STRUCTURAL INEQUALITIES

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ABSTRACT

Climate change poses significant challenges to agricultural livelihoods, food security, and rural development, particularly in societies where access to productive resources and adaptation opportunities is shaped by gender inequalities. In Pakistan, rural women contribute substantially to agricultural production, livestock management, seed preservation, and household food security, yet their capacity to respond to climate-related risks may be constrained by unequal access to land ownership, agricultural information, financial resources, technology, and institutional support. Despite growing attention to climate change and agricultural sustainability, the relationship between gendered inequalities and rural women's agricultural vulnerability requires a systematic synthesis of the available evidence. This study proposes a systematic literature review to examine how climate change affects rural women engaged in agriculture in Pakistan, the adaptation strategies they employ, and the structural factors influencing their adaptive capacity. The review will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. Relevant peer-reviewed studies will be identified through appropriate academic databases using predefined search terms related to gender, rural women, climate change, agriculture, vulnerability, and adaptation in Pakistan. Studies will be screened according to explicit inclusion and exclusion criteria, and eligible publications will be assessed for methodological quality and synthesized thematically. The review will investigate three interconnected dimensions: the gendered effects of climate-related hazards on agricultural livelihoods; the adaptation strategies and livelihood responses adopted by rural women; and the institutional, socioeconomic, and cultural barriers shaping their access to adaptation resources. Drawing on gender and vulnerability perspectives, the study will examine how unequal resource distribution and social relations may influence women's exposure, sensitivity, and adaptive capacity. The anticipated contribution is a consolidated understanding of the evidence, identification of research gaps, and development of recommendations for gender-responsive agricultural extension, climate adaptation policies, and sustainable rural development in Pakistan. By connecting agricultural vulnerability with gender relations and rural livelihoods, the review seeks to contribute to more inclusive climate-resilient agricultural systems.

Keywords: Climate change, rural women, gender inequality, agricultural vulnerability, adaptation strategies, Pakistan, systematic literature review

WEED IMPACT AND CRITICAL PERIOD OF WEED CONTROL IN COTTON CROPS IN EASTERN SENEGAL

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ABSTRACT
Weeds are a major constraint on cotton production in Senegal. To assess the extent of yield loss due to weed infestation and the critical time for their control, a randomised complete block design with four replications was set up at the Sinthiou Malème experimental station in Eastern Senegal. The experiment consisted of two series of weed control treatments. In the first series, the plots were progressively kept weed-free by manual weeding at 2, 4, 6, 8 and 10 weeks after sowing, and were then left to become overgrown with weeds until harvest; whilst in the second series, weeds were allowed to infest the plots at 2, 4, 6, 8 and 10 weeks after sowing, and were then kept weed-free until harvest. Surveys showed that the weed flora was diverse, comprising 186 species. Dicotyledons accounted for nearly two-thirds of this flora. The Fabaceae, Poaceae, Malvaceae and Cyperaceae families were responsible for weed infestation in the plots. The results showed that a lack of intervention up to 30 days after sowing (DAS) can lead to a reduction in plant height, the number of branches formed, boll set, average boll weight and seed cotton yield, by 77.8 per cent, 40 per cent, 30.3 per cent; 61.3 per cent and 13 per cent respectively. The critical period of weed competition was identified as being between 2 and 4 weeks after sowing.

Keywords: weed, Cotton plant, Damage, Critical period of competition, Cotton seed yield

PLANT BIOTECHNOLOGY FOR CROP DEVELOPMENT IN SENEGAL: MICROPROPAGATION, DOMESTICATION, QUALITY PLANTING MATERIAL AND SALINITY RESPONSES

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ABSTRACT
Plant biotechnology offers complementary approaches to expanding crop cultivation, domesticating underutilized species and improving planting material and stress resilience. This contribution synthesizes published research on Annona species, potato and tomato, and outlines prospects for developing garlic cultivation in Senegal. For Annona muricata and A. squamosa, micropropagation protocols using juvenile explants combined shoot multiplication, elongation, rooting and acclimatization. Rooting reached 83.33% and 66.67%, respectively, under specific induction treatments, while acclimatization survival reached 83.33% for selected explant types in both species. These findings provide a technical basis for producing plants to support cultivation development. For the wild species A. senegalensis, protocols established from juvenile and adult material offer complementary tools for domestication. Acclimatization survival reached 83.33% for selected juvenile explants, compared with 50% for adult-derived plants, highlighting persistent challenges in propagating mature material. In potato, research on the Aida, Atlas and Odessa varieties demonstrated that microtuber size influenced subsequent plant performance and minituber production under semi-controlled conditions. These results support the development of local seed potato production systems, with phytosanitary testing needed to establish health status. In tomato, in vitro salinity experiments revealed contrasting proline accumulation among varieties, informing the assessment of stress responses and the identification of candidates for further tolerance evaluation. Complementary review work examined nutritional, microbial and breeding approaches to salinity management. Building on these findings, a proposed garlic research programme in Senegal would investigate meristem culture for pathogen elimination and multiplication, alongside somatic embryogenesis for plant regeneration and potential propagation at scale. Pathogen indexing, genetic fidelity assessment, acclimatization and field evaluation would be essential validation steps. Together, these approaches offer a research pathway linking plant propagation, domestication, planting material quality and adaptation to saline environments.

Keywords: Micropropagation, Domestication, Seed potato production, Salinity responses, Garlic biotechnology

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İlgili Makama,

Uluslararası Ziraat Bilimleri Kongresi, 26–28 Ekim 2026 tarihleri arasında Ankara'da gerçekleştirilmiştir. Kongreye Türkiye, Arnavutluk, Azerbaycan, Bangladeş, Bulgaristan, Cezayir, Endonezya, Fas, Gürcistan, Hindistan, İran, Kazakistan, Kosova, Nijerya, Pakistan, Romanya, Senegal, Ukrayna olmak üzere toplam 18 farklı ülkeden akademisyen ve araştırmacılar katılım sağlamıştır. Kongre kapsamında Türkiye'den 43, diğer ülkelerden 55 olmak üzere toplam 274 bildiri sunulmuştur.

Kongre, 16 Ocak 2020 tarihli Akademik Teşvik Ödeneği Yönetmeliğinde yapılan "Tebliğlerin sunulduğu yurt içinde veya yurt dışındaki etkinliğin uluslararası olarak nitelendirilebilmesi için Türkiye dışında en az beş farklı ülkeden sözlü tebliğ sunan konuşmacının katılım sağlaması ve tebliğlerin yarıdan fazlasının Türkiye dışından katılımcılar tarafından sunulması esastır." hükmüne uygun şekilde düzenlenmiştir.

Bilgilerinize arz ederim.
Saygılarımla.

Prof. Dr. Serap GÖNCÜ
Congress Organizing Committee