ULUSLARARASI TÜRK DÜNYASI FEN BİLİMLERİ VE MÜHENDİSLİK KONGRESİ

TURK-COSE 2025

ХАЛЫҚАРАЛЫҚ ТҮРКІ ӘЛЕМІ ЖАРАТЫЛЫСТАНУ ЖӘНЕ ИНЖЕНЕРЛІК ҒЫЛЫМДАР КОНГРЕСІ

Эл аралык Түрк Дүйнөсүнүн Илим жана Инженердик Конгресси

BEYNƏLXALQ TÜRK DÜNYASI ELM VƏ MÜHƏNDISLIK KONQRESI

KONGRESI NDËRKOMBËTAR I BOTËS TURKE PËR SHKENCË DHE INXHINIERI

INTERNATIONAL TURKIC WORLD CONGRESS ON SCIENCE AND ENGINEERING

VII. INTERNATIONAL TURKIC WORLD CONGRESS on SCIENCE and ENGINEERING

BOOK OF ABSTRACTS

13-15 November 2025

University for Business and Technology

KOSOVO-PRISHTINA

ISBN: 978-975-8062-59-1

GLOBAL UBT · UBT · Niğde Ömer Halisdemir Üniversitesi · Azərbaycan Texniki Universiteti · Akhmet Yasawi University

turk-cose@ohu.edu.tr (NOHU, Türkiye)

www.ohu.edu.tr/turk-cose-tr www.ohu.edu.tr/turk-cose-kg www.ohu.edu.tr/turk-cose-kz
www.ohu.edu.tr/turk-cose-az www.ohu.edu.tr/turk-cose-en www.ohu.edu.tr/turk-cose-al

TURK-COSE 2025
INTERNATIONAL TURKIC WORLD CONGRESS ON SCIENCE AND ENGINEERING

VII. INTERNATIONAL TURKIC WORLD CONGRESS ON SCIENCE AND ENGINEERING

BOOK OF ABSTRACT

ISBN:

978-975-8062-59-1

EDITORS

Prof. Dr. Murat BARUT

Prof. Dr. Ercan ÇELİK

Prof. Dr. Subhan NAMAZOV

Dr. Besian SINANI

Dr. Zhanar TEMİRBEKOVA

Res. Asst. Emrullah POLAT

Graphic Designer Ali Rıza AYTEKİN

13-15 November 2025

PRISHTINA KOSOVO

ORGANIZED BY

University for Business and Technology, Kosovo

Niğde Ömer Halisdemir University, Türkiye

Azerbaijan Technical University, Azerbaijan

Kyrgyz-Turkish Manas University, Kyrgyzstan

Akhmet Yasawi University, Kazakhstan

1 ARCHITECTURE

Atık cam agregalı harçların fiziksel ve mekanik özelliklerinin incelenmesi

[1,*]Semiha Akçaözoğlu, [2]Muhammed Mansur Tit
[1,2]Niğde Ömer Halisdemir Üniversitesi, Mimarlık Fakültesi, Mimarlık Bölümü
[*]sakcaozoglu@ohu.edu.tr

Özet: Bu çalışmada, atık cam malzemelerin harç numunelerde agrega olarak kullanım potansiyeli, deneysel çalışmalar üzerinden incelenmiştir. Camların kullanım alanları gün geçtikçe genişlemekte ve buna paralel olarak üretim ve tüketim süreçlerinden kaynaklanan atık miktarları da artmaktadır. Evsel ve endüstriyel cam atıkların beton ve harç karışımlarında değerlendirilmesi, sürdürülebilir yapı malzemeleri üretiminin yanı sıra çevresel atık sorunlarının azaltılmasına da katkı sağlamaktadır. Çalışma kapsamında inşaat atıklarından elde edilen düz pencere camları kırılarak küçük parçalar haline getirilmiş ve kumla ağırlıkça %25, %50, %75 ve %100 oranlarında ikame edilerek harç numune üretiminde agrega olarak kullanılmıştır. Elde edilen numuneler üzerinde yayılma tablası, birim hacim ağırlık, basınç dayanımı, eğilme dayanımı, su emme ve boşluk oranları deneyleri gerçekleştirilmiştir. Deney sonuçları, artan atık cam agrega oranına bağlı olarak numunelerin mekanik özelliklerinde azalmalar meydana geldiğini göstermiştir. Atık cam oranı yükseldikçe su emme ve boşluk oranları artarken, birim hacim ağırlık değerleri azalmıştır. Tüm deney sonuçları birlikte değerlendirildiğinde, belirli bir mekanik dayanım elde etmek amacıyla atık cam agregaların %50 ikame oranına kadar kullanılma potansiyelinin olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Atık cam, Geri dönüşüm, Beton, Basınç dayanımı, Mekanik özellikler.

Investigation of the physical and mechanical properties of mortars incorporating waste glass aggregates

Abstract: In this study, the potential use of waste glass materials as aggregate in mortar specimens was investigated through experimental studies. The applications of glass are expanding over time, and, in parallel, the amount of waste generated from production and consumption processes is increasing. The utilization of household and industrial glass wastes in concrete and mortar mixtures contributes not only to the production of sustainable construction materials but also to the mitigation of environmental waste problems. Within the scope of the study, flat window glass obtained from construction waste were crushed into small pieces and used as aggregates in mortar sample production by partially replacing sand at rates of 25%, 50%, 75%, and 100% by weight. The prepared samples were subjected to flow table, unit weight, compressive strength, flexural strength, water absorption, and porosity tests. The experimental results indicated that increasing the proportion of waste glass aggregates led to reductions in the mechanical properties of the samples. Higher waste glass content also increased water absorption and porosity ratios while decreasing unit weight values. Considering all the test results together, it was concluded that waste glass aggregates could potentially be used up to a 50% replacement ratio to achieve a certain level of mechanical performance.

Keywords: Waste glass, Recycling, Concrete, Compressive strength, Mechanical properties.

Prizren'de yeniden işlevlendirilen tarihi yapılar üzerine bir değerlendirme

[1,*]Esin Salla, [2]Sennur Akansel
[1]Trakya Üniversitesi, Fen Bilimleri Enstitüsü, Doktora Öğrencisi
[2]Trakya Üniversitesi, Mimarlık Fakültesi, Mimarlık Bölümü
[*]esinsalla1@gmail.com

Özet: Tarihi yapılar şehirlerin kimliğini oluşturan önemli öğelerdir ve toplumların geçmiş yaşantısını, sosyal ve kültürel anlayışını günümüze yansıtır. Bu yapıların korunması ve gelecek nesillere aktarılması kimlik devamlılığı açısından önem taşır. Yapıların sürekliliğini sağlamak için önemli adımlardan biri, onların yeniden işlevlendirilmesidir. Yeniden işlevlendirme sürecinin doğru yöntemlerle yapılması, tarihi yapıların bütüncül olarak korunması ve sürdürülebilirlik ilkeleri açısından büyük önem taşır. Bu çalışmada, Prizren'de yeniden işlev verilen 9 tarihi yapı, koruma ve sürdürülebilirlik bağlamında değerlendirilmiş, yeniden işlevlendirmenin etkisi ve önemi ortaya konulmuştur.

Anahtar Kelimeler: Tarihi Yapı, Yeniden İşlevlendirme, Koruma ve Sürdürülebilirlik, Prizren.

Türkiye ekosisteminde öncü bitkilerin rolü ve uygulama örnekleri

[1,*]Gülden Sandal Erzurumlu
[1]Niğde Ömer Halisdemir Üniversitesi, Mimarlık Fakültesi, Peyzaj Mimarlığı Bölümü
[*]gpeyzaj@gmail.com

Özet: Türkiye, farklı iklim tipleri ve topoğrafyası sayesinde çok çeşitli ekosistemlere ev sahipliği yapmaktadır. Bu çeşitlilik, ekolojik süksesyon süreçlerinde kritik rol oynayan öncü bitki türlerinin zenginliğini de beraberinde getirmiştir. Öncü bitkiler, bozulmuş ekosistemlerde yeniden yaşamın başlamasında, toprağın iyileşmesinde ve biyoçeşitliliğin artmasında önemli işlevler üstlenmektedir. Öncü bitkiler, ekosistem süksesyonunun ilk aşamalarında ortaya çıkan, çevresel stres koşullarına dayanıklı türlerdir. Türkiye'nin farklı iklim ve topoğrafik bölgelerinde, öncü bitkiler özellikle erozyon kontrolü, maden sahalarının restorasyonu ve yangın sonrası ekosistemlerin iyileştirilmesinde kritik bir işlev görmektedir. Bu çalışmada, Türkiye'den seçilen örnekler üzerinden öncü bitkilerin ekolojik özellikleri ve restorasyon ekolojisindeki rolleri incelenmiştir. Bulgular, yerli öncü türlerin kullanıldığı restorasyon projelerinin ekosistem hizmetlerini artırdığını, ancak bazı egzotik türlerin istilacı potansiyel taşıdığını göstermektedir.

Anahtar Kelimeler: Öncü Bitkiler, Ekolojik Süksesyon, Restorasyon, Türkiye, Erozyon Kontrolü.

Bisiklet turizmi bağlamında Niğde kültürel miras rotalarının oluşturulması ve Türkiye ulusal bisiklet yolu ağına entegrasyonu

[1,*]Hasan Taştan
[1]Niğde Ömer Halisdemir Üniversitesi, Mimarlık Fakültesi, Mimarlık Bölümü
[*]hasantastan88@hotmail.com

Özet: Bu çalışma, Niğde ilinin zengin kültürel mirasını bisiklet turizmiyle buluşturarak kentin sürdürülebilir turizm potansiyelini artırmayı amaçlamaktadır. Çalışmada, tarihi, doğal ve kültürel değerler göz önünde bulundurularak "Niğde Kültürel Miras Rotaları" adı altında çeşitli bisiklet güzergâhları oluşturulmuştur. Hançerli, Fertek ve Koyunlu gibi yerleşimlerin yer aldığı rotalar hem tarihi yapılar hem de peyzaj değerleri açısından dikkat çekici duraklar sunmaktadır. Çalışmanın bir diğer amacı, bu yerel bisiklet rotalarının Türkiye Ulusal Bisiklet Yolu Ağı ile entegrasyonunu sağlayarak Niğde'nin ulusal ve uluslararası bisiklet turizmi destinasyonları arasında yer almasını mümkün kılmaktır. Oluşturulan bağlantı yolu önerisinin bisiklet kullanımına uygunluğu ve eğimi değerlendirilmiştir. Oluşturulan rotaların küçük gruplar ile gerçekleştirilen bisiklet turları ile test edildiği çalışmada kentin kültürel mirasının bisiklet turizmi potansiyeli ortaya konmuştur. Sonuç olarak, bisiklet odaklı kültürel miras rotalarının kırsal kalkınmaya, kültürel mirasın korunmasına ve sağlıklı yaşam biçimlerinin teşvikine katkı sağladığı ortaya konmuştur.

Anahtar Kelimeler: Bisiklet Turizmi, Kültürel Miras, Niğde, Sürdürülebilir Turizm Ulusal Bisiklet Yolu Ağı.

2 AGRICULTURAL SCIENCES AND TECHNOLOGIES

Cloning and sequencing of endogenous pararetrovirus sequences in *Glycine falcata*

[1,*]**Ahmet L. Tek,** [1]**Emir Can Kaya,** [1]**Hümeyra Yıldız Akkamış**
[1]**Niğde Ömer Halisdemir University, Ayhan Sahenk Faculty of Agricultural Sciences and Technologies, Department of Agricultural Genetic Engineering, Niğde, Türkiye**
***altek2@gmail.com**

Abstract: Eukaryotic genomes consist of various genome elements. However, some viral sequences have been determined in both animal and plant genomes. Divergent endogenous pararetroviruses (EPRVs), which belong to the Caulimoviridae family, have recently been characterized in plant genomes in detail. There is great potential to understand the number of integrations and evolution of host and viral genomes. The main purpose of this study was to reveal EPRV sequences and their divergence in Glycine falcata through molecular cloning of conserved movement protein (MP) and reverse transcriptase protein (RT) domains and bioinformatic analyses. In total, five MP domains (~306 bp) and six RT domains (~432 bp) sequences were cloned and confirmed via Sanger sequencing. Multiple sequence alignment results demonstrated that both the cloned MP and RT domains are highly conserved. Additionally, bioinformatic analyses revealed high EPRV accumulation in the G. falcata genome with approximately 1000 sequences for each MP and RT domains, and three distinct clades were created via phylogenetic analyses. Moreover, 178 putative full-length EPRV sequences were determined. Consequently, a few distinct Florendovirus-related EPRV integrations were identified in G. falcata. This research has been partially supported by the Niğde Ömer Halisdemir University Scientific Research Projects Coordination Unit of project number TGT 2025/1-LÜTEP and TGT 2025/17-YEDEP.

Keywords: Glycine, EPRV, movement protein, reverse transcriptase, Sanger sequencing.

Sequencing the complete genome of the grapevine Roditis leaf discoloration-associated virus

[1]Beyza Al, [1]Muhammet Ekemen, [1,*]Çiğdem Ulubaş-Serçe
[1]Department of Plant Production and Technologies, Ayhan Şahenk Faculty of Agricultural Sciences and Technologies, Niğde Ömer Halisdemir University, 51240 Niğde, Turkey
[*]cigdemserce@ohu.edu.tr

Abstract: Grapevine Roditis leaf discoloration-associated virus (GRLDaV), a member of the genus *Badnavirus*, is associated with chlorotic leaf symptoms and reduced fruit development in grapevine. In this study, we characterized the complete genome of a Turkish isolate, TR-I3, collected from symptomatic vines in Imamoğlu, Adana. Total nucleic acids were extracted and subjected to PCR amplification using nine overlapping primer pairs covering the full viral genome. Amplicons were Sanger-sequenced, assembled, and analyzed for nucleotide and amino acid composition, open reading frames (ORFs), and phylogenetic relationships. The TR-I3 genome is 6,987 nucleotides long, with a GC content of 41.5%, and contains four ORFs: ORF1 (432 nt, 16.94 kDa), ORF2 (408 nt, 15.06 kDa), ORF3 (5,553 nt, 212.49 kDa), and ORF4 (426 nt, 15.55 kDa). ORF3 encodes key functional domains, including reverse transcriptase, RNase H, a zinc finger motif, and aspartate protease. Comparative analyses revealed 85.08–89.22% nucleotide identity and 70.92–97.04% amino acid identity with previously reported GRLDaV isolates from Greece, South Africa, Italy, and Argentina. Phylogenetic reconstruction grouped TR-I3 forming a distinct clade separate from other global isolates. This study provides the first complete genome sequence of a GRLDaV isolate from Turkey and expands the molecular understanding of this pathogen. These data facilitate future studies on viral diversity, evolution, and the development of diagnostic and management strategies to mitigate GRLDaV infections in grapevine.

Keywords: GRLDaV, Badnavirus, genome sequencing, Turkiye

Calculating the water footprint of cotton production in the Adana region using the CROPWAT model

[1,*]Burak Şen
[1]Niğde Ömer Halisdemir University, Faculty of Agricultural Sciences and Technologies, Department of Biyosystem Engineering
***bsen@ohu.edu.tr**

Abstract: This study estimates the green, blue, and grey components of the water footprint (WF) of cotton in the Adana (Çukurova) region by combining the Water Footprint Assessment framework with FAO's CROPWAT 8.0 model. Cotton phenology and Kc values in Table 1 follow the FAO-56 pattern—low Kc during establishment, peaking at mid-season, and tapering toward harvest—while Tables 2–4 report the season's hydrologic balance and footprint indicators. Using the current entries, the total water footprint is 7,865 $m^3\ t^{-1}$ seed cotton (Table 4), with the green, blue, and grey shares equal to approximately 290, 7,040, and 535 $m^3\ t^{-1}$, respectively. In proportional terms, this corresponds to ~3.7% green, ~89.5% blue, and ~6.8% grey, indicating that irrigation water consumption dominates the cotton WF under the reported conditions.

Keywords: Cotton, CROPWAT, Water Footprint, Adana, CWR

Peyniraltı suyu tozunun farklı doz ve uygulama şekillerinin domates fide kalitesine etkileri

[1,*]Gölgen Bahar ÖZTEKİN, [2]Salih KARASU, [3]Çiğdem TAKMA
[1]Ege Üniversitesi, Ziraat Fakültesi Bahçe Bitkileri Bölümü, Bornova-İzmir, Türkiye
[2]Ege Üniversitesi, Fen Bilimleri Enstitüsü, Bahçe Bitkileri Anabilim Dalı, Bornova-İzmir, Türkiye
[3]Ege Üniversitesi, Ziraat Fakültesi Zootekni Bölümü, Bornova-İzmir, Türkiye
***gölgen.oztekin@ege.edu.tr**

Özet: Bu çalışma Peynir altı suyu (PAS) tozunun domates fidelerinin agromorfolojik gelişim ve kalitesi üzerine olan etkilerini belirlemek üzere yürütülmüştür. Araştırmada PAS tozu tohum ekim ortamına (torf) ve çıkış sonrası yapraklara bir hafta ara ile 0 (kontrol), 1, 5, 10, 25, 50 ve 100 g/L dozlarında uygulanmıştır. Her iki uygulamada fidelerin beslenmesi için 20:20:20 yaprak gübresi kullanılmıştır. Tohum ekimi sonrası fideler çimlendirme odasında tutulmuş, çıkışlar tamamlandıktan sonra sera içerisine alınarak fideler büyütülmüştür. Tohum çıkış süresi ve oranı yanında fidelerde fide boyu, kök boyu, gövde çapı, yaprak kalınlığı, kök ve üst aksam, yaş ve kuru ağırlıkları, yaprak rengi, klorofil indeksi ve fide güç indeksi saptanmıştır. Elde edilen veriler PAS tozu uygulama yeri ve dozunun fide kalitesi üzerinde önemli etkiye sahip olduğunu; torf ortamına düşük dozdaki uygulamaların (1-10 g/L) olumlu sonuçlar verdiğini ortaya koymuştur. En yüksek fide kalite indeksi torf x 1 g/L uygulamasından elde edilmiştir.

Anahtar Kelimeler: PAS, *Solanum lycopersicum*, fide, torf, optimum doz

Identification and Expression Profiling of the C3H Transcription Factors Revealing their role in Biotic stress tolerance in Apple (*Malus domestica*)

[1,*]Muhammad Annas Shahid, [1]Mubashir Sharif, [2]Maria Riaz, [1]Mahad-Ur-Rehman, [3]Ikhlas Shafique [1]Muhammad Amjad Ali
[1]Department of Plant Pathology, University of Agriculture, Faisalabad, Pakistan
[2]Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad, Pakistan
[3]Department of Sustainable Agriculture and Food Security, Institute of Science, Çukurova University, Adana, Türkiye
[*]malikannas239@gmail.com

Abstract: Apple (*Malus domestica*) is one of the most extensively cultivated fruit trees, because of its rich genetic and phenotypic diversity as well as its health-promoting bioactive compounds. Despite its nutritional and agronomic importance, studies on the transcriptional regulation of biotic stress responses, particularly the role of transcription factors remains insufficiently explored. In this study, genome-wide analysis of C3H transcription factors in *Malus domestica* was performed and 60 putative *MdC3H* genes were identified and distributed across all 17 chromosomes. Through comparative phylogenetic analysis with *Arabidopsis thaliana* and *Oryza sativa*, *MdC3H*s were classified based on conserved domains and sequence homology into nine groups (1-9). Conserved motif and gene structure analyses revealed conserved motifs and a high intron/exon count, indicating functional roles in biotic stresses and structural complexity. Promoter analysis revealed cis-regulatory elements linked to light responsiveness, hormone signaling, and various biotic stress responses. Synteny and duplication analyses demonstrated both segmental and tandem duplication, suggesting gene family expansion. Expression profiling under *Venturia inaequalis* infection revealed that *MdC3H06, MdC3H16, MdC3H37*, and *MdC3H42* were highly upregulated whereas the rest of the genes showed downregulation or neutral expression. Under *Alternaria alternata* stress, *MdC3H25* exhibited the strongest upregulation followed by *MdC3H16*, *MdC3H37*, and *MdC3H46.* Under *Gymnosporangium yamadae* infection, *MdC3H16*, *MdC3H25*, and *MdC3H37* were consistently upregulated at both time points (10 dpi and 30 dpi). These findings offer a valuable resource for the development of stress-tolerant cultivars with improved resistance to biotic stress through targeted breeding strategies and molecular improvement programs.

Keywords: C3H gene family, Genome-wide analysis, Malus domestica, Gene expression, Biotic stresses

Kuraklık stresine toleransları farklı domates genotiplerinin agromorfolojik özellikleri

[1,*]Özgün Ünay, [2]Ayşe Gül
[1]Ege Üniversitesi, Ziraat Fakültesi, Bahçe Bitkileri Bölümü
[2]Ege Üniversitesi, Ziraat Fakültesi, Bahçe Bitkileri Bölümü
***ozgun.unay@hotmail.com**

Özet: Domates (Solanum lycopersicum L.), dünya genelinde ve Türkiye'de önemli ekonomik değere sahip olan stratejik sebze türlerinden biridir. İklim değişikliğine bağlı olarak artan kuraklık stresi, domates yetiştiriciliğinde verim ve kalite kayıplarına yol açmakta; bu durum, kuraklık toleransına sahip genotiplerin belirlenmesini ve bu genetik kaynakların ıslah programlarına kazandırılmasını gerekli kılmaktadır. Serada yürütülen bu çalışmada, bitki büyüme odasında gerçekleştirilen in vitro ve in vivo testlere göre kuraklık stresine toleransı farklı olan iki domates genotipinin (kurağa toleransı daha yüksek: TR70707 ve kurağa toleransı daha düşük: TR71378) IPGRI ve UPOV karakterizasyon kriterleri doğrultusunda agro-morfolojik özellikleri değerlendirilmiştir. Çalışma kapsamında fide, bitki, yaprak, çiçek ve meyveye ait 9 kantitatif ve 32 kalitatif olmak üzere toplam 41 morfolojik özellik incelenmiştir. Sonuçlar, iki genotip arasında özellikle bitki yapısı, yaprak formu, tüy yoğunluğu, meyve iriliği ve rengi gibi özellikler olmak üzere belirgin farklılıklar olduğunu ortaya koymuştur. TR70707 genotipi, kısa boğum arası, dik yaprak duruşu, yüksek yaprak yoğunluğu ve orta düzeyde tüylenme gibi kuraklığa toleransta etkili morfolojik özellikler göstermiştir.

Anahtar Kelimeler: Solanum lycopersicum L., genetik çeşitlilik, agro-morfolojik karakterizasyon, kuraklık.

Heterodera schachtii (Schmidt, 1871) (Nematoda: Heteroderidae)'nin Niğde popülasyonunun lahana çeşitlerine karşı reaksiyonunun belirlenmesi

[1*]Gülsüm Badel AKYOL, [2]Mustafa İMREN, [1]Halil TOKTAY
[1]Niğde Ömer Halisdemir Üniversitesi, Tarım Bilimleri ve Teknolojileri Fakültesi, Bitkisel Üretim ve Teknolojileri Bölümü
[2]Bolu Abant İzzet Baysal Üniversitesi, Ziraat Fakültesi, Bitki Koruma Bölümü
[*]akyolbadel@gmail.com

Özet: Niğde ilinde lahana (Brassica oleracea) üretimi yoğun olarak yapılmaktadır. Şeker pancarı kist nematodu (Heterodera schachtii) lahana üretimini önemli ölçüde etkilemektedir. Lahana üretiminin yoğun olarak yapıldığı arazilerden alınan toprak örnekleri laboratuvar ortamına getirilmiştir. Fenwick elek yöntemi ile kistler ayıklanıp denemenin kurulması amacıyla +4 °C buzdolabında saklanmıştır. Lahanadan 10 çeşit, seçilerek çeşit reaksiyonları belirlenmiştir. Konukçu reaksiyonu çalışmalarında, 10 lahana çeşidinde H. schachtii'ye karşı dayanıklılık gösteren herhangi bir çeşide rastlanılmamıştır. Lahana çeşitlerinden Sazlıca ve Balsarma çeşitlerinin H. schachtii'ye orta derecede tolerant olduğu bulunurken; diğer çeşitlerin ise yüksek derecede tolerant olduğu tespit edilmiştir.

Anahtar Kelimeler: Çeşit reaksiyonu, Lahana, Nematod, Niğde, Tolerans

Auxin-Producing Endophytic Fungi as Candidates for Plant Growth Promotion

[1, *]Osameh Atiya, [1]Halil Toktay, [2]Abdelfattah. A. Dababat, [3]Wolfgang Maier, [3, 4]Samad Ashrafi
[1]Niğde Ömer Halisdemir University, Faculty of Agricultural Sciences and Technologies
[2]International Maize and Wheat Improvement Centre – Türkiye office
[3]Julius Kuehn Institute (JKI) – Federal Research Centre for Cultivated Plants, Institute for Epidemiology and Pathogen Diagnostics
[4]Julius Kuehn Institute (JKI) – Federal Research Centre for Cultivated Plants, Institute for Crop and Soil Science
***osamehatiya@yahoo.com**

Abstract: Fungal endophytes are increasingly recognized as promising biocontrol agents due to their ability to colonize host tissues and deploy antagonistic strategies such as mycoparasitism, antibiosis, competition for colonization sites, and induction of host defense responses. In addition to enhancing stress tolerance, many endophytic fungi promote plant growth through the production of phytohormones and secondary metabolites. Dark septate endophytes (DSE) have been reported to improve nutrient uptake, regulate physiological processes, and strengthen tolerance to both biotic and abiotic stresses. This study investigated the ability of four endophytes Ijuhya vitellina, Niesslia gamsii, Polydomus karssenii, and strain JKI72728 to produce indole-3-acetic acid (IAA), a key auxin involved in plant growth regulation. Fungal strains were cultured in yeast malt broth with or without L-tryptophan supplementation. Culture filtrates were analyzed using Salkowski's colorimetric assay, and IAA concentrations were quantified spectrophotometrically using a standard calibration curve. Results revealed that I. vitellina and N. gamsii produced detectable levels of IAA, particularly when supplemented with L-tryptophan, whereas P. karssenii and JKI72728 showed no IAA production. These findings indicate strain-specific differences in auxin biosynthesis and suggest that I. vitellina and N. gamsii may contribute to plant growth promotion via IAA production. Overall, the results support the potential of these fungal endophytes as candidates for sustainable crop protection and growth enhancement strategies.

Keywords: Biocontrol, Endophytes, Indole-3-acetic acid (IAA), Plant growth promotion

Development, Legal Framework, and Current Challenges of the Seed Industry in Kyrgyzstan

[1]Asalkan MAZALBEKOVA, [1]*Eren ÖZDEN
[1]Kyrgyz-Turkish Manas University, Faculty of Agriculture, Department of Horticulture and Agronomy, Bishkek, Kyrgyz Republic.
***eren.ozden@manas.edu.kg**

Abstract: The seed sector plays a crucial role in ensuring agricultural productivity, crop diversity, and food security in Kyrgyzstan. This study presents an overview of the historical development, institutional structure, and current challenges of the seed production and certification system in the country. The foundation of the national seed system was established during the Soviet period, and despite significant reforms after independence, the sector still faces structural and regulatory limitations. Key issues include inadequate seed quality control, limited local breeding capacity, and dependence on imported seeds, which constrain the development of domestic seed production. The analysis also highlights the importance of biological diversity conservation and the legal framework governing seed trade and certification under the Seed Law of the Kyrgyz Republic. Furthermore, the study underscores the need for modernizing seed testing laboratories, improving the management of state seed funds, and promoting collaboration between research institutions and private enterprises. Strengthening the seed industry is essential for achieving sustainable agricultural growth and maintaining the genetic diversity of cultivated plants in Kyrgyzstan.

Keywords: Kyrgyzstan seed industry, seed certification, agricultural development, genetic diversity

The effect of oak tannin extract (ARTUTAN) inclusion on lamb blood metabolic profile

[1,*]Abdulhamid Muhammad GARBA, [2]Sema YAMAN FIRINCIOĞLU
[1]Niğde Ömer Halisdemir University, Graduate School of Natural and Applied Sciences, Department of Animal Production and Technologies
[2]Niğde Ömer Halisdemir University, Faculty of Agricultural Sciences and Technologies, Department of Animal Production and Technologies
***abdulhamid.muhd@yahoo.com**

Abstract: This study investigated the effect of oak tannin extract (ARTUTAN) supplementation on the blood metabolic profile of growing lambs. Twenty lambs were fed diets containing 0%, 0.5%, 1%, 1.5%, and 2% ARTUTAN (on a dry matter basis). Blood samples were analyzed for total protein, blood urea nitrogen (BUN), glucose, gamma-glutamyl The results showed no significant differences ($P > 0.05$) among the treatment groups for any of the measured parameters. However, a numerical trend was observed for some parameters. BUN concentration tended to decrease with increasing ARTUTAN inclusion, suggesting improved nitrogen utilization and reduced protein degradation in the rumen. Albumin and total protein showed a slight, non-significant decrease at higher tannin levels, possibly due to tannin-protein complex formation. Glucose levels remained within the reference range, indicating normal energy metabolism. ALT, GGT, and creatinine were unaffected, suggesting that ARTUTAN did not impair liver or kidney function. In conclusion, ARTUTAN supplementation up to 2% of the diet did not significantly affect the blood parameters of growing lambs, indicating its safe usage. Further studies with extended test periods and different doses are recommended to fully assess the potential of oak tannin in enhancing feed efficiency and preventing nitrogen losses to the environment.

Keywords: Oak tannin, Metabolism, Serum, Lamb Physiology, Blood metabolites

Comparative analysis of ARIMA and LSTM approaches in forecasting white cabbage production: The case of Niğde

[1,*]Mutlu BULUT
[1]Niğde Ömer Halisdemir University Faculty of Agricultural Sciences and Tecnhologies
Department of Animal Production and Technologies
***mutlubulut@ohu.edu.tr**

Abstract: This study investigates the comparative performance of time series forecasting methods for white cabbage production in Niğde province using data from 2003 to 2025. The analysis primarily focused on the traditional statistical ARIMA model and the deep learning-based LSTM model, while Naive and Holt–Winters methods were included as benchmark approaches. The dataset was divided into a training set (2003–2020) and a test set (2021–2025). Since the 2025 data were not finalized, they were estimated using forecasting methods. The ARIMA(1,1,1) model achieved a Mean Absolute Error (MAE) of 3,946 tons and a Root Mean Square Error (RMSE) of 4,092 tons, indicating strong short-term forecasting performance. Although the LSTM model was able to capture the overall trend, its error values (MAE ≈ 7,296 tons, RMSE ≈ 9,387 tons) were relatively higher due to the limited number of observations. The Naive model produced results close to ARIMA, whereas the Holt–Winters method showed weaker performance. In conclusion, the ARIMA model emerged as the most reliable method for short-term forecasting, while LSTM is expected to achieve higher accuracy when supported by larger and multivariate datasets. This study provides an original contribution to the literature as the first comparative application of ARIMA and LSTM models for white cabbage production in Niğde province.

Keywords: White cabbage, Agricultural production estimation, Time series analysis, ARIMA, LSTM

Elmalarda kurşuni küf etmenine karşı bazı kekik uçucu yağlarının antifungal aktivitesi

[1,2,3]Betül Tınaz, [4]Samed Can Irmak, [4,*]Keziban Sinem Tulukoğlu Kunt, [4]Nida Uysal, [5]Sedat Serçe, [4]Çiğdem Ulubaş Serçe
[1]TÜBİTAK UME, Ulusal Meteroloji Enstitüsü
[2]İstanbul Teknik Üniversitesi, Moleküler Biyoloji ve Genetik Bölümü
[3]İstanbul Teknik Üniversitesi, Dr. Orhan Ocalgiray Moleküler Biyoloji-Biyoteknoloji ve Genetik Araştırma Merkezi
[4]Niğde Ömer Halisdemir Üniversitesi, Tarım Bilimleri ve Teknolojileri Fakültesi, Bitkisel Üretim ve Teknolojileri Bölümü
[5]Niğde Ömer Halisdemir Üniversitesi, Tarım Bilimleri ve Teknolojileri Fakültesi, Tarımsal Genetik Mühendisliği
***stulukoglu@ohu.edu.tr**

Özet: *Botrytis cinerea* patojenin neden olduğu gri küf, elma meyvelerinde hasat sonrası kayıpların ana nedenlerinden biridir. Meyve çürükleri ile mücadele yaygın olarak sentetik fungisitler ile gerçekleştirilse de, kullanılan fungisitlere karşı dirençli patojen ırkların ortaya çıkması kullanımını sınırlandırmaktadır. Bitki uçucu yağları ise sentetik fungisitlere doğal bir alternatif olarak kabul edilmektedir. Bu çalışma, *Origanum vulgare* L. ve *Thymus vulgaris* L. uçucu yağlarının *B. cinerea*'ya karşı antifungal aktivitelerini değerlendirmek amacıyla yürütülmüştür. Bu yağların antifungal aktiviteleri, disk difüzyon metodu kullanılarak farklı konsantrasyonlarda (%0, 5, 10, 15, 20, 25, 30) *B. cinerea* patojenine test edilmiştir. *In vitro* çalışmalar, %25 *O. vulgare* ve %20 *T. vulgaris* konsantrasyonlarının sırasıyla %56.52-100.00 ve %65.76-100.00 oranları ile miselyum gelişimini engellediğini göstermiştir. Bu sonuç doğrultusunda %25 *O. vulgare* ve %20 *T. vulgaris* konsantrasyonları *B. cinerea* ile inoküle edilmiş Super Chief elma (cv. Super Chief) meyveleri üzerinde *in vivo* olarak test edilmiştir. *O. vulgare* ve *T. vulgaris* uçucu yağları lezyon inhibisyonu üzerinde orta düzeyde bir etki göstermiştir. Elde edilen bulgular, *O. vulgare* ve *T. vulgaris* uçucu yağlarının soğuk hava depolarında kurşuni küfe karşı doğal fümigant olarak kullanım potansiyeline sahip olduğunu göstermektedir. Ancak uçucu yağların depolama koşullarında etkinlerinin belirlenmesi ve kurşuni küfe karşı etki mekanizmalarının tespit edilmesi için ilerleyen çalışmaların yapılmasına ihtiyaç vardır.

Anahtar Kelimeler: Antifungal, *Botrytis cinerea*, *Origanum vulgare, Thymus vulgaris.*

Antifungal activity of oregano and thyme essential oils against gray mold on apples

[1,2,3]Betül Tınaz, [4]Samed Can Irmak, [4,*]Keziban Sinem Tulukoğlu Kunt, [4]Nida Uysal, [5]Sedat Serçe, [4]Çiğdem Ulubaş Serçe

[1]TÜBITAK UME, National Metrology Institute
[2]Istanbul Technical University, Department of Molecular Biology and Genetics
[3]Istanbul Technical University, Dr. Orhan Ocalgiray Molecular BiologyBiotechnology and Genetics Research Center
[4]Niğde Ömer Halisdemir University, Faculty of Agricultural Science and Technologies, Department of Plant Production and Technologies.

[5]Niğde Ömer Halisdemir University, Faculty of Agricultural Science and Technologies, Department of Agricultural Genetic Engineering.
***stulukoglu@ohu.edu.tr**

Abstract: Gray mold, caused by Botrytis cinerea, is one of the primary reasons for postharvest loss on apple fruits. Although the use of synthetic fungicides is a common practice for controlling fruit rots, there is a limitation due to the emergence of resistant fungal pathogens. Therefore, plant essential oils (EOs) are considered a natural alternative to synthetic fungicides. The present study was carried out to evaluate the antifungal activities of *Origanum vulgare* L. and *Thymus vulgaris* L. essential oils *B. cinerea*. The antifungal activities of these oils were tested using the disk diffusion method at various concentrations (0, 5, 10, 15, 20, 25, and 30%) against *B. cinerea*. *In vitro* studies showed that 25% of *O. vulgare* and 20% of *T. vulgaris* exhibiting high mycelial growth inhibition, with inhibition rates of 56.52-100.00% and 65.76-100.00%, respectively. Thus, these concentrations were tested *in vivo* as a vapor contact application on the apple cv. “Super Chief” fruits inoculated with *B. cinerea*. *O. vulgare* and *T. vulgaris* EOs showed a moderate impact on the lesion inhibition. The findings of this study suggest that *O. vulgare* and *T. vulgaris* EOs have potential as natural fumigants in apple storage rooms against gray mold. Further research is needed to optimize application methods under commercial conditions and to investigate their underlying mode of action.

Key Words: Antifungal, *Botrytis cinerea*, *Origanum vulgare, Thymus vulgaris.*

Alıç meyvesinden izole edilen epifitik maya izolatlarının *Botrytis cinerea*'ya karşı biyokontrol potansiyelinin araştırılması

[1]Merve Bilgi, [1,]*Keziban Sinem Tulukoğlu Kunt, [1]Mustafa Özden
[1]Niğde Ömer Halisdemir Üniversitesi, Tarım Bilimleri ve Teknolojileri Fakültesi, Bitkisel Üretim ve Teknolojileri Bölümü
***stulukoglu@ohu.edu.tr**

Özet: Antagonist mayalar, depolanan elmalarda fungal patojenlerin neden olduğu hasat sonrası kayıpların azaltılmasında kullanılan sürdürülebilir bir yaklaşımdır. Meyve yüzeylerinden izole edilen mayaların hasat sonrası hastalıkların kontrolünde etkili olduğu saptanmış olup, biyokontrol etmenleri olarak umut vadeden bir potansiyel taşımaktadırlar. Nitekim, antagonist mayalardan ticari ürünler geliştirilmiş olup, piyasada bulunmaktadırlar. Ancak yabani meyvelerden izole edilen maya topluluğu hakkındaki bilgimiz sınırlıdır. Dahası, yerli antagonist mayaların potansiyeli büyük ölçüde bilinmemektedir. Bu nedenle, bu çalışma alıçtan (*Crataegus* spp.) epifitik mayaları taramayı ve elmadaki kurşuni küf etmeni *Botrytis cinerea* patojenine karşı antagonist potansiyellerini ortaya çıkarmayı amaçlamaktadır. Bu bağlamda, alıç meyveleri yüzeyinden toplam 29 adet maya izole edilmiş ve ikili kültür testi ile *B. cinerea* patojenine karşı test edilmiştir. Cm17, Cm38, Cm39 ve Cm40 maya izolatlarından, sırasıyla %43,17, %45,59, %44,12 ve %41,67 miselyum engelleme oranı (MEO, %) elde edilmiştir. Ardından, aday izolatlar elma meyvelerine inoküle edilerek biyokontrol testine tabi tutulmuştur. Cm39 izolatı, %48,74 oranıyla en yüksek lezyon engelleme oranına (LEO, %) neden olmuştur. Son olarak, aday izolatlar "internal transcribed spacer" (ITS) bölgesi kullanılarak moleküler olarak karakterize edilmiştir. Moleküler tanımlamaya göre, Cm17 ve Cm40 *Filobasidium magnum*; Cm38 *Vishniacozyma victoriae* ve Cm39 *Cystobasidium laryngis* olarak tanımlanmıştır. Literatüre göre, *Cystobasidium laryngis* izolatı, elma meyvelerinde kurşuni küfe karşı potansiyel bir biyokontrol etmeni olarak ilk kez bildirilmektedir. Ancak, ticari koşullar altındaki etkinliğini ve olası etki mekanizmasını değerlendirmek için daha ileri çalışmalara ihtiyaç duyulmaktadır.

Anahtar Kelimeler: Hasat sonrası, kurşuni küf, yabani meyveler, biyolojik kontrol, *Cystobasidium laryngis*.

Exploring biocontrol potential of epiphytic yeast isolates from hawthorn against *Botrytis cinerea*.

[1]Merve Bilgi, [1,]*Keziban Sinem Tulukoğlu Kunt, [1]Mustafa Özden
[1]Niğde Ömer Halisdemir University, Faculty of Agricultural Science and Technologies, Department of Plant Production and Technologies.
***stulukoglu@ohu.edu.tr**

Abstract: Utilization of antagonistic yeasts is a sustainable approach to reduce postharvest loss of apples caused by fungal pathogens. The yeasts isolated from fruit surfaces have been found effective in controlling postharvest diseases and hold

promising potential as biocontrol agents. Several commercial products have been developed and found in the market. Our knowledge of the yeast community isolated from wild fruits is limited. Moreover, the potential of the native yeast antagonists remains mostly unknown. Therefore, this study aims to screen the epiphytic yeasts from hawthorn (*Crataegus* spp.) and reveal antagonistic potential against *Botrytis cinerea*, the causal agent of gray mold on apple. In this regard, a total of 29 yeasts were isolated from the fruit surface and tested against *B. cinerea* with a dual culture assay. Yeast isolates Cm17, Cm38, Cm39 and Cm40 were selected with 43.17, 45.59, 44.12 and 41.67% mycelium inhibition rate (MIR, %), respectively. Then, these candidate isolates were subjected to a biocontrol assay on apple. Isolate Cm39 showed the highest lesion inhibition rate (LIR, %), causing 48.74% gray mold reduction. Finally, the candidate isolates were molecularly characterized using the internal transcribed spacer (ITS) region. Based on molecular identification, Cm17 and Cm40, Cm38 and Cm39 were identified as *Filobasidium magnum*, *Vishniacozy mavictoriae*, and *Cystobasidium laryngis*, respectively. To our knowledge, the yeast is reported for the first time as a potential biocontrol agent against the gray mold of apple. However, further studies are required to evaluate efficiency under commercial conditions and to evaluate the possible mode of action.

Keywords: Postharvest, gray mold, wild fruit, biological control, *Cystobasidium laryngis*.

Phytochemical and pathological profile of Kiwano (Cucumis metuliferus): A review

[1,*]Nida Uysal, [2]İmran Uysal
[1]Niğde Ömer Halisdemir University, Faculty of Agricultural Sciences and Technologies, Department of Plant Production and Technologies,
[2]Osmaniye Korkut Ata University, Bahçe Vocational School, Department of Food Processing
***n.unlu33@gmail.com**

Abstract: This study addresses the biological potential and agricultural challenges of the plant Cucumis metuliferus (kiwano). Native to Southern and Central Africa, this plant is gaining commercial importance due to its rich nutritional content and medicinal uses. Studies have shown that fruit extracts of the plant exhibit antioxidant, antimicrobial, antiviral, anti-inflammatory, and antidiabetic properties. However, C. metuliferus is susceptible to various pathogens that threaten its commercial cultivation. The study examines angular leaf spot and bacterial wilt as the main bacterial diseases. Among fungal diseases, pathogens like Fusarium oxysporum, Didymella bryoniae, and Podosphaera xanthii can also cause significant damage. Additionally, viruses spread by aphids, such as Zucchini Yellow Mosaic Virus (ZYMV), Watermelon Mosaic Virus (WMV), and Cucumber Mosaic Virus (CMV), can severely affect the plant's yield and quality. In conclusion, C. metuliferus could be a promising source for new food and pharmaceutical products, and effective strategies for disease management and developing resistant varieties can be identified.

Keywords: *Cucumis metuliferus*, Kiwano, Biological Activity, Plant Diseases

Sealing the eggshells of cracked hatching eggs improves hatching and post hatch chick performance traits

[1,*]Kadriye Kurşun, [1]Nasir Abdallah, [1]Mikail Baylan
[1]Cukurova University, Faculty of Agriculture, Department of Animal Science, 01330, Saricam, Adana
***kadriyehatipoglu01@gmail.com**

Abstract: Breeder companies suffers significant losses due regular discarding of hatching eggs with cracked shells. Damages to eggshells can occur on a breeder farm in the laying nest, during collection and storage, as well as during transport and handling of eggs in a hatchery. Eggshells may possess completely cracked shells, star cracks, or hairline cracks. Cracked hatching eggs have been reported not to be suitable for hatching due to their lower hatching rate, higher embryonic mortality, and poorer chick quality score with subsequent economic losses compared to intact eggs. However, studies have shown that covering the shells of cracked eggs with materials such as resin, waxing, cellophane and insulation tape, nail polish and melted paraffin positively hatchability, chick quality, as well as the profitability of hatchery enterprises. This review provides existing evidence on different methods and approaches that have been used to improve the hatching traits and chick quality of eggs with cracked shells.

Keywords: Cracked eggs, hatchability, chick quality

Antibacterial effects of origanum and thymus essential oils against bacterial spot disease on pepper

[1,2,3]Betül Tınaz, [4]*Nida Uysal, [4]Keziban Sinem Tulukoğlu Kunt, [5]Deniz Çaplik, [4]Çiğdem Ulubaş Serçe

[1]TÜBITAK UME (National Metrology Institute), Gebze/Kocaeli, Türkiye,
[2] Istanbul Technical University, Department of Molecular Biology and Genetics
[3]Dr. Orhan Ocalgiray Molecular Biology Biotechnology and Genetics Research Center, Istanbul Technical University,
[4]Niğde Ömer Halisdemir University, Faculty of Agricultural Sciences and Technologies, Department of Plant Production and Technologies
[5]Diyarbakır Plant Protection Research Institute
***n.unlu33@gmail.com**

Abstract: This study evaluated the *in vitro* and *in vivo* antibacterial activities of essential oils from *Origanum minutiflorum, O. syriacum, O. onites, O. vulgare*, and *Thymus vulgaris* against the bacterial spot pathogen, *Xanthomonas euvesicatoria* pv. *euvesicatoria*. All five essential oils showed significant inhibitory effects *in vitro,* with *O. onites* showing the highest efficacy. Dose-response analysis revealed that a 4% concentration of *O. onites* essential oil produced an optimal zone of inhibition of 31.25 mm. In subsequent *in vivo* pot experiments, treatments applied prior to pathogen inoculation resulted in a significant reduction in disease severity with treated plants showing only 4.40% disease severity compared to 64.33% in inoculated controls. These results indicate that, *O. onites* essential oil possesses strong antibacterial properties and can be effectively utilized for the management of bacterial spot disease in pepper plants.

Keywords: Pepper, *Xanthomonas euvesicatoria*, antibacterial, essential oil

Mikrobiyal aşılayıcılar ile kimyasal ve düşük dozlu kimyasal gübrelerin birlikte uygulanmasının ayçiçeğinde verim ve kalite üzerine etkisi

[1,*]Halil İbrahim Kılıç, [1]Ramazan Çakmakçı
[1]Çanakkale Onsekiz Mart Üniversitesi, Ziraat Fakültesi, Tarla Bitkileri Bölümü, Çanakkale, Türkiye
***kilic1998@outlook.com**

Özet: Bu çalışma, Trakya bölgesinde kurak koşullarda ayçiçeğinde (*Helianthus annuus* L.) mineral gübre yerine mikroorganizma uygulamalarının etkilerini belirlemek amacıyla yürütülmüştür. Deneme 3 tekerrürlü ve 13 uygulamalı olacak şekilde tesadüf blokları deneme desenine göre düzenlenmiştir. Uygulamalar, kontrol ve ticari mikrobiyal gübreye ek olarak, üç mineral gübrenin (önerilen NPK oranının %100, %75 ve %50'si) iki mikrobiyal M1 (*Pseudomonas fluorescens* RC48 + *Bacillus megaterium* RA17 + *Bacillus subtilis* RC136) ve M2 (*P. fluorescens* RC68 + *B. megaterium* RA19 + *B. subtilis* RC136) formülasyonları (bakteri aşılamalı ve aşılamasız) kombinasyonları kullanılarak hazırlanmıştır. Elde edilen bulgulara göre, bitki boyu, tabla çapı, tabla ağırlığı, parsel verimi, dekara verim, dane yağ oranı, dekara yağ verimi ve bin tane ağırlığı bakımından uygulamalar arasında önemli farklılıklar gözlenmiştir. İncelenen parametrelerde en yüksek dekara tane verimi, %100 NPK + M1 (305,3 kg/da) ve %100 NPK + M2 (300,1 kg/da) kombinasyonları sağlarken, bu uygulamalar sırasıyla kontrol uygulamasına kıyasla %27,4 ve %25,3 artış sağlamıştır. En yüksek tane verimi ve yağ verimi biyogübre formülasyonları + %100 NPK' den elde edilmiş, bunu biyogübre + %75 NPK takip etmiş ve sonuçlar NPK gübrelemesinin yanı sıra mikrobiyal uygulamaların ayçiçeği verimini ve kalite özelliklerini artırabileceğini göstermiştir. Sonuçlar, mikrobiyal aşılama uygulamasıyla ayçiçeği tabla çapı, tabla ağırlığı, tane verimi ve yağ veriminden ödün vermeden önerilen NPK dozunun %25, hatta %50 oranında azaltılabileceğini göstermiştir.

Anahtar Kelimeler: Biyolojik Gübre, *Helianthus annuus* L., Azaltılmış kimyasal gübre, Sürdürülebilir tarım, Mikrobiyal aşılama

Effect of combined application of microbial inoculants and chemical and reduced-rate chemical fertilizers on yield and quality in sunflower

[1,*]Halil İbrahim Kılıç, [1]Ramazan Çakmakçı
[1]Çanakkale Onsekiz Mart University, Faculty of Agriculture, Department of Field Crops, Çanakkale, Türkiye
***kilic1998@outlook.com**

Abstract: This study was carried out to determine the effects of replacing mineral fertilizer with microorganism applications on sunflower (*Helianthus annuus* L.) under dry conditions in the Thrace region. Experiments were conducted in a completely randomized block design with three replicates and 13 treatments. Treatments were

prepared using combinations of three mineral fertilizers (100%, 75%, and 50% of the recommended NPK rate), with two microbial formulations, M1 (*Pseudomonas fluorescens* RC48 + *Bacillus megaterium* RA17 + *Bacillus subtilis* RC136) and M2 (*P. fluorescens* RC68 + *B. megaterium* RA19 + *B. subtilis* RC136) formulations (with/without), in addition to the control and commercial biofertilizers**.** According to the findings, significant differences were observed between the applications in terms of plant height, head diameter, head weight, plot yield, seed yield per hectare, seed oil content, oil yield per decare, and thousand-seed weight. The highest seed yield per hectare among the parameters examined was achieved by the %100 NPK + M1 (3053 kg ha^{-1}) and %100 NPK + M2 (3001 kg ha^{-1}) combinations, which provided increases of 27.4% and 25.3%, respectively, compared to the control application. The highest seed yield and oil yield were obtained from biofertilizer formulations + 100% NPK, followed by biofertilizers + 75% NPK, and the results showed that microbial applications in addition to NPK fertilization can increase sunflower yield and quality traits. The results showed that the recommended NPK dose could be reduced by 25% or even 50% without compromising sunflower head diameter, head weight, grain yield, and oil yield through the application of microbial inoculants.

Keywords: Biofertilizer, *Helianthus annuus* L., Reduced chemical fertilizer, Sustainable agriculture, Microbial inoculation

Koyun yetiştiriciliğinde çevreci yaklaşımlar: Biyokömür destekli besleme ve akıllı tarım teknolojilerinin entegrasyonu

[1,*]Beyza YILMAZ, [2]Ayhan CEYHAN
[1, 2]Niğde Ömer Halisdemir University, Faculty of Agricultural Science and Technologies, Department of Animal Production and Technologies
***byzylmz.95@gmail.com**

Özet: Küresel iklim değişikliği, doğal kaynakların aşırı kullanımı ve hayvancılığın çevresel etkileri, sürdürülebilir üretim stratejilerinin küçükbaş hayvancılık sistemlerine entegre edilmesini zorunlu kılmıştır. Bu bağlamda, koyun yetiştiriciliğinde çevresel etkilerin azaltılmasına yönelik iki önemli yaklaşım olan biyokömür (biyochar) katkılı besleme ve akıllı tarım teknolojileri bu derlemede bütüncül bir bakış açısıyla ele alınmıştır. Biyokömür, piroliz yoluyla elde edilen karbonca zengin bir materyal olup, ruminantlarda sindirim verimliliğini artırmak, metan üretimini azaltmak ve bağışıklık sistemini desteklemek gibi birçok olumlu etkiye sahiptir. Literatürde koyun rasyonlarına farklı dozlarda biyokömür eklenerek yapılan çalışmalarda sindirim, verim, çevresel emisyonlar ve rumen mikrobiyotası üzerindeki etkileri ortaya konmuştur. Öte yandan, akıllı tarım uygulamaları kapsamında IoT tabanlı sensör sistemleri, giyilebilir teknolojiler, görüntü işleme algoritmaları ve karar destek sistemleri sayesinde hayvanların fizyolojik ve davranışsal verileri gerçek zamanlı olarak izlenebilmekte, erken hastalık tanısı ve bireysel refah takibi sağlanmaktadır. Bu iki teknolojinin entegrasyonu, biyokömür uygulamalarının fizyolojik etkilerini sensörler aracılığıyla izleyerek bireysel hayvan yönetimi, beslemenin optimizasyonu ve metan azaltımı gibi stratejik hedeflerin gerçekleştirilmesine olanak tanımaktadır. Ayrıca bu entegrasyon, karbon yutak kapasitesini artırmak, yem katkı maliyetlerini azaltmak ve döngüsel ekonomi çerçevesinde atıkların yeniden kullanımını teşvik etmek açısından önemli fırsatlar sunmaktadır. Bu çerçevede, biyokömürün rumen mikrobiyotasını modüle edici etkileri sayesinde enterik fermantasyon süreçlerinin iyileştirilmesi ve metan salımının azaltılması mümkün görünmektedir. Akıllı sensör teknolojileri ile bu etkilerin gerçek zamanlı takibi, özellikle bireysel düzeyde yemleme stratejilerinin optimize edilmesine olanak sağlamaktadır. Böylece hem hayvan refahı hem de kaynak kullanım verimliliği dijital tarım altyapısıyla desteklenmektedir. Ayrıca, bu entegrasyon karbon ayak izinin hesaplanması ve azaltılmasına yönelik nesnel verilerin elde edilmesine katkı sunarak, sürdürülebilir üretim politikalarının şekillendirilmesine bilimsel temel oluşturmaktadır. Gelişmekte olan ülkelerde uygun maliyetli, düşük enerji tüketimli sistemlerin geliştirilmesi ve yerel atık kaynaklarının biyokömür üretiminde değerlendirilmesi, kırsal kalkınma ve çevresel yönetim açısından stratejik fırsatlar barındırmaktadır. Sonuç olarak, biyokömür destekli hayvan besleme ile akıllı tarım teknolojilerinin birlikte kullanımı, koyun yetiştiriciliğinde çevresel sürdürülebilirliği artıran, üretim verimliliğini destekleyen ve dijital dönüşümle uyumlu bir model olarak öne çıkmaktadır. Ancak bu yaklaşımın yaygınlaştırılması için daha fazla saha çalışması, teknik altyapı yatırımı ve çiftçi eğitimi gerekmektedir.

Anahtar Kelimeler: IoT sensör sistemleri, Sürdürülebilir hayvansal üretim, Biyokömür katkısı, Rumen fermantasyonu, İklim dostu tarım uygulamaları

What small fruits genetic resources offer to cope with environmental change: A case study of strawberry

[1,*]Sedat SERÇE, [2]Nusrat SULTANA
[1] Niğde Ömer Halisdemir University, Agricultural Genetic Engineering, Faculty of Agricultural Sciences and Technologies
[2] Department of Botany, Faculty of Life and Earth Sciences, Jagannath University
***sedatserce@gmail.com**

Abstract: During agricultural production, all plants face the effects of changing environmental conditions due to the durations and severities of stress. Extreme temperatures, frost, and drought are examples of these extremes. The Turkish temperate fruit production, for example, has suffered from the effect of an extreme late frost in 2025. The plant researchers are constantly working on the production techniques to mitigate the effects of the extreme conditions. The development of more resilient cultivars by breeding activities is one of the sustainable approaches to cope with a changing environment. Plant genetic resources play a crucial role in cultivar development, especially for changing environments for cultivated small fruits. In this review, we have presented a global overview of small fruit genetic resources and their significance in crop improvement. As a case study, the utilization of strawberry (Fragaria ×ananassa) plant genetic resources is discussed, including sampling and evaluation. For instance, utilizing progenitor species of cultivated strawberry, F. chiloensis and F. virginiana, in cultivar development offers a great potential to crop researchers. The clones of these species are important to expand the genetic base, reconstruction, and breeding activities within F. chiloensis clones. Introduction of the day-neutrality trait in strawberry revolutionized the production by extending the harvesting season.

Keywords: Abiotic stress, disease Resistance, Fragaria ×ananassa, germplasm, pest resistance

КОМПЛЕКСНАЯ ОЦЕНКА ТЕХНОЛОГИИ ПРОРАЩИВАНИЯ ЗЕРЕН С УЧЁТОМ ГЕОХИМИЧЕСКОГО ФОНА ПОЧВ

[1,*] Сунакбаева Дилара
[1]кандидат технических наук, Международный казахско-турецкий университет имени Ходжи Ахмеда Ясави, Туркестан, Казахстан
***dilara.subakbayeva@ayu.edu.kz**

Абстрактный: В настоящей работе проведена комплексная оценка усовершенствованной технологии получения экологически чистых и функционально обогащённых продуктов из пророщенных зерен пшеницы, маша и черноглазой фасоли с учётом геоэкологических факторов. Основное внимание уделено разработке методов проращивания, направленных на сохранение нутритивного потенциала зерновых культур и повышение биологической доступности витаминов, минералов и антиоксидантов. Особое место в исследовании занимает анализ влияния минерального состава почв и геохимических особенностей регионов произрастания на питательную ценность зерна. Установлено, что проращивание приводит к значительному повышению содержания белков, аминокислот, клетчатки, а также микроэлементов (Ca, Mg, Fe, Zn), аккумулированных растениями в зависимости от геологического фона и геохимической среды. Технология включает оптимизацию условий проращивания (температурные режимы, влажность, продолжительность процесса), что позволяет учитывать как биологические особенности каждой культуры, так и исходный минеральный состав зерна. Использование инновационных, экологически чистых методов обработки минимизирует воздействие химических реагентов и способствует получению продуктов с высокой степенью натуральности, экологической безопасности и функциональной ценности. В работе проведён сравнительный анализ качественных характеристик продукции, полученной по усовершенствованной технологии, и традиционных методов обработки зерновых культур. Результаты исследования подтвердили эффективность разработанной технологии, а также выявили значительную роль геологических и геохимических факторов в формировании нутритивных свойств пророщенных зерен. Практическая значимость работы заключается в возможности внедрения предложенной технологии в производство инновационных продуктов питания, ориентированных на укрепление здоровья и обеспечение принципов устойчивого развития.

Ключевые слова: маш, питательные вещества, пророщенные зерна, пшеница, усовершенствованная технология, черноглазая фасоль, экологически чистые продукты.

Impact of sustainable pasture use on agrochemical properties of mountain pastures, Shamshy ur. of Chui valley

[1,*]Totubaeva N.E., [2]Shalpykov K.T,
[1]Kyrgyz-Turkish Manas University, Bishkek, Kyrgyzstan, 56 Ch. Aytmatov Avenue,
[2]Institute of Chemistry and Phytotechnology, National Academy of Sciences, Bishkek, Kyrgyzstan, 265 Chui Avenue Bölümü
nurzat.totubaeva@manas.edu.kg
alhor6464@mail.ru

Abstract: Intensive use of pastures, without the use of rotational technique in the Kyrgyz Republic, over the past 30 years has led to the deterioration of their ecological condition, as a result more than 60% of the country's pastures are degraded. One of the indicators of pastures' state is the agrochemical indicators of pasture soils. Therefore, the purpose of our research was to study changes in agrochemical indicators of soils, with different types of pasture use. We created demonstration plots of 1 hectare each, with an interval of 1 year of withdrawal from common use. Our studies showed that the pasture plot that was fenced 1 year ago contained more particles the size of which were <0.001mm (18.04%), and the plot that was not fenced and subjected to overgrazing contained minimal particle content of size <0.001mm (15.64%). In contrast, the content of large particles of 1.0-0.25 mm, in the unfenced plot was elevated and was 9.45%, and in the fenced plot the content of particles of 1.0-0.25 mm was 2.49 and 2.71%. Ca2+ content in the unfenced plot was lower than in the fenced plots and was 0,008/0,40 %/mg.eq. As the increase of Ca2+ in soil is an important indicator of improvement of soil structure and general condition, we can assume that creation of rotational grazing is important to improve structure, pasture productivity, and possibility of good practice of successful sustainable grazing and improve life and health of local population vulnerable to climate change.

Keywords: Sustainable pasture use, biodiversity, anthropogenic pressure, soil degradation, ecosystem, agrochemical indicators

Experimental-laboratory research on mungbean sowing in justifying the parameters of a pneumatic seeding apparatus

[1,*]Mukhayyokhon Saidova, [2]Asomiddin Karaxanov, [2]Abdukarim Abduraxmono, [1]Hasanova Surayyo
[1]Tashkent State Technical University, Tashkent, 100095, Uzbekistan
[2]Scientific Research Institute of Agricultural Mechanization (SRIAM), Tashkent, Uzbekistan
***m.saidova87@mail.ru**

Abstract : This article presents data on mungbean sowing. It justifies the parameters of the disc prepared for mungbean seed planting. The sowing interval, the seed spacing within the row, and the sowing accuracy coefficient for mungbean were determined. Furthermore, laboratory and field tests for precision (puncture) sowing of mungbean seeds were conducted.

Keywords: Sowing apparatus, disc, mungbean

Investigation of the effect of different types of hives on the overwintering performance of honey bees (*Apis mellifera anatolica*)

[1,*]Emre ŞENER, [2]Salim AKTÜRK, [1]Ahmet ŞEKEROĞLU, [1]Muhammed Talha İNCE
[1]Niğde Omer Halisdemir University, Faculty of Agricultural Sciences and Technologies, Department of Animal Production and Technologies
[2]Apiculture Research Institute, Ordu, Türkiye
***emresener353@gmail.com**

Abstract: Hives provide the environmental conditions necessary for bee colonies to survive and produce bee products. Factors such as temperature, humidity, and air circulation are crucial in bee hives. In this study, the aim was to determine the type of hive that minimizes colony losses, supports development of colonies and can be beneficial to regional beekeeping during the overwintering of bee colonies in Niğde province, located in the Central Anatolia Region, where the continental climate prevails. In this context, we evaluated wooden and plastic hives, with the focus on physiological characteristics such as survival rate, overwintering ability, use of stock honey and post-overwintering brood production efficiency of colonies wintered in different types of hives across a given period of the year. The results indicated that the effect of type of hive on temperature ($P<0.001$), humidity ($P<0.001$) and survival rate ($P<0.05$) was significant. On the other hand, the effect of the type of hive on honey yield, number of frames and brood area was insignificant ($P>0.05$). The effect of period of the year on honey yield ($P<0.001$), brood area ($P<0.05$), temperature and humidity ($P<0.001$) was significant. When the type of hive and period of the year factors were evaluated together, the effect on the brood area was significant ($P<0.001$). In conclusion, wooden hives had a more positive effect on the wintering performance of bees in the continental climate region of Niğde province.

Keywords: Honeybee, wintering, hive type, performance

Diversity of Fusarium isolates responsible for wilt disease in chickpea crop in Thal region and screening of resistant resources

[1,*]Amjad ABBAS, [2]Muhammad Amjad Ali, [2]Huzaifa Tanveer
[1]Department of Plant Pathology, University of Agriculture, Faisalabad
***amjad.abbas@uaf.edu.pk**

Abstract : Chickpea is major crop which is a good source of safe protein and is import part of daily diet. The crop is grown in irrigated and semi-arid zones of the world. Since low water requirements make it a good choice for cultivation in water scarce areas. In Pakistan, Thal region which is mainly sandy area is famous for chickpea cultivation. Availability of low inputs, especially water, is the main abiotic constraint of chickpea production. Besides water, fungal diseases mainly wilt caused by Fusarium oxysporum f. sp. ciceris is responsible for low yield. Variable incidence of the wilt disease was observed during extensive surveys in the Bhakkar, Layyah, Jhang and Chakwal districts of Thal area. From the lab data it is evident that there is considerable variation in the virulence of the fungi which was collected from this area after testing under controlled sick bed conditions. The morphological differences were also observed in the isolates of different regions of Thal area. DNA was successfully isolated, and ITS region was amplified by using Universal primer pair. Results suggest that Thal region is very diverse and there is good variation in the occurrence of Fusarium in this region and our germplasm screening results against this pathogen point towards the resistance/susceptibility present in chickpea germplasm.

Keywords: Chickpea wilt disease, Germplasm screening, Fusarium oxysporum, ITS characterization

In vitro management of sesame seed-borne pathogens using biological control agents

[1]Sobeeqa Khalid, [1]Saman Arif, [2]Maham Sarwar, [1]Muhammad Usman, [1,*]Muhammad Amjad Ali, [1]Amjad Abbas
[1]Department of Plant Pathology, University of Agriculture Faisalabad
[2]Department of Plant Pathology and Crop Protection, Georg-August-Universität
***amjad.ali@uaf.edu.pk**

Abstract: The sesame (Sesamum indicum L.) is an important oilseed crop, cultivated both in the tropics and the temperate zone of the globe. It holds vital economic and nutritional value in the food industry. Different deteriorating microorganisms, especially fungi, have caused numerous issues such as poor germination, seed rot, mortality in sesame production and storage, causing a significant threat to crop establishment and productivity. The current research deals with the isolation, identification and biological management of the most frequent pathogen associated with the seeds of sesame. The pathogen associated with the seeds were isolated by placing the infected seeds on the Potato Dextrose Agar media. The most frequent pathogen associated with sesame seed were Aspergillus niger and Curvularia lunata. These pathogens were later purified by using hyphal tip and single spore purification technique. The seed associated pathogens were managed with the help of biological control agents by using poison food technique. Three BCAs viz Agrobacterium fabrum, Pseudomonas fluorescens and Bacillus megaterium were used. The A. fabrum was most effective to control A. niger and C. lunata. Statistical analyses were conducted using Analysis of Variance and Complete Randomized Design.

Keywords: Sesamum indicum L., Aspergillus niger, Curvularia lunata, Biological Control, Agrobacterium fabrum

Evaluation of different methods to break weed seed dormancy in *Datura stramonium*

[1,*]Khawar Jabran
[1]Niğde Ömer Halisdemir University, Faculty of Agricultural Sciences and Technologies, Department of Plant Production and Technologies
***khavar.jabran@ohu.edu.tr**

Abstract : Jimson weed (*Datura stramonium* L.) is one among the most poisonous and troublesome weeds that infest various crops around the world. Seed dormancy is the characteristic of this weed that makes its persistence possible in the environment for long. Further, if the weed seeds are dormant, it is not possible to conduct any laboratory or greenhouse studies using the dormant seeds. Hence, this study was aimed to evaluated different weed seed dormancy breaking methods to overcome seed dormancy problem in *Datura stramonium*. The weed seed dormancy breaking treatments included hormones (kinetin, indole-3-butyric acid, gibberellic acid, 6-benzylaminopurine, benzyl adenine) and mechanical scarification (sandpaper treatment). The control treatment received none except the distilled water. The weed seeds were allowed to germinate for two weeks, and the experiment was terminated then. The results showed that none of the treatments (either hormones or mechanical scarifications) could diminish dormancy and improve seed germination in *Datura stramonium*. The results of this study imply that additional treatments or seed dormancy breaking treatments should be explored as the currently tested treatments were not effective to relieve weed seed dormancy in the seeds of *Datura stramonium*.

Keywords: Dormancy, Hormones, Jimson weed, Weed seed

Organik, kimyasal ve azaltılmış oranlı kimyasal gübrelerin mikrobiyal aşılayıcı ile birlikte aşılanmasının ekmeklik buğday gelişme ve verimi üzerine etkisi

[1,2*]Melike Öztan, [1,2*]Halil İbrahim Kılıç, [1]Ramazan Çakmakçı
[1]Çanakkale Onsekiz Mart Üniversitesi, Ziraat Fakültesi, Tarla Bitkileri Bölümü, Çanakkale, Türkiye
[2]Çanakkale Onsekiz Mart Üniversitesi, Lisans Üstü Eğitim Enstitüsü, Çanakkale, Türkiye
***kilic1998@outlook.com**

Özet: Bu araştırmada, kontrol, üç mineral gübre NPK (önerilen NPK oranının, T1 %100, T2 %75 ve T3 %50'si), çiftlik gübresi (FM:3 t da^{-1}), azot fikseri, fosfat çözücü ve ACC deaminaze ve indol asetik asit üretici bakterilerden oluşturulan biyolojik gübre formülasyonu (BF: *Pseudomonas fluorescens* RC48 + *Bacillus thuringiensis* RC187 + *Bacillus subtilis* RC136), FM+ BF, T1+BF, T2+BF ve T3+BF uygulamalarının Çanakkale tarla koşullarında ekmeklik buğday Masaccio'da gelişme, verim ve kalite üzerindeki olası etkileri değerlendirilmiştir. Buğdaya FM, BF, T1, T2, T3, FM+ BF, T1+BF, T2+BF ve T3+BF uygulamalarının kontrole kıyasla sırasıyla, bitki yüksekliğinde %12,5,12,9, 14,7, 13,4, 11,4, 14,0, 15,1, 14,4, ve 13,6; başak uzunluğu %10,0, 12,1, 16,9, 13,7, 12,2, 14,2, 16,7, 14,2 ve 12,1; başakta başakçık sayısı %10,0, 10,2, 14,9, 11,2, 7,3, 10,5, 16,0, 11,8 ve 10,1; başakta tane sayısı %6,6, 7,2, 9,0, 5,6, 2,7, 6,1, 9,2, 7,2 ve 6,2; başakta tane ağırlığı %7,1, 7,7, 9,8, 5,7, 4,3, 6,9, 10,6, 8,5 ve 7,2; tane verimi %18,8, 21,4, 23,7, 21,6, 18,4, 24,7, 29,4, 26,1 ve 24,4; sap verimi %14,8, 19,6, 25,4, 19,7, 15,3, 21,6, 26,3, 23,0 ve 21,7; biyolojik verim %16,1, 20,2, 24,9, 20,3, 16,3, 22,6, 27,3, 24,0 ve 22,6; erken hamur olum dönemi klorofil içeriği %12,3, 12,4, 16,3, 12,5, 9,1, 16,5, 18,2, 15,7 ve 12,3; bin tane ağırlığı %14,1, 14,4, 17,7, 14,4, 13,5, 17,7, 18,3, 16,3 ve 14,6 ve hektolitre ağırlığında %10,6, 11,0, 13,8, 10,0, 8,4, 12,1, 13,9, 12,0 ve 11,8 oranında artış sağladığı belirlenmiştir. Mikrobiyal formülasyonla buğday gelişme ve veriminde herhangi bir azalmaya yol açmadan önerilen NPK dozu %25 hatta %50 oranında azaltılabilecektir.

Anahtar Kelimeler: Ekmeklik buğday, Verim, Çiftlik gübresi, Azaltılmış kimyasal gübre, Mikrobiyal aşılama

Effect of co-inoculation of organic, chemical, and reduced-rate chemical fertilizers with microbial inoculant on bread wheat growth and yield

[1,2*]Melike Öztan, [1,2*]Halil İbrahim Kılıç, [1]Ramazan Çakmakçı
[1]Çanakkale Onsekiz Mart Üniversitesi, Ziraat Fakültesi, Tarla Bitkileri Bölümü, Çanakkale, Türkiye
[2]Çanakkale Onsekiz Mart Üniversitesi, Lisans Üstü Eğitim Enstitüsü, Çanakkale, Türkiye
***kilic1998@outlook.com**

Abstract: The study assessed possible effects of control, three mineral fertilizers (T1 100%, T2 75%, and T3 50% of the recommended NPK rate), farmyard manure (FM: 30 t ha-1), triple strains combinations of N_2-fixing, P-solubilizing, and ACC-deaminase and IAA-producing bacteria-based formulations (BF: *Pseudomonas fluorescens* RC48 + *Bacillus thuringiensis* RC187 + *Bacillus subtilis* RC136), FM+ BF, T1+BF, T2+BF,

and T3+BF on the growth, yield, and quality in bread wheat Masaccio in field conditions of Çanakkale. Applications of wheat with FM, BF, T1, T2, T3, FM+ BF, T1+BF, T2+BF, and T3+BF increased plant height by 12.5,12.9, 14.7, 13.4, 11.4, 14.0, 15.1, 14.4, and 13.6% as compared to the control; spike length by %10.0, 12.1, 16.9, 13.7, 12.2, 14.2, 16.7, 14.2, and 12.1%; number of spikelet per spike by %10.0, 10.2, 14.9, 11.2, 7.3, 10.5, 16.0, 11.8, and 10.1%; number of grain per spike by %6.6, 7.2, 9.0, 5.6, 2.7, 6.1, 9.2, 7.2, and 6.2%; grain weight per spike by 7.1, 7.7, 9.8, 5.7, 4.3, 6.9, 10.6, 8.5, and 7.2%; grain yield by 18.8, 21.4, 23.7, 21.6, 18.4, 24.7, 29.4, 26.1, and 24.4%; straw yield by 14.8, 19.6, 25.4, 19.7, 15.3, 21.6, 26.3, 23.0, and 21.7%; biological yield by 16.1, 20.2, 24.9, 20.3, 16.3, 22.6, 27.3, 24.0, and 22.6%, chlorophyll content at early dough by 12.3, 12.4, 16.3, 12.5, 9.1, 16.5, 18.2, 15.7, and 12.3%; thousand grain weight by 14.1, 14.4, 17.7, 14.4, 13.5, 17.7, 18.3, 16.3, and 14.6%, and hectoliter weight by 10.6, 11.0, 13.8, 10.0, 8.4, 12.1, 13.9, 12.0, and 11.8%, respectively. With microbial formulations, the recommended NPK dose could be reduced by 25% or even 50% without causing any reduction in wheat growth and yield.

Keywords: Bread wheat, Yield, Farmyard manure, Reduced chemical fertilizer, Microbial inoculation

A new prey-predator modeling with real data for biological control of couch grass

[1,2,*]Mehmet Yavuz, [1]Merve Başaçık, [1]Ayşe Nur Yaman
[1]Necmettin Erbakan University, Faculty of Science, Department of Mathematics and Computer Sciences
[2]Kyrgyz-Turkish Manas University, Department of Applied Mathematics and Informatics
***mehmet.yavuz@manas.edu.kg**

Abstract: In this study, a new three-dimensional predator–prey model is developed, consisting of one prey and two predators. The aim of the model is to reduce or eliminate the target weed species through natural means. What makes this study unique is that one of the predators is the radish plant, and the model parameters are obtained from real data. The primary objective of the project is to investigate the natural suppression or eradication of the harmful weed species using the constructed predator–prey framework, supported by numerical simulations. Through these simulations, the interactions between the two populations are examined by varying the initial planting rates/numbers of radish and couch grass, and the dynamic changes of the populations over time are analyzed. Furthermore, the model and its solutions are interpreted within the context of mathematical biology. The equilibrium points are determined, followed by stability and sensitivity analyses of these points. Numerical solutions of the three-dimensional system are obtained, and corresponding simulations are performed. For stability analysis, the Routh–Hurwitz stability criterion is employed to assess local asymptotic stability, while the Lyapunov direct method is applied to establish global stability. The numerical simulations are carried out using the fourth-order Runge–Kutta method.

Keywords: Couch grass, radish, herbivores, data, mathematical modeling

Ayrık Otunun Biyolojik Kontrolü İçin Gerçek Verilerle Yeni Bir Av-Avcı Modellemesi

[1,2,*]Mehmet Yavuz, [1]Merve Başaçık, [1]Ayşe Nur Yaman
[1]Necmettin Erbakan Üniversitesi, Fen Fakültesi, Matematik ve Bilgisayar Bilimleri Bölümü
[2]Kırgızistan-Türkiye Manas Üniversitesi, Uygulamalı Matematik ve Enformatik Bölümü
***mehmet.yavuz@manas.edu.kg**

Özet: Bu çalışmada, bir av ve iki avcıdan oluşan yeni bir üç boyutlu av-avcı modeli geliştirilmiştir. Modelin amacı, hedef yabancı ot türlerini doğal yollarla azaltmak veya ortadan kaldırmaktır. Bu çalışmayı benzersiz kılan, avcılardan birinin turp bitkisi olması ve model parametrelerinin gerçek verilerden elde edilmiş olmasıdır. Projenin temel amacı, sayısal simülasyonlarla desteklenen yapılandırılmış av-avcı çerçevesini kullanarak zararlı yabancı ot türlerinin doğal olarak bastırılmasını veya yok edilmesini araştırmaktır. Bu simülasyonlar aracılığıyla, iki popülasyon arasındaki etkileşimler, turp ve ayrık otu için başlangıçtaki ekim oranları/sayıları değiştirilerek incelenir ve popülasyonların zaman içindeki dinamik değişimleri analiz edilir. Ayrıca, model ve

çözümleri matematiksel biyoloji bağlamında yorumlanır. Denge noktaları belirlenir ve ardından bu noktaların kararlılık ve duyarlılık analizleri yapılır. Üç boyutlu sistemin sayısal çözümleri elde edilir ve ilgili simülasyonlar gerçekleştirilir. Kararlılık analizinde, yerel asimptotik kararlılığı değerlendirmek için Routh-Hurwitz kararlılık kriteri kullanılırken, genel kararlılığı belirlemek için Lyapunov doğrudan yöntemi kullanılmıştır. Sayısal simülasyonlar, dördüncü dereceden Runge-Kutta yöntemi kullanılarak gerçekleştirilmiştir.

Anahtar Kelimeler: Ayrık otu, turp, otçullar, veri, matematiksel modelleme

Genome-wide identification of LBD transcription factors and their role in biotic stress tolerance in chickpea (*Cicer arietinum*)

[1,*]Mubashir Sharif, [1]**Muhammad Annas Shahid,** [2]**Syeda Sahar Fatima**, [1]**Mahad-Ur-Rehman,** [3]**Ikhlas Shafique ,**[1]**Muhammad Amjad Ali**
[1]**Department of Plant Pathology, University of Agriculture, Faisalabad, Pakistan**
[2]**Centre for Agricultural Biochemistry and Biotechnology, University of Agriculture, Faisalabad, Pakistan**
[3]**Department of Sustainable Agriculture and Food Security, Institute of Science, Çukurova University, Adana, Türkiye**
***mubashirsharif1003@gmail.com**

Abstract: Chickpea (*Cicer arietinum* L.) is the second most important legume crop worldwide, mostly cultivated in arid and semi-arid regions. Despite its nutritional and agronomic value, Chickpea productivity is limited by biotic and abiotic stress due to low genetic diversity. In this study, whole-genome analysis of LBD transcription factor in Chickpea was conducted and 48 candidate *CaLBDs* were identified and localized across all 8 chromosomes. Comparative phylogeny with *Arabidopsis thaliana* and *Oryza sativa* classified LBD transcription factors into 5 groups (I-a, I-b, I-c, I-d, and II-a), based on sequence homology and conserved domains. Variation in intron/exon count among *CaLBD* genes indicated structural diversity, while conserved motifs suggested functional roles in biotic stress response. Synteny analysis revealed the evolutionary relationship of Chickpea with *Arabidopsis thaliana* and *Medicago truncatula.* Gene duplication analysis demonstrated tandem and segmental duplications expressing their roles in gene family expansion. Transcriptomic profiling of *CaLBD* genes under *Phytophthora* root rot treatment revealed the strong upregulation of *CaLBD38* and *CaLBD46*. Under *Fusarium* wilt stress, *CaLBD46* was highly expressed, followed by *CaLBD14* and *CaLBD38*. This genome-wide computational analysis provides a valuable foundation for future genetic studies and serves as base for development of stress-resilient cultivars through molecular breeding programs.

Keywords: LBD gene family, Genome-wide analysis, *Cicer arietinum* L., Gene expression, Biotic stresses

Tissue culture optimization and genetic transformation of local canola varieties for reporter and herbicidal genes

[1,*]Sumbal Sabir
[1]University of The Punjab, Centre of Excellence in Molecular Biology
***sumbal.sabir@cemb.edu.pk**

Abstract: Canola (*Brassica napus L.)* stands as a cornerstone of global oilseed production. Despite its high economic value and global adaptability, canola cultivation faces persistent challenges from environmental stresses; most notably, weed competition. The research focused on two primary objectives: optimizing tissue culture protocols for efficient regeneration of local canola cultivars, Super Canola and TM Canola, and introducing herbicide-resistant trait to develop dual herbicide-resistant lines. Four plasmid constructs were employed: two reporter plasmids (pGFPGUSPlus and p35S: RUBY) to assess transformation efficiency and two functional constructs: pCAMBIA1301 carrying the cp4EPSPS gene for glyphosate resistance and pKSE401 harboring CRISPR/Cas9 targeting the *PQT3* gene for paraquat resistance. *Agrobacterium tumefaciens* GV3101 strains harboring these constructs were used to infect explants i.e. cotyledons, cotyledonary nodes and hypocotyls. Co-cultivation was followed by callus induction, with healthy calli transferred to shoot induction media. Regenerated shoots were then subjected to root development. Acclimatization trials using soil and peat moss showed better plant vigor with peat moss, and 6 out of 11 regenerated plants survived the transition to open-air conditions. Reporter gene analysis demonstrated successful transformation: two plants showed strong RUBY expression while one plant exhibited GUS activity through histochemical staining. In contrast, GTG and CRISPR/Cas9-transformed plants targeting *PQT3* for herbicides resistance are currently at the rooting stage, reflecting the observed challenges in regeneration efficiency with genome editing constructs. The successful introduction of glyphosate resistance, along with the ongoing development of paraquat-tolerant lines, underscores the potential of combining CRISPR-based genome editing with conventional transformation approaches to develop dual herbicide-resistant crops.

Keywords: Herbicide resistance, Genetic transformation, Paraquat, Glyphosate, PQT3.

Genome-wide analysis of the bZIP transcription factor family in spinach (*Spinacia oleracea*) and its role in abiotic stress responses

[1]Mahad-ur-Rehman, [2]Ikhlas Shafique, [1]Amjad Abbas, [1]Ayesha Arshad, [1]Mubashir Sharif, [1]Muhammad Annas Shahid, [1,*]Muhammad Amjad Ali
[1]Department of Plant Pathology, University of Agriculture Faisalabad, Pakistan
[2]Department of Sustainable Agriculture and Food Security, Institute of Science, Çukurova University, Adana, Türkiye
***amjad.ali@uaf.edu.pk**

Abstract: Spinach (*Spinacia oleracea*) is a nutritionally important crop, but its cultivation can be threatened by abiotic stresses. Basic leucine zipper (bZIP) transcription factors are known to be central mediators in how plants respond to such environmental challenges. However, a systematic study of this gene family has not been identified in spinach. This study addresses this gap by performing a genome-wide identification and characterization of bZIP genes in *Spinacia oleracea*. We identified 45 *SobZIP* genes and analyzed their phylogenetic relationships, conserved motifs, gene structures, and promoter analyses. Evolutionary analysis, compared with *Arabidopsis thaliana*, grouped the SobZIP proteins into 12 distinct subfamilies. The promoter regions of these genes were enriched with *cis*-acting elements related to stress and hormone responses, suggesting roles in development and stress adaptation. To investigate their function, we analyzed their expression patterns under heat and salicylic acid (SA) stress. Several genes, notably *SobZIP02*, *SobZIP14*, *SobZIP20* and *SobZIP43* were strongly upregulated, identifying them as key candidates involved in spinach stress response pathways. Our results provide a valuable foundation for understanding the regulatory mechanisms of bZIPs in spinach and support future efforts in breeding stress-resistant varieties.

Keywords: Spinach, bZIP transcription factor, Genome-wide identification, Expression analysis, Abiotic stress

The effect on agricultural production of water crisis in world

[1,*]Maliha Afreen, [2]İlknur Uçak, [3]M. Cüneyt Bağdatlı
[1]University of Veterinary and Animal Science
[2]Nigde Ömer Halisdemir University, Faculty of Agricultural Sciences and Technologies Department of Animal Production and Technologies
[3]Nigde Ömer Halisdemir University, Faculty of Architecture, Department of City and Regional Planning
[*]malihaafreen120@gmail.com

Abstract : Water is a vital component of living ecosystem especially for Agriculture because without water there is no food and without food there will be no people in near future. Unfortunately water scarcity is a universal big issue these days in many developing and even in developed countries. Around 70 percent of worldwide water used for agriculture inluding crop production and for production and maintenance of livestock specifically poultry production requires higher amount of water. This globally higher consumption of water caused by population increase, growing living standards, and the extension of irrigated agriculture. Water scarcity causes quality damage and shortage of crop production including wheat, maize, rice and sugarcane which required more water for good quality and higher production. Water shortage causes shorter length of wheat and maize crop which decreases the grain production of these crops. İt also effects the photosynthesis of food crops which leads to the damage of nutrient quality of agricultural food. Water scarcity is the main reason of the food production deficiency in many areas of the world including the Middle East, North Africa, South Asia, and Southern Europe. There should be some irrigation strategies for proper water management to get required crop production.

Keywords: Water scarcity, Agriculture, Irrigation, Crop production, Livestock

Koyunlarda çoklu doğum ile ilişkili bazı gen mutasyonlarının T-ARMS PCR tekniği ile belirlenmesi

[1,*]Koray KIRIKÇI, [1]Melike KAVUZKOZ
[1]Kırşehir Ahi Evran Üniversitesi, Ziraat Fakültesi, Zootekni Bölümü
[*]koray.kirikci@ahievran.edu.tr

Özet: Çiftlik hayvanlarında genetik varyasyonların belirlenmesinde DNA dizi analizi, PCR-RFLP, SSCP ve T-ARMS PCR gibi kullanılabilecek birçok moleküler yöntem bulunmaktadır. Proje bütçesi, laboratuvar alt yapısı, deneyim ve genetik varyasyonun türü gibi unsurlar kullanılacak yöntemin seçiminde belirleyici olmaktadır. T-ARMS-PCR yöntemi, az maliyet, daha az zaman ve iş gücü gereksinimi ile ön plana çıkmaktadır. Ancak geleneksel PCR'a göre birden fazla ve allele özgü primer gerektirmesi sebebiyle ilgili yöntemin optimizasyon koşullarının belirlenmesinde güçlükler yaşanabilmektedir. Türkiye'de koyunlarda ürüme özellikleri ile ilişkili yapılan çalışmalarda ise daha çok PCR-RFLP yönteminin tercih edildiği tespit edilmiştir. Bu nedenle, çalışmada daha ekonomik, az maliyet ve zaman gerektiren T-ARMS-PCR yönteminin önemine değinilerek uygulamaya aktarılmasına çalışılmıştır. Bu amaçla, Akkaraman koyun ırkında GDF9 geni G1, G4 ve G6 mutasyonları T-ARMS-PCR yöntemi ile araştırılmıştır. Çalışma sonucunda, sadece G1 mutasyonu tespit edilmiştir.

Anahtar Kelimeler: T-ARMS-PCR, Koyun, Üreme, Çoklu doğum, GDF9

Keçilerde emzirmenin süt verimi ve bileşenleri ile somatik hücre sayısı üzerine etkileri

[1,*]Koray Kırıkçı, [2]Mehmet Akif Çam
[1]Kırşehir Ahi Evran Üniversitesi, Ziraat Fakültesi, Zootekni Bölümü
[2]Samsun Ondokuz Mayıs Üniversitesi, Ziraat Fakültesi, Zootekni Bölümü
[*]koray.kirikci@ahievran.edu.tr

Özet: Çalışmada emzirmenin süt somatik hücre sayısı (SHS) ile süt verimi ve bazı bileşenler üzerindeki etkisi incelenmiştir. Bu amaçla, 20 baş Saanen keçisi kullanılmıştır. Keçiler doğum sonrası 98. günde kontrol (yavrularını emzirmeyenler) ve muamele (yavrularını emzirenler) olmak üzere iki gruba ayrılmışlar ve 45 gün sürmüştür. Emzirmenin etkisinin belirlenebilmesi için 15 gün aralıklarla üç dönem (Deneme başlangıcı, ortası ve sonu) süt kontrolleri yapılmış ve laboratuvar analizleri için süt örnekleri alınmıştır. Araştırmada emzirme ile süt veriminde %20'lik bir artış sağlanırken, süt protein ve yağ içerikleri bakımından gruplar arasında bir fark tespit edilmemiştir. Sonuç olarak, emzirmenin süt verimini arttırma eğilimi ve süt hijyeni ile meme sağlığının önemli bir göstergesi olan SHS üzerinde önemli etkisi olduğu saptanmıştır.

Anahtar Kelimeler: Saanen, keçi sütü, emzirme, somatik hücre sayısı, süt verimi

Besi üretiminde destek politikalarının ekonomik etkileri

[1]Hakan KARAARDIÇ, [1]Seda GÜRÜN, [1,2,*]Emine İKİKAT TÜMER,
[1] Kahramanmaraş Sütçü İmam Üniversitesi, Tarımsal Yayım Araştırma ve Uygulama Merkez Müdürlüğü
[2] Kırgızistan-Türkiye Manas Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İktisat Bölümü
***emine.ikikattumer@manas.edu.kg**

Özet: Besi üreticiliği, Türkiye tarım sektörü içinde ekonomik ve kırsal kalkınma açısından önemli bir faaliyettir. Bu çalışmada, besi üreticilerinin devlet desteklerinden yararlanma durumları ve bu desteklerin yeterliliğine ilişkin görüşleri ile gelir düzeyine etkileri incelenmiştir. Kahramanmaraş ilinde 2024 yılında oransal örnekleme yöntemiyle belirlenen 104 besi üreticisi ile yüz yüze anketler uygulanmış ve elde edilen veriler tanımlayıcı istatistikler ve Ki-kare testi ile analiz edilmiştir. Ki-kare analizi sonucunda üreticilerin yaş grupları, tarım işgücüne katılan aile birey sayısı, besicilik tecrübesi, büyükbaş hayvan varlığı ile gelir düzeyi arasında istatistiki açıdan anlamlı ilişki olduğu belirlenmiştir. Kahramanmaraş ilindeki besi üreticilerinin devlet desteklerinden sınırlı düzeyde faydalandığı, mevcut desteklerin üreticilerin ihtiyaçlarını karşılamada yetersiz kaldığı belirlenmiştir. Desteklerin kapsamı ve dağıtım süreçleri yeniden düzenlenmeli, ödeme zamanlaması iyileştirilmeli ve üreticilerin bilgilendirilmesine önem verilmelidir. Ayrıca tarım işgücünün etkin kullanımı, küçük ölçekli işletmelerin desteklenmesi, büyükbaş hayvan varlığının artırılması ve besicilik eğitim programlarının yaygınlaştırılması, üreticilerin gelir düzeylerini yükseltecek ve sektörün sürdürülebilirliğini güçlendirecek önemli stratejilerdir.

Anahtar Kelimeler: Besi üreticiliği, Desteklemeler, Tarımsal Gelir, Kahramanmaraş

Economic impacts of support policies in cattle fattening production

[1]Hakan KARAARDIÇ, [1]Seda GÜRÜN, [1,2,*]Emine İKİKAT TÜMER
[1] Kahramanmaraş Sütçü İmam University, Agricultural Extension Research and Application Center
[2] Kırgızistan-Türkiye Manas University, Faculty of Economics and Administrative Sciences, Department of Economics
***emine.ikikattumer@manas.edu.kg**

Abstract: Cattle fattening is an economically and rurally significant activity within the Turkish agricultural sector. This study examines the utilization of government support by cattle fatteners, their perceptions regarding the adequacy of these supports, and the effects on their income levels. Face-to-face surveys were conducted in 2024 with 104 cattle producers in Kahramanmaraş province, selected using a proportional sampling method. The collected data were analyzed using descriptive statistics and Chi-square tests. The results indicate statistically significant relationships between income levels and producers' age groups, the number of family members involved in

agricultural labor, fattening experience, the number of large cattle, and perceptions of support adequacy.

The findings reveal that cattle producers in Kahramanmaraş benefit from government support programs to a limited extent, and the existing supports are insufficient to meet their needs. It is recommended that the scope and distribution processes of support programs be revised, payment schedules improved, and producers better informed. Furthermore, effective utilization of family labor, support for small-scale enterprises, increasing large cattle holdings, and the expansion of training programs in cattle fattening are key strategies to enhance producers' income levels and strengthen the sustainability of the sector.

Keywords: Cattle fattening, Government support, Agricultural income, Kahramanmaraş

Rapid and reproducible *Agrobacterium*-mediated transformation of soybean expressing CRISPR-Cas constructs

[1,*]Arshia Amin Khan, [1]Muhammad Waqas Choudry, [1]Abdul Qayyum Rao, [1]Allah Bakhsh
[1]Seed Biotech Labs, Centre of Excellence in Molecular Biology, University of the Punjab, Lahore, Pakistan
***arshiaamin1019@gmail.com**

Absract: Soybean yield is drastically reduced by weed competition, and chemical herbicides like paraquat pose a serious threat to crop productivity. This study employed the CRISPR-Cas9-mediated genome editing technique to knock-out the negative regulators of oxidative stress genes; *Paraquat resistance 1 (PAR1)* and *Paraquat tolerance 3 (PQT3)*, to develop paraquat-tolerant soybean lines to address the significant risk weed infestation poses to soybean yield. Local soybean varieties (AARI Soy, Golden Soy, and Super Soy) were genetically transformed using fast, reproducible, and advanced half-seed explant method with *Agrobacterium tumefaciens*, which enhances gene delivery and regeneration potential in legumes. After transformation, the explants were subjected to rigorous selection, regeneration and acclimation procedures, which ultimately produced three putative transgenic soybean plants with stable CRISPR-Cas9 construct integration. Further molecular evaluation via PCR was performed for the detection of cassette integration by confirming the presence of *nptII* (selection marker), Cas9, pKSE401 flanking regions, and the targeted gRNAs for *PQT3* and *PAR1*, demonstrating that the CRISPR-Cas9 system was successfully delivered and integrated into soybean genome. The overall transformation efficiency was 0.166%, while the confirmed transformation efficiency for AARI soy was 0.674%, suggesting that cultivar selection and protocol optimization were critical factors for improving transformation efficiency and plant recovery. The AARI cultivar demonstrated strong regeneration and transformation potential, with a notable number of rooted putative transgenic plants, indicating its high amenability to *Agrobacterium*-mediated transformation and suitability for genetic improvement in soybean.

Keywords: *Agrobacterium tumefaciens*, Soybean transformation, CRISPR-Cas9, Half-seeds, Herbicide-tolerance.

Patateste (*Solanum tuberosum* L.) kükürt beslenmesi ve önemi

[1,*]Esra ALINCAK, [2]Sevgi ÇALIŞKAN
[1]Niğde Ömer Halisdemir Üniversitesi, Fen Bilimleri Enstitüsü, Bitkisel Üretim ve Teknolojileri Bölümü
[2]Niğde Ömer Halisdemir Üniversitesi, Ayhan Şahenk Tarım Bilimleri ve Teknolojileri Fakültesi, Bitkisel Üretim ve Teknolojileri Bölümü
***esra.alincak@tarimorman.gov.tr**

Özet: Patates (Solanum tuberosum L.) üretiminde kükürt, bitki büyümesi, yumru verimi ve besin elementi alımı üzerinde kritik bir role sahiptir. Bu derleme, kükürt beslenmesinin patates bitkisindeki etkilerini literatür ışığında sistematik olarak incelemekte ve farklı toprak tiplerinde kükürt uygulamalarının verim, kalite ve besin elementi dengesi üzerindeki sonuçlarını ortaya koymaktadır. Bulgular, kükürt eksikliğinin amino asit sentezini sınırlayarak kuru madde birikimini düşürdüğünü ve yumru mineral dengesini bozduğunu göstermektedir. Öte yandan, aşırı kükürt uygulamaları yaprak yanması, kloroz ve kök gelişiminde zayıflama gibi olumsuz etkiler yaratabilmektedir. Toprak pH'ı, organik madde içeriği ve mevcut besin elementleri dikkate alınarak dengeli kükürt uygulamalarının sağlanması, patates verimini artırmak, yumru kalitesini iyileştirmek ve besin elementi alımını optimize etmek için önem taşımaktadır.

Anahtar Kelimeler: Patates, Kükürt beslenmesi, Yumru verimi, Toprak pH'sı, Besin elementi alımı

Mitigating heat stress in poultry birds through dietary mint leaf supplementation

[1,*]Yusuf Shafiu YUSUF, [2]Sibel CANOĞULLARI DOĞAN
[1]Texas Tech University, Department of Interdisciplinary (Biotechnology & Microbiology)
[2]Niğde Ömer Halisdemir University, Faculty of Agricultural Science and Technology, Department of Animal Production and Technologies
***yusufmashkalla@gmail.com**

Abstract: There is an incredible number of potential problems that heat stress poses to global poultry production, especially in tropical and subtropical climates like southern Türkiye, the Middle East, and African region where an increased ambient temperature disturbs bird welfare, productivity, and profitability. This review aims to critically scrutinizes the pathophysiology of heat stress in poultry, focusing on systemic metabolic, immunological, and performance-related effects. The shortcomings of certain traditional cooling systems are covered, and it stresses nutritional control, emphasizing phytogenic feed additives (PFAs) as sustainable alternatives. Among PFAs, mint (Mentha spp.)—notably Mentha piperita, Mentha spicata, and Mentha longifolia—has emerged as a promising candidate due to its rich phytochemical profile, including menthol, carvone, and rosmarinic acid. These compounds exert antioxidant, anti-inflammatory, antimicrobial, and thermoregulatory effects. Empirical evidence shows that dietary mint improves broiler growth performance, enhances feed conversion ratio, lowers rectal temperature, reduces oxidative stress markers, stabilizes gut microbiota, and enhances carcass hygiene under heat stress conditions. However, variations in mint species, dosage, form (oil, powder, or extract), and bird genotype, alongside issues of standardization and potential toxicity (e.g., pulegone), remain limiting factors. The paper consolidates recent findings from verified sources and calls for long-term, field-based studies under commercial conditions. It also recommends dose optimization protocols and integrating mint supplementation with broader nutritional and phytogenic strategies to sustainably mitigate heat stress in poultry systems.

Keywords: Heat stress, mint leafs, poultry

Üreticilerin şeker pancarı üretim memnuniyeti

[1*]Ahmet Emre ÇALI, [1]Enes GENÇASLAN, [2]Emine İKİKAT TÜMER
[1] Kahramanmaraş Sütçü İmam Üniversitesi, Tarımsal Yayım Araştırma ve Uygulama Merkez Müdürlüğü
[2] Kırgızistan-Türkiye Manas Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İktisat Bölümü
***emine.ikikattumer@manas.edu.kg**

Özet: Şeker, hem insan beslenmesinde temel karbonhidrat kaynaklarından biri olması hem de sanayi ve istihdam açısından stratejik bir ürün niteliği taşıması nedeniyle dünya genelinde önemli bir tarımsal üründür. Küresel ölçekte üretimin büyük bölümü şeker kamışına dayansa da, Türkiye coğrafi koşullar gereği şeker pancarı üretiminde öne çıkmaktadır. Ülke genelinde yaklaşık 500 bin çiftçi doğrudan şeker pancarı üretiminden geçimini sağlamakta olup, bu durum şeker pancarını ekonomik ve sosyal açıdan kritik hale getirmektedir. Yozgat ilinde yürütülen bu araştırmada, şeker pancarı üreticilerinin sosyo-ekonomik özellikleri, üretim süreçleri ve üretimden duydukları memnuniyet düzeyleri incelenmiştir. Üreticilerin yaş ortalaması 48,2 yıl, tarımsal tecrübeleri yaklaşık 31 yıl, şeker pancarı yetiştirme tecrübeleri ise 28 yıl olarak belirlenmiştir. Şeker pancarı üretiminde en sık karşılaşılan problemler iklim (%25,5) ve sulama (%18,6) iken; hastalıklar arasında Cercospora (%26,5) ve mantar (%16,7) öne çıkmaktadır. Sonuç olarak, Yozgat'taki şeker pancarı üreticileri yüksek tarımsal deneyime sahip olmalarına rağmen, iklim koşulları, su kaynaklarının yetersizliği ve hastalıklar nedeniyle üretimden duydukları memnuniyet olumsuz etkilenmektedir. Bu bulgular, üretici memnuniyetini artırmaya yönelik destek ve politikaların önemini ortaya koymaktadır.

Anahtar kelimeler: Şeker pancarı, üretici memnuniyeti, tarımsal destekler, Yozgat

Sugar beet production satisfaction of producers

[1*]Ahmet Emre ÇALI, [1]Enes GENÇASLAN, [2]Emine İKİKAT TÜMER
[1] Kahramanmaraş Sütçü İmam Üniversitesi, Tarımsal Yayım Araştırma ve Uygulama Merkez Müdürlüğü
[2] Kırgızistan-Türkiye Manas Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İktisat Bölümü
***emine.ikikattumer@manas.edu.kg**

Abstract: Sugar is an important agricultural product worldwide, both as a primary source of carbohydrates in human nutrition and as a strategic product in terms of industry and employment. Although most of the global production is based on sugarcane, Turkey stands out in sugar beet production due to its geographical conditions. Approximately 500,000 farmers across the country earn their livelihood directly from sugar beet production, making sugar beet critical from an economic and social perspective. This study, conducted in the province of Yozgat, examined the socio-economic characteristics of sugar beet producers, their production processes, and their level of satisfaction with production. The average age of producers was determined to be 48.2 years, their agricultural experience approximately 31 years, and their sugar beet cultivation experience 28 years. The most common problems

encountered in sugar beet production are climate (25.5%) and irrigation (18.6%), while Cercospora (26.5%) and fungi (16.7%) are the most prevalent diseases. As a result, despite their high level of agricultural experience, sugar beet producers in Yozgat are dissatisfied with their production due to climatic conditions, insufficient water resources, and diseases. These findings highlight the importance of support and policies aimed at increasing producer satisfaction.

Keywords: Sugar beet, producer satisfaction, agricultural support, Yozgat

Utilization of entomopathogenic nematodes (epns) for the control of citrus decline caused by fusarium spp. and tylenchulus semipenetrans

[1,*]Maria Fayyaz, [1]Sajid Aleem Khan, [1]Huma Abbas, [1]Muhammad Amjad Ali, [1]Amjad Abbas, [2]Muhammad Arshad, [2]Muhammad Sufyan
[1]Department of Plant Pathology, University of Agriculture, Faisalabad
[2]Department of Entomology, University of Agriculture, Faisalabad
***mariafiaz@outlook.com**

Abstract: Citrus decline is a significant disease adversely affecting citrus production and quality in numerous regions of Pakistan. The following study was aimed to find out the interaction between associated fungi, Fusarium solani and citrus nematode, Tylenchulus semipenetrans individually and simultaneously causing citrus decline. For the management of these pathogens certain techniques are being used including chemical control. However, due to high toxicity and potentially deleterious influence of chemical control of Tylenchulus semipenetrans and Fusarium solani on the environment safety, it is often a restricted option. Now requirement is towards safe, and friendly environmental control strategy with an emphasis on the use of biological control agents i.e., Entomopathogenic nematodes (EPNs). Entomopathogenic nematodes (Steinernemaitidae and Heterorhabditidae) and then associated bacteria can be helpful for reducing decline problem in citrus. In the present study, the experiment was conducted to evaluate the relationship between various densities of T. semipenetrans and reduction in growth parameters of Citrus jambhiri, and nematode infestation was examined in pot experiment. A visual inspection for the appearance of symptoms related to fusarium or nematodes infection on treated and untreated citrus was carried out periodically every two weeks throughout the experimental period. Data was collected on fresh and dry weight of shoot and root, shoot length, nematode population in the roots and soil. All the data was subjected to analysis of variance and means compared by using LSD Test at 5%. This study may lead to the development of a potential non-chemical approach for management of Citrus Decline.

Keywords: Citrus decline, Fusarium spp., Tylenchulus semipenetrans, Epns

Plant pathogens and food security: Innovative pathways for mitigation

[1,*]Rabia Irshad, [1]Ameer Hamza Aslam, [1]Amjad Abbas, [1]Muhammad Amjad Ali
[1]Department of Plant Pathology, University of Agriculture, Faisalabad
***rabiairshad49@gmail.com**

Abstract: Silent but relentless, plant pathogens are a catastrophic biological threat to global food security. Diseases caused by fungi, bacteria, viruses, nematodes and oomycetes not only reduce crop yields but also greatly affect nutritional quality and contaminate the food chain with harmful metabolites such as mycotoxins. Climate change (rising temperature, CO2 and O3 levels), globalization (trade without inspection), and agricultural practices (monocropping, overuse of pesticides) have accelerated the emergence, evolution and spread of virulent and fungicide-resistant pathogen strains. This has increased the frequency and scale of outbreaks across the globe. These risks are particularly limited to those regions where limited diagnostic and management capacity is available, resulting in severe yield loss. Beyond reducing yields, these outbreaks drive economic instability, restrict trade, and intensify the risk of hunger and malnutrition worldwide. Advanced mitigation strategies should be implemented to fight this escalating threat, going beyond conventional practice. Recent progress in molecular diagnostics, remote-sensing technologies and artificial intelligence (AI) offers opportunities for real-time detection, surveillance and predictive modeling of plant disease outbreaks. At the same time, novel tools such as CRISPR-based genome editing, RNA interference (RNAi), breeding of climate-resilient and pathogen-resistant varieties are shaping the future of crop protection. Integrating these innovations with sustainable farming practices, enhanced biosecurity, and strong international collaboration is vital for safeguarding agricultural productivity. This study highlights the urgent need for coordinated scientific, technological, and policy interventions to address plant pathogens as a significant global threat and to safeguard food security for a rapidly expanding population.

Keywords: Plant Pathogens, food security, malnutrition, advanced mitigation strategies, sustainable farming

Genome-wide analysis of lr34-mediated defense against wheat leaf rust (puccinia triticina) for breeding-resistant genotypes

[1,*]Ameer Hamza Aslam, [1]Rabia Irshad, [1]Muhammad Amjad Ali, [1]Amjad Abbas
[1]Department of Plant Pathology, University of Agriculture, Faisalabad
***hamzaaslampp58@gmail.com**

Abstract: Wheat leaf rust caused by Puccinia triticina remains a major constraint to wheat production worldwide and causing severe yield losses under conducive conditions. To develop durable resistance, genome-wide approaches can elucidate host defense mechanisms at the molecular level. In this study, a genome-wide transcriptomic analysis was conducted to investigate the defense response mediated by the Lr34 gene, a key adult-plant resistance (APR) gene providing partial, durable, race nonspecific resistance. During infection, comparison of resistant and susceptible wheat genotypes revealed significant upregulation of genes involved in pathogen recognition, signal transduction, oxidative stress response and systemic acquired resistance. Pathogenesis-related proteins, WRKY transcription factors and reactive oxygen species neutralizing enzymes exhibited 2 to 5-fold higher expression in Lr34 containing genotypes. Several novel candidate genes with potential regulatory roles were also identified, expanding our understanding of the Lr34 defense network. These findings provide actionable targets for marker-assisted selection, gene pyramiding and genome-editing strategies, enabling the development of durable leaf rust resistant wheat genotypes. Integrating genome-wide insights with modern breeding tools offers a smart, sustainable and eco-friendly approach to wheat leaf rust management, reducing chemical inputs and improving crop resilience.

Keywords: Genome-wide, Lr34, leaf rust, adult plant resistance, breeding resistant

Fig Cultivation in Kahramanmaraş Province of Turkey, Its Importance and Problems

[1]Zeliha Büşra Ayhan, [2,*]Mürüvvet Ilgın
[1]Kahramanmaraş Sütçü İmam Üniversitesi
[2]Kırgızistan Türkiye Manas Üniversitesi
***muruvvet.ilgin@manas.edu.kg**

Abstract: Fig (Ficus carica L.) is one of Turkey's oldest cultivated fruits and an important agricultural product consumed both fresh and dried. Kahramanmaraş province, thanks to its diverse ecological conditions and microclimate zones, offers potential for fig cultivation. This study examines the current status of fig cultivation in Kahramanmaraş province, its economic and sociocultural importance, and the challenges encountered. According to 2023 statistics, approximately 938 tons of figs were produced in the province. The study determined that fig cultivation in the province is concentrated primarily in the Onikişubat, Andırın, and Dulkadiroğlu districts, but development is limited due to climate fluctuations, inadequate irrigation, diseases and pests, marketing problems, and deficiencies in producer organization. For sustainable fig production, it is recommended to adopt modern cultivation techniques, strengthen producer organization, and develop value-added products.

Keywords: Fig, Kahramanmaraş, Fruit Growing, Agriculture, Problems

Exploring biological agents for in-vitro control of seed-borne fungi in maize

[1]Saman Arif, [1]Sobeeqa Khalid, [2]Maham Sarwar, [1]Muhammad Usman, [1,*]Muhammad Ajmad Ali, [1]Amjad Abbas
[1]University of Agriculture Faisalabad
[2]Department of Plant Pathology and Crop Protection, Georg-August-Universität Göttingen
***amjad.ali@uaf.edu.pk**

Abstract: The cereal crop Zea mays L. commonly known as maize maintains worldwide importance as food items for humans, animals and poultry birds. After rice and wheat, maize has emerged as the third most important food grain. 717 million metric tonnes of maize are produced worldwide. It is composed of 72% starch, 10% protein, and 4% fat. The crop is attacked by many pests including insects, weeds and fungal pathogens. The fungi attack the standing field crop as well as seeds in the stores. The cultivation of maize seeds faces major challenges from seed-borne fungal pathogens which produce toxins called mycotoxins. Economic effects of mycotoxins include the loss of both human and animal life. The research examines morphological traits of these fungal pathogens together with testing the effectiveness of biological control agents (BCAs) for infection control. The pathogens associated with the infected seeds were isolated by placing the seeds on the Potato dextrose agar media. Aspergillus flavus and Curvularia lunata are the most common pathogens related to seeds. Hyphal tip and single spore isolation techniques were used to purify the isolated pathogens for further processing. Poisoned food technique was used to manage the seed associated pathogens with the help of new Biological Control Agents. Three Biological control agents viz Pseudomonas fluorescens, Bacillus megaterium, Agrobacterium fabrum were used. The Pseudomonas fluorescens was most effective to control the fungal pathogens. Statistical analysis was conducted using Analysis of Variance and Complete Randomized Design. The means were compared using least significant difference (LSD) test.

Keywords: Zea mays, Fungi, Seed-borne diseases, Biological Control Agents

Increasing population in world and adequency of agricultural production

[1,*] Wadah Elsheikh, [2]İknur Uçak, [3]M. Cüneyt Bağdatlı
[1]University of Khartoum, Faculty of Animal Production, Department of Meat Production
[2]Nigde Ömer Halisdemir University, Faculty of Agricultural Sciences and Technologies, Department of Animal Production and Technologies
[3]Nigde Ömer Halisdemir University, Faculty of Architecture, Department of City and Regional Planning
***Wadah988@gmail.com**

Abstract: Agriculture is one of the most important sectors, as most of the world's population depends on it for food. It is a key component of the economy. This research aims to study the impact of population increase worldwide and the efficiency of agricultural production in light of the current challenges; we discuss current trends in population and food production, the key challenges facing the agricultural sector, and possible solutions through technological advancements and sustainable practices. The agricultural sector is essential for ensuring food security and achieving sustainable development goals. Despite advancements in agricultural production globally, new challenges have arisen, notably global climate change. Alternatively, expanding arable land cannot satisfy future demands, particularly for urban populations, necessitating continually increasing food supplies. Moreover, the expanding global population has heightened the need for land for residential purposes. Agricultural productivity is dropping for several reasons. Therefore, it is necessary to enhance agricultural productivity and efficiency and adopt measures and policies to reduce encroachment on agricultural lands.

Keywords: Agricultural production, World Population, sustainable, food.

Tohum ekim ortamına eklenen biyokömürün substrat kültüründe kuzumarulu yetiştiriciliğine etkileri

[1,*]Gölgen Bahar ÖZTEKİN, [2]Ali Kemal DEMİRCAN, [3]Çiğdem TAKMA
[1] Ege Üniversitesi, Ziraat Fakültesi Bahçe Bitkileri Bölümü
[2] Ege Üniversitesi, Fen Bilimleri Enstitüsü, Bahçe Bitkileri Anabilim Dalı
[3]Ege Üniversitesi, Ziraat Fakültesi Zootekni Bölümü
[*]golgen.oztekin@ege.edu.tr

Özet: Torf yataklarında azalma nedeni ile fide yetiştirme ortamı olarak alternatif uygulamalar arayışı, toprak verimliği ve bitki gelişimi üzerine olumlu etkileri nedeni ile biyokömürü öne çıkarmıştır. Yürütülen bu çalışmada fide ortamına (torf, T) farklı oranlarda (%0:kontrol, 5, 10 ve 20) eklenen biyokömürün (BK) kullanılmış subsutratlarda (1 ve 2 yıllık perlit-P ve 1 yıllık Hindistan cevizi torfu-HTC) kuzu marulu yetiştiriciliğindeki etkilerinin belirlenmesi amaçlanmıştır. Biyokömür hacimsel olarak belirtilen oranlarında torf ile karıştırılmış ve hazırlanan karışım nemlendirilerek viyollerde doldurulmuş, her bir göze 1 adet tohum (cv. Volhart-3) elle ekilmiştir. Viyoller 3 gün boyunca çimlenme odasında tutulduktan sonra adaptasyon serasına alınmıştır. Fideler 2 yapraklı hale gelince serada saksı içinde ortam kültürüne aktarılmış, açık sistem beslemeye tabi tutulmuştur. Fideler 30 gün ortam kültüründe yetiştirilmiş ve hasat olgunluğuna gelen bitkilerde bitki gelişimi, verim ve kalite değerlerine bakılmıştır. Denemeden elde edilen veriler, düşük düzeyde biyokömür ilavesinde (%5–10) yetişen fidelerin kuzu marul gelişimi ve verimini artırdığını, organik bir ortam olan HTC'de inert bir ortam olan P ortamlarına göre daha iyi sonuç alındığı, ortamların kullanım süresi arttıkça bitki gelişimi ve verimde düşüşler olabileceği gözlemlenmiştir. Ekonomik boyut ve tüm ölçülen parametreler birlikte değerlendirildiğinde özellikle %5 BK katkılı torf ortamından elde edilen fidelerin HTC ortamında yetiştirilmesi umutvar sonuçlar sağlamıştır. Çalışma atıkların değerlendirilmesi, doğal kaynakları koruması, çevre kirliliğini azaltma ve ekonomik verimlilik açısından topraksız tarımda sürdürülebilirlik adına önem arz etmiştir.

Anahtar Kelimeler: *Valeriana locusta*, Mısır Salatası, Topraksız Tarım, Biyoçar, Substrat.

3 BIOLOGY

Gizli Tehlike mi Masum Katkı mı: Gıda Koruyucusu Kalsiyum Asetatın Komet Testi ile DNA Hasarına Etkilerinin Değerlendirilmesi

[1,2*]Merve Yıldız, [2]Deniz Yüzbaşıoğlu, [2]Fatma Ünal
[1]Gazi Üniversitesi, Fen Bilimleri Enstitüsü, Biyoloji Anabilim Dalı, Teknikokullar, Ankara
[2]Gazi Üniversitesi, Fen Fakültesi, Biyoloji Bölümü, Teknikokullar, Ankara
***yildizmerve@gazi.edu.tr**

Özet: Gıda katkı maddeleri, teknolojik bir amaç doğrultusunda gıdalara eklenen ve anti-mikrobiyal, anti-oksidan, asitlik düzenleyici, lezzet arttırıcı, renklendirici, tatlandırıcı gibi rolleri bilinen maddeleri ifade eder. Koruyucular ise gıdalarda kalitenin arttırılması ve raf ömrünün uzatılması gibi amaçlar doğrultusunda gıdalara eklenen bir gıda katkı maddesi sınıfıdır. Anti-mikrobiyal, anti-oksidan ve asitlik düzenleyici aktivitelere sahiptirler. Kalsiyum asetat (E263), balık ve balık ürünleri, soslar, salatalar, tüketime hazır atıştırmalıklar, işlenmiş et karışımları, işlenmiş meyve veya dondurma gibi pek çok gıdada katkı maddesi olarak kullanılmaktadır. Komet testi, DNA'da tek ve çift zincir kırıkları, alkali hassas bölgeler, oksidatif DNA hasarı, nekrotik ve apoptotik çekirdeklerin ölçümüne olanak tanıyan ve tek hücre süspansiyonu haline getirilebilen dokularda uygulanabilen, hızlı ve güvenilir bir genotoksisite testidir. Çalışma kapsamında koruyucu gıda katkı maddesi kalsiyum asetatın insan periferal lenfositlerinde komet testi ile *in vitro* genotoksik etkileri incelenmiştir. Kalsiyum asetatın 12,5; 25; 50; 100 ve 200 µg/mL'lik beş farklı konsantrasyonu LD50 değeri baz alınarak gerçekleştirilen mitotik indeks hesaplamaları sonucunda seçilmiştir. Pozitif kontrol olarak hidrojen peroksit (H_2O_2, 100 µM), negatif kontrol grubu olarak ise distile su kullanılmıştır. Komet testi sonucuna göre kuyruk uzunluğu parametresinde konsantrasyon artışıyla birlikte en düşük iki konsantrasyon haricinde anlamlı artışlar gözlenmiştir. Kuyruk yoğunluğu verileri incelendiğinde konsantrasyon artışı ile birlikte kontrol grubuna kıyasla her konsantrasyonda anlamlı ($p<0,05$) bir artış görülmüştür. Kuyruk momentinde ise en düşük konsantrasyon hariç kontrole kıyasla anlamlı bir yükseliş söz konusudur. Sonuç olarak, gıda koruyucusu olarak kullanılan kalsiyum asetatın yüksek konsantrasyonlarının izole lenfositlerde bir saatlik uygulaması sonucunda genotoksik etkilere sebep olduğu belirlenmiştir. Ancak bu bulgunun diğer genotoksisite testleriyle de desteklenmesine ihtiyaç vardır.

Anahtar Kelimeler: Gıda Koruyucuları, Kalsiyum asetat, Asetatlar, Komet Testi, Genotoksisite

Teşekkür: Bu çalışma, Gazi Üniversitesi Bilimsel Araştırma Projeleri Koordinasyon Birimi tarafından FYL-2025-10168 numaralı proje olarak desteklenmiştir.

Production of recombinant spider silk and the hosts utilized in its production

[1*] Merve Karakaya, [1]Osman Seyyar
[1] Niğde Ömer Halisdemir University, Science Faculty, Department of Biology, Türkiye
[*]mervedryrk@gmail.com; oseyyar@ohu.edu.tr

Abstract: The remarkable mechanical and biophysical attributes of spider silks have positioned them as a leading topic of research for several years. Spider dragline silks exhibit a variety of unique mechanical attributes such as high strength and impressive toughness. Because of these excellent properties, many researchers are directing their attention to this biomaterial in the domains of biology, biochemistry, polymer technology, and textile technology. The cultivation of the majority of spider species is not feasible due to the considerable difficulties presented by their cannibalistic tendencies. The sole effective approach for large-scale production of spider silk is through the biotechnological synthesis of spidroins. Recent developments in genetic engineering have made it possible to synthesize recombinant spider silks. The large-scale production of spider silk proteins, known as spidroins, is being pursued through recombinant methods. A variety of heterologous hosts have been employed for the production of spidroins, including Leishmania, Salmonella, Escherichia coli, Pichia pastoris, Saccharomyces cerevisiae, mammalian cells, mice, goats, rice, sheep, Arabidopsis cells, tobacco, insect cells, silkworm, and other appropriate hosts. This review focusing on the production of recombinant spider silk through host systems.

Keywords: Spider silk, recombinant production, spidroin, dragline silk, spider

A list of endemic spiders in Anatolia

[1,*] Albulene EMİNİ, [2]Osman SEYYAR, [2]Hakan DEMİR,
[1]Municipality of Ferizaj, Ferizaj, Republish of Kosovo
[2] Niğde Ömer Halisdemir University, Science Faculty, Departmant of Biology, Türkiye
[*]albuleneemini@gmail.com

Abstract: The endemic spiders of Anatolia comprises 205 species belonging to 26 families, they represent nearly 15% of all spider species of Türkiye. The largest number of endemic species is found in the Dysderidae with 59 species. Also, Macrothelidae and Hersiliidae are 100% endemic. Genus *Harpactea* has the highest endemism with 33 species. The largest number of endemic species is distributed in northern and southern parts of Anatolia. The largest number of endemic species in Anatolia was mainly distributed in caves. Some remarks on conservation of endemic spiders were also added.

Keywords: Endemic, fauna, spider, Anatolia.

Spectroscopic analysis of nest papers of the wasps Vespula germanica, Dolichovespula media, and Dolichovespula sylvestris

[1,*]Nil Bağrıaçık, [2]Muhittin Öztürk, [3]Mustafa Okutan, [4]Ahmet Demir, [5]Orhan Yalçın
[1] Niğde Ömer Halisdemir University, Faculty of Science, Department of Biology
[2] Niğde Ömer Halisdemir University, Niğde Zübeyde Hanım Vocational School of Health Services, Program of Opticianry
[3] University of Siegen, Institute of High Frequency and Quantum Electronics
[4] Düzce University, Faculty of Sciences And Arts, Department of Physics
[5] Niğde Ömer Halisdemir University, Faculty of Science, Department of Physics
[*]nil@ohu.edu.tr

Abstract: This study examines the physical properties of nest papers from three Vespidae species (*Vespula germanica*, *Dolichovespula sylvestris*, and *Dolichovespula media*) collected in Central Anatolia, Turkey. The nests of these three Vespidae species consist of internal combs and an outer envelope surrounding the combs. Nests composed of combs and envelopes are used for thermal regulation and weather protection, and their physical properties vary depending on the species and the nest's location. The wasp produces its own nest paper by chewing plant cellulose with its saliva. In this study, the outer nest paper, also known as the envelope surrounding the combs, was investigated. Wasp nest papers prepared from plant fiber cellulose and saliva exhibited semiconductor optical properties. The dielectric behavior of different wasp nest papers was found to be consistent with the general theory. Furthermore, appropriate relaxation models were determined for dielectric plane graphs. Dielectric and optical analysis of the outer nest papers of the three Vespidae species revealed that these samples could inspire optoelectronic circuits in technological applications. X-ray diffraction tests have shown the SiO_2 and Al_2O_3 content, and common minerals such as carbonates that contribute to their structure.

Keywords: Wasp, nest paper, physical properties, dielectric spectroscopy, optic spectroscopy

Acknowkedgements: This research has been supported by the Scientific Research Projects Coordination Unit of Niğde Ömer Halisdemir University. Project Number: FMT 2025/19-YEDEP

Logistics Sector and Current Equipment in The Transportation and Preservation of Biological Materials

[1]Rzgar Farooq Rashid, [2*]Mesut Selamoglu
[1]Department of Medical Laboratory Science, College of Science, Knowledge University
[2]Logistics Program, Department of Management and Organization, Bahce Vocational School, Osmaniye Korkut Ata University Bahce
[*]mesutselamoglu@osmaniye.edu.tr

Abstract: The logistics sector plays a vital part in shipping and warehousing biological materials that need to be diligently handled in order to maintain their integrity, safety, and efficacy. Biological products such as pharmaceuticals, vaccines, and laboratory samples are very sensitive to the conditions of their surroundings such as temperature, humidity, and vibration. Efficient and reliable logistics systems are therefore needed for their safe transport. Cutting-edge technology in the form of cold chain storage rooms, temperature-controlled shipping, and IoT-enabled monitoring systems maintains these products under specified conditions throughout the entire supply chain. Extremely sensitive biologic products are usually stored in high-tech refrigeration systems like thermoelectric coolers and cryogenic storage. Round-the-clock real-time monitoring through smart sensors and constant environmental condition tracking inform stakeholders of excursions. There is also a growing application of robotic handlers and automated systems in the logistics of biological materials that is improving accuracy, speed, and reducing human error in handling. Not only are these improvements bringing about greater operational efficiency, but they are also ensuring higher levels of safety and compliance with regulatory stipulations. As the world demands more biological materials, such technological advances are crucial to meeting the needs of the healthcare, research, and biotechnology sectors while maintaining the highest standards of quality control and safety. An integrated logistics system like this one, which combines state-of-the-art equipment with real-time data monitoring, is critical to maintaining the integrity of biological materials during the transportation and storage processes..

Keywords: Cold Chain Logistics, Biological MaterialTransportation Temperature-Controlled Storage

Emli Vadisi (Aladağlar Milli Parkı) Örümcek Faunası (Türkiye) (Araneae)

[1] *Zeynep Düzelten Ballı, [2]Tuncay Türkeş
[1] Niğde Ömer Halisdemir Üniversitesi, Fen Bilimleri Enstitüsü, Biyoloji Bölümü
[2] Niğde Ömer Halisdemir Üniversitesi, Fen Fakültesi, Biyoloji Bölümü
***zeynepduzelten34@gmail.com**

Özet: Emli Vadisi'nin örümcek faunasını belirlemek amacıyla 2024-2025 yıllarının Mayıs, Temmuz ve Eylül aylarında yapılan arazi çalışmalarıyla örümcek örnekleri toplanmıştır. Toplam 259 örümcek örneği incelenmiş, 17 familyadan 42 cinse ait 51 örümcek türü tespit edilmiştir.

Anahtar Kelimeler: Aladağlar, Emli Vadisi, Fauna, Örümcek

Determination of the MSTN gen in the genome of local Kyrgyz horse

[1,*]Nurgul Ermekova, [1]Kadyrbay Chekirov, [1]Adinay Karypova
[1]Kyrgyz-Turkish Manas University, Faculty of Sciences, Department of Biology
***1912.02025@manas.edu.kg**

Abstract: The Kyrgyz horse (*Equus caballus*), an integral part of the nomadic lifestyle, cultural heritage, and economy of the Kyrgyz people, represents a unique genetic resource well adapted to the harsh natural conditions of Central Asia. However, due to extensive crossbreeding and declining population size, the breed is currently at risk of extinction. Genetic characterization of indigenous horse populations is essential for conserving biodiversity, improving breeding strategies, and clarifying gene–geographical origins, yet the gene pool of native horses in Central and Eastern Asia remains poorly studied.

This study focuses on the myostatin (MSTN) gene, a major regulator of skeletal muscle growth and a well-established genetic marker of equine performance traits. The MSTN promoter SINE insertion and the intronic SNP (C>T) are strongly associated with speed, endurance, and muscle fiber composition. The SINE insertion reduces MSTN expression, favoring type 2X glycolytic fibers and sprint performance, whereas the C allele of the intronic SNP is linked to short-distance speed and the T allele to long-distance endurance.

Biological material (blood) will be collected from native Kyrgyz horses. DNA will be extracted and assessed for quality, followed by PCR amplification using selected primers. Polymorphisms will be analyzed via the RFLP method. The expected outcome is the identification of MSTN variants in Kyrgyz horse populations, providing the first insights into the genetic basis of their performance traits. These findings will serve as a foundation for future studies and contribute to the preservation and sustainable breeding of the Kyrgyz horse.

Keywords: Kyrgyz horse**,** Myostatin (MSTN) gene**,** PCR-RFLP, SNP (C>T)

Comparative Morphology of the Cecum in Yaks (*Bos grunniens*) and Cattle (*Bos taurus*)

[1,*]Nurzhan Shamshieva, [1]Nurbek Aldayarov
[1]Department of Biology, Faculty of Sciences, Kyrgyz-Turkish Manas University
***2452y1201002@manas.edu.kg**

Abstract: This study examined the anatomical and histological features of the cecum in yaks (*Bos grunniens*) and cattle (*Bos taurus*) to identify both similarities and species-specific distinctions. The research was conducted on three yaks and three cattle, aged 2.5–3 years, weighing 260–280 kg and 280–310 kg, respectively. Tissue samples were obtained at slaughter and processed in the Histology Laboratory of the Department of Biology, Faculty of Sciences, Kyrgyz-Turkish Manas University. Anatomical assessment included organ size, color, consistency, and internal morphology. For microscopic analysis, tissues were fixed in 10% neutral formalin, sectioned at 5 µm, and stained with hematoxylin and eosin, along with histochemical and special staining methods (PAS, toluidine blue, Masson's trichrome, and Hart's technique). Both species displayed common organizational patterns: the cecum was conventionally divided into five regions, composed of three structural layers, and contained a cecal tonsil formed by lymphoid follicles and T-lymphocyte aggregates. The mucosa showed glandular epithelium with localized glands, while the muscular coat was arranged into two layers. Notable differences were also identified. The cattle cecum was generally larger, with more developed lymphoid structures and greater numbers of glandulocytes, whereas the yak cecum contained higher densities of eosinophils and mast cells. Overall, the macro- and micromorphological organization of the cecum in yaks and cattle demonstrates broad similarity, yet distinct interspecies differences are evident. These findings provide fundamental insights that may serve as a reference for further microscopic studies on digestive and immune functions in ruminants.

Keywords: cecum comparative morphology, lymphoid tissue, mast cells, yaks and cattle.

Advanced Techniques for Detecting Vitamin D, Phosphorus, and Calcium in Rohu (*Labeo rohita*)

[1]Aqsa Sarwar, [2,*]Basim. S. A. Al-Sulivany, [3]Muhammad Owais, [1]Ghulam Abbas, [4]Nuha Hameed Al-Bassam, [1]Javaria Altaf, [5]Syed Sibt E Hassan
[1]Department of Zoology, Government College University
[2]Deparment of Biology, College of Science, University of Zakho, Zakho
[3]Department of Zoology, Emerson University, Multan.
[4]Department of Animal Production, College of Agriculture, University of Tikrit, Tikrit, Iraq
[5]School of Life Science
***basim.ahmed@uoz.edu.krd**

Abstract: The present research examines serum levels of Vitamin D, calcium (Ca^{+2}), and phosphorus (P) in *Labeo rohita*. Young specimens were maintained under standardized laboratory conditions within experimental tanks and provided with feed containing 30% crude protein content. Subsequently, blood serum was collected from these fish for biochemical analysis to determine the aforementioned nutrient concentrations. For Vitamin D quantification, High-Performance Liquid Chromatography (HPLC) was used, whereas calcium (Ca+2) and phosphorus (P) concentrations were determined through colorimetric assays and Enzyme-Linked Immunosorbent Assay (ELISA) techniques, respectively. The analytical results revealed that Vitamin D concentrations averaged 515.0±63.15 ng/mL across all samples, with individual measurements falling between 79.1 and 1071.0 ng/mL. Serum calcium levels demonstrated an average value of 10.35±1.37 mg/dL, with concentrations ranging from 7.99 to 12.27 mg/dL. Meanwhile, phosphorus measurements showed a mean concentration of 15.75±1.3 mg/dL, with observed values extending from 7.54 to 34.56 mg/dL among the tested specimens.

The observed variations in Vitamin D levels showed notable associations with corresponding changes in both calcium and phosphorus concentrations, suggesting an intricate relationship influenced by multiple factors including nutritional sources, physiological processes, and ambient conditions. These results highlight the essential function of Vitamin D in maintaining mineral balance within fish physiology and point to important considerations for commercial fish farming operations. Subsequent investigations should examine how these results can be applied to develop more effective feed compositions tailored to the specific nutritional demands of individual fish species within environmentally responsible farming practices.

Keywords: *Labio rohita*, Vitamin D, Calcium, Phosphorus, HPLC technique.

Antioxidant and antimicrobial studies on *Centaurea iberica* L. from Quba

Ayten Shukurova, Aysel Nasirova
Department of Pharmacognosy, Azerbaijan Medical University, Baku, Azerbaijan
asukurova@amu.edu.az

Abstract: The genus *Centaurea* L. (Asteraceae) comprises nearly 800 species worldwide, 29 of which are endemic to Azerbaijan. *Centaurea iberica* is mainly distributed in the western and eastern parts of the Greater Caucasus, as well as in the Samur-Dəvəçi and Caspian coastal lowland regions. Owing to its diverse content of biologically active compounds, this species has been widely used in both folk and scientific medicine. Investigating this plant within Azerbaijan's rich flora is essential for evaluating its potential for industrial and pharmacological applications.

This study aimed to examine selected pharmacognostic characteristics and biological activities of *C. iberica* growing in Azerbaijan. The aerial parts were collected in Qırız-Dəhnə village, Quba district [41°14′22″ N, 48°18′36″ E] on 07.07.2024. Dried plant material (30.00 g) was extracted separately with n-hexane (CIHE), ethyl acetate (CIEA), 80% methanol (CIME), 50% ethanol (CIE50), and 80% ethanol (CIE80) for 24 hours (3 × 300 ml). Organic extracts were concentrated using a rotary evaporator, while the aqueous fraction (CIME) was lyophilized. Extractive yields were calculated gravimetrically. Resulting in the following values: CIHE (17.94%), CIEA (15.89%), CIME (1.82%), CIE50 (4.16%), and CIE80 (24.68%).

Antioxidant activity was evaluated using the DPPH assay (0.060 mg/ml) with gallic acid (250 µg/ml) as a standard and extracts at 2 mg/ml. Measurements were performed in triplicate using a 96-well microplate and Agilent BioTek Gen6 software. Radical scavenging activity of the extracts was as follows: CIHE (43.86% ± 1.04), CIEA (68.35% ± 0.75), CIME (75.17% ± 0.58), CIE80 (66.93% ± 0.61), and CIE50 (85.06% ± 0.32), compared with gallic acid (64.81% ± 0.62). The 50% ethanol extract (CIE50) showed the strongest antioxidant effect.

Antimicrobial testing revealed moderate activity in the 50% and 80% ethanol extracts, while the aqueous extract was inactive. No antifungal activity was detected. Overall, the results confirm the significant biological potential of *C. iberica* and its relevance for future medicinal applications.

Keywords. *Centaurea iberica* L., *asteraceae*, antioxidant, and antimicrobial activities.

Identification of flavonoids from *Betonica officinalis L.* by (HPLC - DAD)

[1,*]Shukurova A.S., [1]Alili S.A.
[1]Azerbaijan Medical University, Baku, Azerbaijan, The department of Pharmacognosy, Faculty of Pharmacy
***aytenshukurova85@gmail.com**

Abstract: The extraction of biologically active compounds from medicinal plant raw materials, their phytochemical characterization, and the evaluation of their pharmacological properties are among the essential tasks of modern pharmacy. In this context, *Betonica officinalis* L., a representative of the genus *Betonica* L. (family Lamiaceae) found within the flora of Azerbaijan, holds considerable scientific interest due to its therapeutic applications in both folk medicine and clinical practice. This relevance highlights the importance of its comprehensive pharmacognostic investigation. Previous international studies on *B. officinalis* L. have demonstrated that its raw material is rich in phenolic compounds, particularly flavonoids. Based on this information, the present research aimed to identify the flavonoid constituents of the plant using high-performance liquid chromatography with diode-array detection (HPLC-DAD).

For this purpose, 30 g of powdered plant material were extracted with methanol (1:10) at room temperature for 24 hours, with the procedure repeated three times over three days. The combined extracts were concentrated using a rotary evaporator and evaporated to dryness to obtain a resin-like residue. For analysis, 0.1 g of the residue was dissolved in 10 ml of methanol. Standard solutions of apigenin, quercetin, quercitrin, luteolin, and rutin were prepared accordingly. Chromatographic separation was performed on an Agilent 1260 HPLC system equipped with a DAD detector and a Gemini C18 column (4.6 × 250 mm, 5 µm), using water:methanol:acetonitrile (550:50:400) as the mobile phase at a flow rate of 1.2 ml/min and detection at 254 nm.

Seven peaks were observed in the chromatogram, with two (at 2.662 and 4.970 min) suitable for identification. Comparison with standards confirmed the presence of rutin, quercetin, quercitrin, and luteolin. These results verify the occurrence of flavonoids in *B. officinalis* L. and form a basis for further phytochemical and pharmacological investigations, including expanding research to other species of the genus *Betonica* L.

Keywords: *Betonica officinalis* L., phenolic compounds, flavonoids, chromatographic analysis.

Combined Effects of Plastics and Rising Temperatures on the Mediterranean Sponge *Sarcotragus spinosulus*

[1]Maria del Mar Ribas-Taberner, [1]Maria Magdalena Quetglas-Llabrés, [1]Jessica Lombardo, [1]Montserrat Compa, [2,3,4]Silvia Tejada-Gavela, [3,5]Samuel Pinya, [5]Llorenç Gll, [1,3,4,*]Antoni Sureda
[1]Research Group on Community Nutrition & Oxidative Stress, University of the Balearic Islands-IUNICS
[2]Group of Neurophysiology, Department of Biology, University of the Balearic Islands
[3]Health Research Institute of the Balearic Islands (IdISBa)
[4]CIBEROBN (Physiopathology of Obesity and Nutrition)
[5]Interdisciplinary Ecology Group, University of the Balearic Islands
***antoni.sureda@uib.es**

Absract: Human activities exert increasing pressure on marine ecosystems, mainly through plastic pollution and rising seawater temperatures. This study assessed the combined impact of these stressors on the sponge *Sarcotragus spinosulus* along the southwest coast of Mallorca (Balearic Islands). Sponge and plastic samples were collected in July, August, and November 2024, representing different thermal conditions. The presence of *Vibrio* bacteria, microplastic (MP) incorporation in sponge tissues, and several biomarkers related to oxidative stress, detoxification, and immune response were evaluated. Results revealed a significant increase in colony-forming units (CFU), particularly *Vibrio alginolyticus*, in August for both plastics and sponge samples. Affected sponges—characterized by dull coloration and heavy epiphytic growth—harbored notably higher CFU counts compared to healthy individuals, with values returning to baseline by November. MPs were detected in both groups, though concentrations were higher in affected sponges. Biochemical analyses indicated that healthy individuals exhibited enhanced antioxidant and defense responses in August, including increased catalase, superoxide dismutase, glutathione S-transferase, and lysozyme activities. Conversely, affected sponges showed elevated malondialdehyde levels, reflecting oxidative damage, together with weaker protective responses. Overall, these findings demonstrate that the combined influence of high temperatures and plastic pollution promotes the proliferation of pathogenic bacteria and undermines the physiological resilience of *S. spinosulus*. This scenario highlights a potential threat to the survival of this ecologically important sponge species in the face of ongoing climate change.

Keywords: Sponge; microplastics; Vibrio; oxidative stress; climate change

Yaşayan duvar sistemlerinde yenilikçi biyomateryal olarak briyofitlerin kullanım potansiyelinin incelenmesi

[1*]Tülay Ezer
[1]Niğde Ömer Halisdemir Üniversitesi, Mimarlık Fakültesi, Peyzaj Mimarlığı Bölümü
[*]tezer@ohu.edu.tr

Özet: Günümüzde estetik ve ekolojik amaçlarla binalara entegre edilen yeşil çatılar ve yeşil duvarlar gibi yeşillendirme sistemlerinin kullanımları giderek artmaktadır. Ancak, mevcut yaşayan duvar sistemlerinin yüksek kurulum ve bakım maliyetleri, kentsel mekânların yeşillendirilmesini olumsuz yönde etkilemektedir. Bu nedenle briyofitler, özellikle de kurakçıl karakterli türler, ihtiyaç duydukları su ve besin miktarının azlığı, yüksek kuruma toleransı gibi sahip oldukları biyolojik özelliklerinden dolayı, kentsel çevreler için düşük maliyetli ve az bakım gerektiren alternatif bir yeşil kaplama materyali olarak değerlendirilebilir. Bu çalışmada, Niğde kent merkezinde yayılış gösteren bazı briyofitlerin sürdürülebilir peyzaj tasarımı kapsamında yeşil duvar sistemlerinde yeni biyomateryaller olarak kullanım potansiyeli araştırılmıştır. Yapılan arazi ve teşhis çalışmaları sonucunda tespit edilen briyofit türlerinin biyolojik ve ekolojik özellikleri belirlenerek bu türlerin yaşayan duvar uygulamalarında alternatif biyomateryal olarak kullanılabilirlik potansiyelleri değerlendirilmiş ve elde edilen bulgular doğrultusunda kullanım alanlarına yönelik öneriler sunulmuştur.

Anahtar Kelimeler: Biyomateryal, Briyofit, Dikey yeşillendirme.

4 BIOTECHNOLOGY

Investigation of Anticancer Effects of Polysaccharides Extracted from *Prangos Ferulacea* (L) on MCF7 and A549 Cancer Cell Lines at Gene and Protein Levels

[1] Amina İbrahimova, [1]Rahime Altıntas, [1]Selma Saoula, [1]*Melda Şişecioğlu
[1]Department of Molecular Biology and Genetics, Ataturk University, 25240 Erzurum, Turkiye
***msisecioglu@atauni.edu.tr**

Abstract: Polysaccharides are biopolymers found widely in nature. Plant polysaccharides, in particular, are attracting intense interest in clinical, food, pharmaceutical, and biotechnological fields due to their diverse biological activities, such as antitumor, immunomodulatory, and antioxidant properties. The biological activity of plant polysaccharides depends on their sugar composition, molecular size, distribution of functional groups, extraction method, and processing procedures. It has been reported that the anti-tumor activities of polysaccharides are closely related to their molecular structure, most of the polysaccharides show anti-tumor activity mainly through cell cycle arrest, anti-angiogenesis, apoptosis and immunomodulation mechanisms. Therefore, in this study, it was aimed to investigate the effects of polysaccharides purified and characterized by different extraction methods from the Casır plant (*Prangos Ferulacea* (L.)) grown in Erzurum for the first time, on human breast (MCF-7) and lung (A549) cell lines. Accordingly, polysaccharides were extracted from the *Prangos Ferula* (L.) using TPP, TPP enzyme pre-treatment (E-TPP), TPP magnetic field pre-treatment (M-TPP), and TPP enzyme/magnetic field pre-treatment (E/M-TPP) methods. The anticancer effects of the extracted polysaccharides were investigated via the apoptotic pathway by qPCR at the gene level and western blot analysis at the protein level. As a result, it was determined that among the polysaccharides extracted by different methods, especially the PFPs-E/M fraction significantly increased the apoptotic BAX gene and protein expression. Additionally, it was observed that this fraction caused a significant increase in Caspase-3 activity and BAX/BCL-2 ratio. These findings strongly suggest that PFPs-E/M polysaccharides have anticancer potential by inducing apoptosis.

Keywords: *Prangos Ferulacea* (L.), Polysaccharide, Extraction, Anticancer activity, Gene expression

Niğde ilinde patates çürüklük hastalığı etmeni (*Pectobacterium* sp.) dağılımının araştırılması

[1]Niyazi GÜCENMEZ, [2,*]Tuba ARTAN ONAT
[1] KOSGEB Müdürlüğü Niğde, Türkiye
[2]Niğde Ömer Halisdemir Üniversitesi Fen Fakültesi Biyoteknoloji Bölümü Kampüs Niğde Türkiye
tubaartan@ohu.edu.tr

Özet: Patates, dünya genelinde temel gıda ürünlerinden biri olup Türkiye'de özellikle Niğde ili, üretimde önemli bir paya sahiptir. Ancak patates üretimi, Soft Rot Pectobacteriaceae (SRP) grubuna ait bakterilerin neden olduğu karabacak ve yumuşak çürüklük hastalıkları nedeniyle ciddi tehdit altındadır. Bu hastalıklar uygun çevresel koşullarda %20-80'e varan ürün kayıplarına yol açabilmektedir. Türkiye'de daha önce çeşitli bölgelerde *Pectobacterium* ve *Dickeya* türleri rapor edilmiş olmasına rağmen, Niğde'de güncel saha verileri sınırlıdır. Bu çalışmada Niğde ilinde farklı tarla ve depolardan toplam 104 örnek toplanmış ve bakteriyel izolasyonlar yapılmıştır. Crystal Violet Pectate (CVP) besiyerinde çukur oluşturan ve patates dilimlerinde pektinolitik aktivite gösteren izolatlar seçilmiştir. Toplam 64 izolat pektinolitik aktivite göstermiştir. Bu izolatlardan 25 tanesi moleküler yöntemlerle tanımlanmıştır. Elde edilen sonuçlar, *Pectobacterium* spp.'nin bölgede yaygın olarak bulunduğunu göstermektedir. Özellikle *P. carotovorum subsp. carotovorum* başlıca patojen olarak öne çıkmıştır. Ayrıca *P. odoriferum*, *P. atrosepticum* ve *P. versatile* türleri de belirlenmiştir. Bunun yanında *Lelliottia amnigena* ve *Aeromonas* sp. gibi farklı bakteri türleri de tanımlanmıştır. Çalışma, Niğde'de patates çürüklük etmenlerinin çeşitliliğini güncel olarak ortaya koymakta ve bölgesel epidemiyolojiye katkı sağlamaktadır. Bulgular, tohumluk patates üretiminde sertifikasyon ve biyokontrol uygulamalarının önemini vurgulamaktadır. Ayrıca patojen çeşitliliği, sürdürülebilir patates üretimi için sürekli izleme ve yeni kontrol stratejilerinin geliştirilmesi gerektiğini göstermektedir.

Anahtar Kelimeler: patates çürüklüğü, karabacak hastalığı, SRP (Soft Rot Pectobacteriaceae), *Pectobacterium*

Determination of the prevalence of potato rot disease causative agent (Pectobacterium sp.) in Niğde Province

[1]Niyazi GÜCENMEZ, [2,*]Tuba ARTAN ONAT
[1]KOSGEB Müdürlüğü Niğde, Türkiye
[2]Niğde Ömer Halisdemir University, Faculty of Science, Biotechnology
***tubaartan@ohu.edu.tr**

Abstract: Potato is one of the major staple crops worldwide, and Niğde province in Turkey has a significant importance in its production. However, potato cultivation is severely threatened by blackleg and soft rot diseases caused by members of the Soft Rot Pectobacteriaceae (SRP) group. Under favorable environmental conditions, these diseases can lead to yield losses ranging from 20% to 80%. Although *Pectobacterium* and *Dickeya* species have previously been reported in different regions of Turkey,

updated epidemiological data for Niğde remain limited. In this study, a total of 104 samples were collected from various potato fields and storage facilities across Niğde province, and bacterial isolations were carried out. Isolates forming cavities on Crystal Violet Pectate (CVP) medium and exhibiting pectinolytic activity on potato tuber slices were selected for further analysis. Among these, 64 isolates showed pectinolytic activity. Twenty-five representative isolates were subjected to molecular identification. The results revealed that Pectobacterium spp. were the predominant pathogens in the region, with *P. carotovorum subsp. carotovorum* being the most common. In addition, *P. odoriferum, P. atrosepticum*, and *P. versatile* were also detected. Other bacterial species such as *Lelliottia amnigena* and *Aeromonas* sp. were identified as well. This study provides updated insights into the diversity of potato soft rot pathogens in Niğde and contributes to the regional epidemiological understanding of the disease. The findings highlight the importance of certified seed tuber use, regular monitoring, and the development of integrated management strategies, including biocontrol approaches, to ensure sustainable potato production in the region.

Keywords: potato rot disease, blackleg disease, SRP (Soft Rot Pectobacteriaceae), *Pectobacterium*

Potential of Endemic *Pastinaca zozimoides* Fenzl Novel Beverage Fermentation with the Kombucha Consortium

[1,*]Cihan DÜŞGÜN
[1]Niğde Ömer Halisdemir Üniversity, Faculty of Science, Department of Biology
[*]cihandusgun@ohu.edu.tr

Abstract: Kombucha is a fermented beverage that is slightly sweet, slightly acidic, refreshing, and has a low carbon dioxide content, consumed worldwide. Traditionally, kombucha is obtained by fermenting sugary tea (*Camellia sinensis*) with the addition of SCOBY, a symbiotic association of bacteria and yeast. In this study, sugared endemic *Pastinaca zozimoides* Fenzl was used for the fermentation of kombucha. The antioxidant activities, total phenolic contents, physicochemical properties of kombucha beverages were assessed. Additionally, the effects of fermentation on kombucha beverages were compared. The results found that *P. zozimoides* kombucha beverages possessed strong antioxidant activities and high total phenolic content. In addition, fermentation with *P. zozimoides* could remarkably enhance the antioxidant activity and total phenolic contents. Therefore, it might be a better strategy to produce kombucha by fermentation process of *P. zozimoides*.

Keywords: Kombucha, *P. zozimoides*, antioxidant, fermentation

Current Biomedical Tools and Their Areas Of Use

[1*]Roza Sadykova, [1]Dinara Ilesbekova, [1,2]Zeliha Selamoglu
[1]Khoja Akhmet Yassawi International Kazakh-Turkish University, Faculty of Sciences, Department of Biology, Central Campus, Turkestan, Kazakhstan
[2]Department of Medical Biology, Faculty of Medicine, Nigde Omer Halisdemir University, Nigde, Türkiye
***rose.sadykova@bk.ru**

Abstract: This article will provide a comprehensive overview of the medical equipment available for use in various areas of medical practice, along with guidance on its utilisation and classification. This information is of paramount importance for students and medical professionals alike.

At present, medical equipment is of considerable importance in the diagnosis and treatment of patients. The term "biomedical equipment" is used to denote any devices or technologies used for medical purposes, including those employed for the purposes of diagnosis, treatment, and patient monitoring. The range of such technologies is vast, extending from simple devices such as a stethoscope to more sophisticated equipment including ventilators and magnetic resonance imaging (MRI) machines. These devices are at the forefront of innovation in healthcare, as biomedical equipment is crucial for accurate diagnosis, effective treatment and patient monitoring. Access to reliable equipment is instrumental in reducing mortality rates and enhancing patient outcomes. In this regard, the healthcare service has been steadily enhancing its standards and treatment methods on an annual basis, thereby contributing to an increase in the effectiveness of treatment.

The utilisation of biomedical devices encompasses a wide range of medical disciplines, and their classification is predicated on the functions they perform. The most elementary pieces of equipment are the microscope and the stethoscope, which perform a multitude of diagnostic functions. The serviceability of the device is as important as its correct setup and use. Equipment maintenance is regarded as the most crucial stage of research, given that laboratory devices function with a particular reagent, which is directly associated with the precision of the analysis outcomes. Further information on this topic can be found in the article.

Keywords: Classification, equipment, diagnostics.

Lokal Endemik ve Nesli Tükenme Tehlikesi Altında Olan *Scrophularia scopolii* Hoppe ex Pers. var. *parryi* R. Mill. (Elköpürten)'in Önemi ve Korunması

[1,]Nurevşan Gündoğdu, [2*]Bengü Türkyılmaz Ünal
[1]Niğde Ömer Halisdemir Üniversitesi, Fen Bilimleri Enstitüsü, Biyoteknoloji Anabilim Dalı
[2]Niğde Ömer Halisdemir Üniversitesi, Fen Fakültesi, Biyoteknoloji Anabilim Dalı
***bturkyilmaz@ohu.edu.tr**

Özet: İklim değişikliği, çevre kirliliği ve insan kaynaklı habitat tahribatı bitkilerin yaşamlarını olumsuz etkilemektedir. Özellikle son yıllarda artan kuraklık, tuzluluk gibi stres faktörleri bitkilerin daha hassas bir hale gelmesine sebep olmaktadır. Her yıl değişen iklim koşulları, abiyotik ve biyotik stres faktörleri ekosistemde ciddi tahribatlara yol açmaktadır. Endemik bitkiler, yalnızca belirli bir coğrafyada yetişen ve doğal yayılım alanı sınırlı olan türlerdir. Bu türlerin korunması, biyolojik çeşitliliğin sürdürülmesi ve ekosistem dengesinin sağlanması açısından kritik bir öneme sahiptir. Bu bildiride ülkemiz florası ve biyoçeşitliliğinde önemli bir yere sahip, nesli tükenme tehlikesi altında olan, lokal endemik tür kategorisinde bulunan *Scrophularia scopolii* Hoppe ex Pers. var. *parryi* R. Mill. (Elköpürten)'in önemine dikkat çekilmesi amaçlanmaktadır.

Anahtar Kelimeler: iklim değişikliği, lokal endemik türler, mikroçoğaltım teknikleri, nesli tehlike altında olan bitkiler, *Scrophularia scopolii*

The Importance and Conservation of the Locally Endemic and Endangered *Scrophularia scopolii* Hoppe ex Pers. var. parryi R. Mill. (Elköpürten)

[1]Nurevşan Gündoğdu, [2*]Bengü Türkyılmaz Ünal
[1]Niğde Ömer Halisdemir Üniversitesi, Fen Bilimleri Enstitüsü, Biyoteknoloji Anabilim Dalı
[2]Niğde Ömer Halisdemir Üniversitesi, Fen Fakültesi, Biyoteknoloji Anabilim Dalı
***bturkyilmaz@ohu.edu.tr**

Abstract: Climate change, environmental pollution, and human-induced habitat destruction negatively impact plant life. Stress factors such as drought and salinity, which have increased in recent years, are making plants more vulnerable. Annually changing climate conditions, along with abiotic and biotic stress factors, are causing serious damage to ecosystems. Endemic plants are species that grow only in a specific geography and have a limited natural distribution area. The protection of these species is critical for maintaining biodiversity and ecosystem balance. This paper aims to highlight the importance of *Scrophularia scopolii* Hoppe ex Pers. var. parryi R. Mill. (Elköpürten), that a locally endemic species, holds a significant place in our country's flora and biodiversity and is at risk of extinction.

Keywords: climate change, endangered plants, local endemic species, micropropagation techniques, *Scrophularia scopolii*

DNA Damage Potentials and Repair Mechanisms of Today's Common Radioactive Agents: An Update

[1,*]Ilesbekova Dinara, [1]Roza Sadykova, [1,2]Zeliha Selamoglu
[1]Department of Biology, Faculty of Sciences, Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan
[2]Department of Medical Biology, Faculty of Medicine, Nigde Omer Halisdemir University, Nigde, Türkiye
***ilesbekovadi1@gmail.com**

Abstract: The utilization of contemporary radioactive substances in medical, industrial, and nuclear energy applications has the potential to compromise the genetic integrity of cells. Ionizing radiation has been demonstrated to induce a range of damage to the deoxyribonucleic acid (DNA) molecule, including single- and double-stranded breaks, base oxidation, and cluster damage. Double-strand breaks (DSBs) are of particular concern due to their ability to induce mutations, genomic instability, and oncogenesis. It has been demonstrated that exposure to high-LET (low-energy transfer) radiation, such as α-particles or neutrons, results in more complex and intractable damage when compared to low-LET radiation (γ- and X-rays). The cell possesses a variety of sophisticated DNA repair mechanisms. Key pathways include non-homologous end joining (NHEJ), homologous recombination (HR), base excision repair (BER), and nucleotide excision repair (NER).The activation of signaling cascades involving ATM, ATR, and DNA-PK proteins serves to regulate the cellular response to damage. Recent studies have demonstrated the role of long non-coding RNAs, such as NEAT1, in the coordination of repair processes, as well as the importance of the spatial architecture of the genome for damage distribution. It is imperative to comprehend the molecular mechanisms of DNA repair during radiation exposure for radiobiology, the development of anticancer strategies, and the enhancement of biosafety. The application of contemporary scientific data has the potential to enhance the efficacy of radiotherapy methodologies, mitigate genetic risks, and facilitate the development of novel radioprotectors.

Keywords: DNA Damage, DNA Repair, Mutation, Radioactive agent, Recombination

Priming Uygulamalarının Bitki Biyoteknolojisinde Önemi

[1,*]Hüseyin TÜRKER, [2]Fatma ÖZMEN
[1] Niğde Ömer Halisdemir Üniversitesi, Fen Fakültesi Biyoteknoloji Bölümü
[2]Niğde Ömer Halisdemir Üniversitesi, Fen Bilimleri Enstitüsü, Biyoteknoloji Bölümü
[*]huseyinturker@ohu.edu.tr

Özet: Olumsuz çevre koşulları ve aşırı abiyotik stresler (sıcaklık, kuraklık, soğuk, tuzluluk, Ultraviyole ve ağır metal stresi) bitki büyümesini, gelişmini ve verimini ciddi şekilde etkilemektedir. Çeşitli abiyotik stres faktörlerine karşı toleransın sağlanması veya ilgili stres faktörlerinin zararlı etkilerinin hafifletilemesinde priming (hazırlama) yöntemlerinin oldukça etkili olduğu ve bitki büyümesi ve gelişimi için umut vaat eden bir yaklaşım olduğu kabul edilmektedir. Tohum veya fide gibi bitkilerin farklı gelişim aşamalarında priming yöntemlerinin uygulanabilirliği nedeniyle günümüzde bitki biyoteknolojisinde giderek ilgi gören bir uygulama haline gelmektedir. Bu derlemede priming yöntemleri hakkında bilgiler verilecek olup priming uygulamalarının bitki biyoteknolojisindeki önemi detaylı bir şekilde irdelenecektir.

Anahtar Kelimeler: Abiyotik stres, Bitki biyoteknolojisi, Kuraklık, Priming, UV-B

The Importance of Priming Applications in Plant Biotechnology

[1,*] Hüseyin Türker, [2]Fatma ÖZMEN
[1]Niğde Ömer Halisdemir University, Faculty of Science, Department of Biotechnology
[2] Niğde Ömer Halisdemir University, Graduate School of Natural and Applied Sciences, Department of Biotechnology
***huseyinturker@ohu.edu.tr**

Abstract: Adverse environmental conditions and excessive abiotic stresses (temperature, drought, cold, salinity, ultraviolet radiation, and heavy metal stress) seriously affect plant growth, development, and yield. Priming methods are recognized as highly effective in providing tolerance to various abiotic stress factors or mitigating the harmful effects of related stress factors, and are considered a promising approach for plant growth and development. Due to the applicability of priming methods at different stages of plant development, such as seeds or seedlings, it has become an increasingly popular application in plant biotechnology today. This review will provide information on priming methods and examine in detail the importance of priming applications in plant biotechnology.

Keywords: Abiotic stress, Plant biotechnology, Drought, Priming, UV-B

Parazit Bitkilerle Mücadelede Biyoteknolojik Yaklaşımlar

[1,*]Hüseyin TÜRKER, [2]Fatma ÖZMEN
[1] Niğde Ömer Halisdemir Üniversitesi, Fen Fakültesi Biyoteknoloji Bölümü
[2]Niğde Ömer Halisdemir Üniversitesi, Fen Bilimleri Enstitüsü, Biyoteknoloji Bölümü
[*]huseyinturker@ohu.edu.tr

Özet: Parazit bitkiler hem gelişmiş hem de gelişmekte olan ülkelerde bitkisel üretim için en yıkıcı ve çözülmesi zor sorunlardan birini oluşturmaktadır. Yaklaşık olarak 20 familyanın ihtiva ettiği çeşitli parazitik bitki türleri neredeyse tüm dünyada temel gıda ve bitkisel üretimde %30-80 oranında üretim kaybına neden olmaktadır. Diğer yabani otlarla karşılaştırıldığında, parazitik yabani bitkilerin yaşam tarzları nedeniyle geleneksel yöntemlerle kontrol edilmesi oldukça zordur. Parazitler bitkiler konakçı ile yakından ilişkili olduğu ve metabolik olarak da oldukça benzerlik gösterdikleri için farklı çözümler geliştirmek zor olabilmektedir. Parazit bitkilerle etkin bir şekilde mücadele edebilmek için, histolojik, fizyolojik, genetik ve moleküler düzeylerdeki etkileşim ve bunlarla ilişkili direnç mekanizmalarının daha iyi anlaşılmasını gereklidir. Son zamanlarda parazit bitkilerle mücadele için yapılan çalışmalar parazit bitki(ler) ve konakçıları arasındaki etkileşimleri, taksonomiyi ve parazit yabani otların biyolojisini ve klasik kontrolünü kapsamaktadır. Bu derlemede, parazit bitkilerin kontrol ve mücadelesinde alternatif yöntemlerin neden gerekli olduğu tartışılacak ve biyoteknolojiye dayalı kontrol önlemleri hakkında bilgiler verilecektir.

Anahtar Kelimeler: Bitki biyoteknolojisi, Mücadele, *Orobanche* sp., Parazit Bitki

Biotechnological Approaches in the Control of Parasitic Plants

[1,*] Hüseyin Türker, [2]Fatma ÖZMEN
[1]Niğde Ömer Halisdemir University, Faculty of Science, Department of Biotechnology
[2] Niğde Ömer Halisdemir University, Graduate School of Natural and Applied Sciences, Department of Biotechnology
***huseyinturker@ohu.edu.tr**

Abstract: Parasitic plants constitute one of the most destructive and difficult problems to solve for plant production in both developed and developing countries. Various parasitic plant species, comprising approximately 20 families, cause production losses of 30-80% in basic food and plant production almost worldwide. Compared to other weeds, parasitic weeds are quite difficult to control using traditional methods due to their lifestyle. Since parasites are closely related to their host plants and are also quite similar metabolically, it can be difficult to develop different solutions. To effectively combat parasitic plants, it is necessary to better understand the interactions at the histological, physiological, genetic, and molecular levels and the associated resistance mechanisms. Recent studies on combating parasitic plants have covered the interactions between parasitic plants and their hosts, taxonomy, and the biology and classical control of parasitic weeds. This review will discuss why alternative methods are necessary for the control and management of parasitic plants and provide information on new biotechnology-based control measures.

Keywords: Plant biotechnology, Control, *Orobanche* sp., Parasitic Plant

Plant-Based Antimicrobial Peptides: Natural Solutions to Antibiotic Resistance

[1,*]Abdol Ghaffar Ebadi, [2]Zeliha Selamoğlu
[1]Department of Agriculture, Jo.C, Islamic Azad University
[2]Department of Medical Biology, Medicine Faculty, Nigde Omer Halisdemir University
***dr_ebadi2000@yahoo.com**

Abstract: The rising prevalence of antibiotic-resistant pathogens poses a critical threat to global public health, and thus, alternative antimicrobial agents need urgent exploration. Among the emerging alternatives are plant-derived antimicrobial peptides (AMPs), which are receiving increased attention because of their broad-spectrum activity, low toxicity, and biodegradability. This paper addresses recent advances in the discovery, purification, structural elucidation, and modes of action of AMPs derived from medicinal and agricultural plants. Experimental and computational literature reveals that the peptides primarily function by disrupting microbial membranes or intracellular targets, reducing the risk of resistance development. Biotechnological approaches such as genetic engineering, synthesis of synthetic peptides, and nanoparticle delivery systems have enhanced the stability and bioavailability of AMPs for therapeutic and agricultural applications. Some AMPs are also shown to have synergistic activity with conventional antibiotics, thus enabling combination therapy. Plant AMPs are promising candidates as bio-preservatives and bio-pesticides in agriculture and can assist in providing sustainable crop protection. Scalability limitations, regulatory problems, and degradation of peptides in the body are obstacles. However, the application of AMPs in clinical and environmental settings is increasingly possible with advancements in synthetic biology and peptide production. The study concludes that plant-derived antimicrobial peptides are potential next-generation antimicrobial products that align with sustainability and environmental protection aims.

Keywords: Antimicrobial peptides, Antibiotic resistance, Plant biotechnology, Natural antibiotics, Bio-preservation, Sustainable medicine

Identification of retrotransposons in the genomes of local tomato varieties in Kyrgyzstan

[1,*]Aibiike Bektemirova, [1]Kadyrbai Chekirov
[1]Kyrgyz-Turkish Manas University, Institute of graduate studies, Biotechnology Department
***2452y1202002@manas.edu.kg**

Abstract: Tomato (*Solanum lycopersicum L*.) is a key vegetable cultivated throughout Kyrgyzstan, also one of the most extensively studied dicotyledonous crops in molecular genetics. The country's unique ecological conditions together with temperature fluctuations that are pronounced, high-altitude areas, plus a continental climate, have fostered local varieties that develop high adaptive potential, yet people have explored their molecular genetic characteristics poorly. Genetic variation depends considerably on mobile genetic elements since they represent a large portion of plant genomes. Among them, retrotransposons do occupy more than 60% of the tomato genome. These retrotransposons move by way of a “copy-and-paste” mechanism, and they have an influence upon genome structure, mutagenesis, and species evolution. This research seeks to probe retrotransposon dynamics within genomes of eight Kyrgyzstan local tomato cultivars. Their structure and polymorphism we will determine while exploring their possible role regarding adaptation to local ecological states. PCR plus agarose gel electrophoresis will detect polymorphic loci plus the CTAB method will extract high-quality genomic DNA. IRAP (Inter-Retrotransposon Increased Polymorphism) is the main molecular method, utilized for assessing retrotransposons' placement and polymorphism within tomato genomes. The expected results should reveal informative retrotransposon-associated markers for subsequent genetic and breeding studies and conserve local tomato germplasm. Comprehension of the role for mobile elements in plant genome evolution will be improved by all of these findings with also providing of a scientific basis for breeding of new cultivars with improved resilience also adaptive capacity under the environmental stresses within Central Asia.

Keywords: Tomato (*Solanum lycopersicum L*.), local cultivars, retrotransposons, mobile genetic elements, genetic polymorphism.

Genetic study of tomato varieties grown in Kyrgyzstan for the presence of transgenes

[1,*]Aizat Ibragim kyzy, [1]Kadırbay Chekirov
Kyrgyz-Turkish Manas University, Institute of graduate studies, Biotechnology Department
***2452y1202003@manas.edu.kg**

Abstract: This work aims to propose a research program designed to assess the presence of genetically modified organisms (GMOs) in tomato varieties cultivated in Kyrgyzstan. The main advantage and novelty of this study lie in its pioneering nature: it represents the first systematic effort to screen tomatoes for GMO markers specifically in Kyrgyzstan. The study addresses concerns related to national food safety and biodiversity conservation. Existing scientific data, such as the detection of the CaMV 35S promoter in maize varieties in Kyrgyzstan, underscores the necessity for GMO monitoring. Based on this precedent, the planned research will analyze 17 tomato varieties (including local and imported ones from countries like China, Russia, and the Netherlands) collected from different regions of Kyrgyzstan. DNA will be extracted from the samples and screened via Polymerase Chain Reaction (PCR) for key GMO markers (e.g., NOS terminator, CaMV 35S promoter, hygromycin resistance gene, cry1Ac, and cry3A genes). The PCR products will be analyzed using agarose gel electrophoresis, and any detected sequences will be subjected to bioinformatic analysis (BLAST) for confirmation. The expected outcomes of this study will provide the first scientific data on the GMO status of tomatoes in Kyrgyzstan, enabling an assessment of transgene prevalence and contributing to the development of regulatory measures for food safety and ecological balance.

Keywords: Genetically Modified Organisms (GMO), Tomato, Polymerase Chain Reaction (PCR), Food Safety, Biodiversity**.**

Bıoactive Constituents Of Eucalyptus And Their Potential Applications In Contemporary Medicine

[1,*]İ.E.Jahangirova, [1]C.E.Tagiyeva
[1]The department of Pharmacognosy, Faculty of Pharmacy,
Azerbaijan Medical University, Baku, Azerbaijan
***jeylantagiyeva@gmail.com**

Abstract: Modern medical research demonstrates that medicinal plants play a crucial role in the treatment and prevention of various diseases. Their biologically active constituents possess significant pharmacological properties. Among these plants, species of the genus Eucalyptus occupy a distinguished position. *Eucalyptus* L. (*eucalyptus*), belonging to the family Myrtaceae, comprises more than 600 species of flowering plants. Globally, approximately 700 species are distributed across Melanesia, New Zealand, the Mediterranean coasts, California, Florida, certain regions of Africa, and South America. In Azerbaijan, around 20 species are found, particularly in the humid subtropical climate of Lankaran, as well as in the Kura-Araz lowland and some arid subtropical areas of the Absheron Peninsula. Among them are E. *macarthurii*, E. *viminalis*, E. *cinerea*, E. *globulus*, E. *stuartiana*, and others.

The chemical composition and pharmacological properties of eucalyptus species cultivated in Azerbaijan have been extensively studied in various scientific works. A detailed and systematic investigation of their biologically active compounds provides the basis for assessing potential therapeutic and pharmacognostic applications, as well as for identifying novel uses and evaluating their clinical efficacy.

The phytochemical profile of *Eucalyptus globulus* includes essential oils, monoterpene oxides (1,8-cineole, eucalyptol), monoterpenes (α-pinene, β-pinene, limonene, terpinolene), sesquiterpenes (aromadendrene, globulol, spathulenol), aldehydes (p-cymene derivatives), alcohols (terpinen-4-ol, α-terpineol), phenolic acids (gallic acid, caffeic acid), and flavonoids (quercetin, rutin). E. *citriodora* is particularly rich in aldehydes, alcohols (citronellol, isopulegol), esters, monoterpenes (β-pinene, limonene), phenolic acids, flavonoids, and tannins.

Due to this wide spectrum of bioactive constituents, Eucalyptus species demonstrate multiple pharmacological activities. These include antimicrobial and antibacterial protection, anti-inflammatory and anti-edematous effects, as well as improvements in respiratory function. Moreover, analgesic, antioxidant, and general protective properties further enhance the therapeutic potential of eucalyptus. Consequently, it is recognized as a valuable medicinal plant in modern phytotherapy and pharmacology.

The genus *Eucalyptus* L. has long been a subject of scientific interest in both global and Azerbaijani research. Internationally, studies by Shevchenko and A. V. Grigoriev (1970s), V. A. Sabo et al. (2019), and I. Almas et al. (2021) have investigated its chemical and pharmacological features. In Azerbaijan, research has been carried out by Vaqif Abbasov (2023), N. Mammadov (1980s), S. Huseynov (2005), L. Aliyeva (2012), T. Guliyev (2018), among others.

Eucalyptus L. is a significant medicinal genus distinguished by its complex chemical profile and broad pharmacological activities. Its essential oils, monoterpenes, flavonoids, phenolic acids, and other bioactive constituents exhibit antibacterial, antioxidant, anti-inflammatory, and respiratory-protective effects. These features underscore its therapeutic potential in the management of infectious and inflammatory disorders. The present research emphasizes an in-depth exploration of the phytochemical and pharmacological prospects of Eucalyptus to determine its targeted and effective applications in contemporary medicine.

Keywords: *Eucalyptus*, *Eucalyptus* L. species, essential oils and bioactive compounds, chemical composition and effects, pharmacological and phytotherapeutic applications, contemporary studies, research conducted in Azerbaijan.

Determination Of Antioxidant Activity Of *Betonica Officinalis* L. By *İn Vitro* Method

[1,*]Shukurova A.S., [1]Alili S.A.
The department of Pharmacognosy, Faculty of Pharmacy,
Azerbaijan Medical University, Baku, Azerbaijan
***aytenshukurova85@gmail.com**

Abstract: Botanicals are important sources of natural antioxidants and other bioactive compounds, which may find various applications as functional ingredients, such as components of food supplements, cosmetics and pharmaceuticals. One of the natural plant antioxidants is *Betonica officinalis* L., a plant belonging to the genus *Betonica* L. of the *Lamiaceae* family. The aim of the study is to study the antioxidant properties of B. *officinalis* L. using an *in vitro* method. The aim of the study is to find the antioxidant activity of B. *officinalis* L. using an *in vitro* method, the DPPH (1,1-diphenyl-2-picrylhydrazyl) method.

The antioxidant activity of B. *officinalis* L. extracts obtained using hexane, ethyl acetate, methanol, 80% ethanol, and 50% ethanol was investigated based on the DPPH method. A plant extract with a concentration of 2 mg/ml was mixed with 3 mg of DPPH (0.060 mg/ml) in 50 ml of methanol. The resulting solution was kept in a dark place at room temperature for 30 minutes. The optical density of the solution was measured at a wavelength of 517 nm using a spectrophotometer. Gallic acid (250 µg/ml) was used as the standard. A mixture of 50 µl MeOH + 200 µl DPPH was used as the control solution, while ethanol was used as the blank.

The free radical scavenging capacity (antioxidant activity) of the samples was calculated according to the following formula based on DPPH:

DPPH radical scavenging activity (%) = $(A_0 - A_1) / A_0 \times 100$

Where:

A_0 – optical density of the standard sample after 30 minutes (at 517 nm)

A_1 – optical density of the test sample after 30 minutes (at 517 nm)

Gallic acid was used as the secondary standard. All experiments were performed in triplicate.

According to the obtained results, compared with gallic acid (68.81% ± 0.60), the hexane extract (40.86% ± 1.07) exhibited lower antioxidant activity, whereas the ethyl acetate (68.45% ± 0.73), 80% ethanol (66.95% ± 0.61), 50% ethanol (81.06% ± 0.32) and especially the methanol extract (75.37% ± 0.58) demonstrated higher antioxidant activity. Thus, the methanol extract showed the strongest antioxidant effect among all extracts, which may indicate its higher content of phenolic compounds.

The study revealed that B. *officinalis* L. exhibits notable antioxidant activity, which depends on the extraction solvent. Thus, B. *officinalis* L. can be considered a promising natural source of antioxidants for potential use in pharmaceutical, cosmetic, and food supplement.

Key words: *Betonica officinalis* L., antioxidant activity, *in vitro* method, DPPH

Identification and chromatographic profiling of phenolic constituents in *Betonica officinalis* L. and *Betonica nivea* stev.

[1,*]Shukurova A.S., [1]Alili S.A.
[1]The department of Pharmacognosy, Faculty of Pharmacy,
Azerbaijan Medical University, Baku, Azerbaijan
***aytenshukurova85@gmail.com**

Abstract: In modern times, medicinal plants and herbal raw materials are widely used in the treatment and prevention of various diseases. One of the well-represented families in the flora of Azerbaijan is the *Lamiaceae* family. The genus *Betonica* L. is included in this family. In Azerbaijan, it is represented by four species: B. *grandiflora*, B. *nivea*, B. *orientalis*, and B. *officinalis*. Among them, *Betonica nivea* Stev. is recognized as an endemic species of the Azerbaijani flora. To date, the pharmacognostic and biological studies of *Betonica* species growing in Azerbaijan have not been sufficiently carried out. Therefore, the investigation of biologically active compounds in these species and their identification by means of classical pharmacognostic methods remains one of the relevant scientific objectives. In this regard, the present research aims to study B. *officinalis* L. and B. *nivea* Stev. using identity reactions and thin-layer chromatography. 80% ethanolic extracts were prepared from the aerial parts of B. *officinalis* L. and B. *nivea* Stev. For each extract, three qualitative identification reactions characteristic of tannins were performed using the following reagents: 1% gelatin solution, ferric ammonium sulfate solution, 10% acetic acid, and 10% lead acetate solution (medium lead acetate solution). In addition, seven identification reactions specific to flavonoids were carried out, namely: the cyanidin reaction, the cyanidin reaction according to Briant, reactions with alkaline solutions, the aluminum chloride reaction, the ferric (III) chloride reaction, the Wilson reaction, and the reaction with vanillin in concentrated hydrochloric acid. For the chromatographic analysis of tannins, thin-layer chromatography (TLC) was applied using aluminum plates coated with silica gel 60 F_{254} (Merck). The chromatograms were observed under ultraviolet (UV) light, and as a detecting reagent, 1% vanillin solution in concentrated hydrochloric acid was used. The solvent system consisted of n-butanol–acetic acid–water (40:12:28).
For the chromatographic analysis of flavonoids, TLC was likewise performed on silica gel 60 F_{254} aluminum plates (Merck). The plates were examined under UV light, and a 10% potassium hydroxide solution was used as a detecting reagent. The solvent system applied consisted of chloroform–methanol–water (61:32:7).
Based on the analytical results, it was determined that the compositions of B. *officinalis* L. and B. *nivea* Stev. are predominantly characterized by tannins belonging to the condensed (hydrolyzable) group and by flavonoid compounds of the flavone and flavonol types. According to the results obtained from chromatographic analyses, under UV light at a wavelength of 365 nm, colorless spots were observed for tannins and faint yellow spots for flavonoids before treatment with the reagent. After treatment with the reagent under UV light at 365 nm, red-orange spots appeared for tannins, while yellow spots were observed for flavonoids.
As a result of identity and chromatographic analyses, flavonoids and tannins were detected in B. *officinalis* L. and B. *nivea* Stev. plants, which provides the basis for conducting extensive phytochemical and pharmacological studies.
Keywords: *Betonica officinalis* L., *Betonica nivea* Stev., phenol compounds, tannins, flavonoids, identity and chromatographic analysis

Comparative analysis of alkaloids in *thalictrum minus* l. from Azerbaijan flora

[1],*Ilkin Nasirli, [1]Eldar Garaev,
[1]Azerbaijan Medical University, Faculty of Pharmacy, Department of Pharmaceutical Toxicology and Chemistry
***inasirli@amu.edu.az**

Abstract: *Thalictrum minus* L., belonging to the Ranunculaceae family, is a plant widely distributed in the mountainous regions of Azerbaijan. It has traditionally been used in folk medicine to treat various diseases. The plant contains alkaloids, flavonoids, saponins, and phenolic compounds. The presence of these biologically active substances explains the antibacterial, antioxidant, and anti-inflammatory properties of *T. minus. T. minus* plant was collected in 2023 from the Altiaghaj settlement, then dried, crushed, and prepared for extraction. To determine the plant's chemical composition, the following modern analytical methods were used: Preparative Thin-Layer Chromatography (PTLC), High-Performance Liquid Chromatography-Mass Spectrometry (HPLC-MS), and Nuclear Magnetic Resonance (NMR) Spectroscopy. Using these methods, mass spectra (MS) were obtained for extracts (dichloromethane, ethyl acetate, hexane, butanol, and total ethanol) from both aerial and underground parts of the plant. NMR and MS spectra were also recorded for individual alkaloids isolated from the plant's roots. Based on the NMR and MS spectra, seven individual alkaloids isolated from the underground part of *T. minus* by PTLC were identified as talmelatidine, berberine, adiantifoline, talicarpine, talifendine, talmineline, and talfinine. From the MS spectra of extracts obtained from the plant's aerial and underground parts, the brutto molecular formulas and molecular networking of the compounds were established. Seven alkaloids—talmelatidine, berberine, adiantifoline, talicarpine, talifendine, talmineline, and talfinine—were individually isolated from the underground part of *T. minus* and identified using modern analytical techniques. The brutto molecular formulas and molecular networking of alkaloids present in the plant extracts were determined based on their MS spectra. Research in this direction is ongoing.

Keywords: *Thalictrum minus L., alkaloids, NMR, mass spectrometry, HPLC-MS*

Screening of methanolic extract of *Cinnamomum verum* cytotoxic effect against hepatocellular carcinoma

[1]Javaria Zafar, [1]Maryam, [2]Zeliha Selamoglu, [1],*Ammara Riaz
[1]Khwaja Fareed University of Engineering and Information Technology, Faculty of Natural and Applied Sciences, Department of Life Sciences
[2]Nigde Omer Halisdemir University, Faculty of Medicine
***ammara.riaz@kfueit.edu.pk**

Abstract: One of the main causes of cancer-related fatalities globally is hepatocellular carcinoma (HCC), which requires the development of novel and efficient treatment approaches. *Cinnamomum verum* (cinnamon) methanolic extract's cytotoxic activity against human hepatocellular carcinoma (HepG2) cells is the main objective of this study. *C. verum* bark was gathered, shade-dried, ground into a powder, and then extracted using Soxhlet extraction with methanol. The MTT assay was used to evaluate the extract's cytotoxic activity, and phytochemical screening was done to find its active ingredients. HepG2 cell proliferation was significantly and dose-dependently inhibited by the methanolic extract of *C. verum*, suggesting strong anticancer activity. The presence of steroids, alkaloids, flavonoids, phenolic compounds, saponins, and tannins was verified by both qualitative and quantitative phytochemical studies. Important bioactive substances with anticancer and antioxidant qualities, including ferulic acid, p-coumaric acid, and chlorogenic acid, were also identified by HPLC profiling. These results suggest that *C. verum* has promising cytotoxic potential and may be a natural source for the creation of plant-based liver cancer treatment drugs. It is advised to do additional in vivo research and mechanistic analyses to verify its effectiveness and safety.

Keywords: *Cinnamomum verum,* hepatocellular carcinoma, cytotoxicity, methanolic extract, phytochemicals

5 CHEMISTRY

From parasitism to protection: inhibitive effect of *Viscum album* aqueous extract on iron corrosion in acidic medium

[1,*]Demet ÖZKIR
[1]Niğde Ömer Halisdemir University, Faculty of Science, Department of Chemistry, 51240, Niğde, TÜRKİYE
[*]dozkir@ohu.edu.tr

Abstract: This study investigates the corrosion inhibition performance of an aqueous extract of *Viscum album* (mistletoe), a hemiparasitic plant known for its aggressive colonization of host trees, against iron corrosion in 1 M HCl solution. *Viscum album* samples were collected from the Emli Valley, Aladağlar region, Niğde, Türkiye in May 2023. The naturally derived extract was prepared via aqueous reflux and tested as an environmentally friendly inhibitor using potentiodynamic polarization (Tafel extrapolation) and electrochemical impedance spectroscopy (EIS) techniques. All electrochemical results revealed that the mistletoe extract significantly reduced corrosion current density and increased polarization resistance, achieving inhibition efficiencies ranging from 86% to 90% at all concentrations. The impedance plots demonstrated enlarged semicircle diameters in the presence of the extract, indicating the formation of a protective film layer on the iron surface. Surface morphology analyses by field emission scanning electron microscopy (FESEM) confirmed the smoother appearance of the inhibited samples compared to the severely damaged surface in the blank solution. The findings suggest that *Viscum album*, notorious for damaging its hosts, can instead serve as a sustainable “protector” of metals against acidic corrosion.

Keywords: *Viscum album,* Mistletoe extract*,* Eco-friendly inhibitior, Acidic medium.

Synthesis and spectroscopic characterization Nickel(II) complex of Schiff base containing N, O donor atoms

[1,*]Selma Yıldırım Uçan
[1]Niğde Ömer Halisdemir University, Faculty of Sciences, Department of Chemistry
***selmaucan@ohu.edu.tr**

Abstract: A new Schiff base ligand was synthesized by the condensation reaction of N,N'-bis(2-hydroxy-4-methoxybenzylidene)-1,2-propylenediamine and 2-chloro-N-(naphthalen-1-yl)acetamide. The complex was synthesized by adding Nickel(II) acetate salt dissolved in alcohol to the ligand. The structures of the ligand and its Ni(II) complex were characterized using elemental analysis, FT-IR, UV–Vis, SEM and conductance measurements. FT-IR spectral data show that the Schiff base ligand is coordinated to the Nickel(II) ion through two azomethine nitrogen atoms and two phenolic oxygen atoms. The Schiff base ligand is coordinated to the Ni(II) metal as a tetradentate ONNO ligand. Additionally, elemental analysis enounces the Nickel(II) complex to have a 1:1 stoichiometry. On the other hand, the electronic spectral data indicates the existence of a tetrahedral geometry for the structure of the Ni(II) complex.

Keywords: ONNO type Schiff bases, mononuclear complexes, Spectroscopic Characterization, Ni(II) complexes.

Box-Behnken design of column solid phase separation and purification for determination of total anthocyanins in hibiscus, black cabbage, rose hip, and pistachio Shell

[1,*]Abdullah Taner BİŞGİN, [2]Hamza Alaşalvar
[1]Niğde Ömer Halisdemir University, Faculty of Sciences, Department of Chemistry
[2]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Food Engineering
[*]atbisgin@ohu.edu.tr

Abstract: Box-behnken design of column solid phase separation and purification method was developed for the first time to determine total anthocyanin content in hibiscus, black cabbage, rose hip, and pistachio shell. The anthocyanin standard solution was obtained from hibiscus extract in laboratory condition and used in extraction process. pH value of extraction was 2.00, other independent variables of the method including resin amount, sample and eluent flow rates were optimized with Box-Behnken Design of Response Surface Methodology. Quadratic extraction model was obtained with R2 of 0.9972. At the optimized conditions, 87 and 290 µg/L of total anthocyanin was determined for LOD and LOQ values of the method, respectively. Preconcentration factor was obtained to be 50. Anthocyanins were determined linearly in the range of 0.29-28.5 µg/mL. Greenness evaluation was performed separately for both method and sample preparation process. Validation tests were performed applying analyte addition-recovery studies. The anthocyanin concentration of the analyzed real samples were determined between 8.79 and 680 µg/g with recovery values ranging from 88 to 98%.

Keywords: SPE, Anthocyanins, BBD, RSM, UV-Vis spectrophotometry.

Synthesis and optical properties of ZnO-decorated boron nitride nanocomposite

[1,*]Neslihan Sakar
[1]Dokuz Eylul University
***birinci.neslihan@gmail.com**

Abstract: Zinc oxide (ZnO)-decorated boron nitride (BN) powders were synthesized through a facile solution-based route. X-ray diffraction confirmed the coexistence of hexagonal BN and wurtzite ZnO phases, while scanning electron microscopy revealed ZnO nanoparticles anchored on BN surfaces. X-ray photoelectron spectroscopy evidenced Zn–O bonding and suggested interfacial interactions between ZnO and BN. Photoluminescence analysis showed a redshift in the hybrid material compared to pristine BN, with strong green emission around 536 nm arising from ZnO defect states and charge transfer at the BN–ZnO interface. The results demonstrate that ZnO decoration effectively tunes the optical response of BN, providing enhanced visible-light activity. Such composites hold promise for applications in photocatalysis, light-emitting devices, and optoelectronic sensors.

Keywords: Zinc oxide, Boron nitride, Photoluminescence, Redshift

Effect of certain parameters on nickel adsorption in aqueous media with magnetically separable TiO_2 nanocomposite

[1]Tolgahan POLAT, [1,2,*]Hayrunnisa MAZLUMOGLU
[1]Ataturk University, Faculty of Engineering, Department of Chemical Engineering
[2]Ataturk University, Department of Nanoscience and Nanoengineering
***h.mazlumoglu@atauni.edu.tr**

Abstract: In this study, a magnetic nanocomposite material was synthesized, employing TiO_2 nanoflowers as a support material and serving as an adsorbent for the removal of Ni. An investigation was conducted to examine the effects of pH, the adsorbent amount, and shaking speed on the adsorption process. The following conclusions were reached: i) competition with metal cations occurs in the medium due to the ionic effect, and maintaining an optimum pH level is crucial to prevent precipitation, ii) shaking speed initially increases adsorption, attributable to the enhancement of mass transfer and the thinning of the boundary layer. However, at higher values, the effectiveness of adsorption is known to decrease due to the occurrence of vortex formation, iii) increasing the adsorbent amount increases adsorption by increasing active sites, but it can also cause aggregation. Consequently, the nanocomposite is considered to be a promising material for noble studies due to its facile reusability and magnetic separability.

Keywords: TiO_2, magnetite, Fe_3O_4, adsorption, nickel.

Elektrospinning yöntemiyle üretilmiş PLA–Kenevir nanolif biyokompozitler

[1]Kemal Karadağ, [1*]Ersen Turaç
Niğde Ömer Halisdemir Üniversitesi, Fen Fakültesi, Kimya Bölümü
***ersenturac@ohu.edu.tr**

Özet: Nanoteknoloji, tekstil endüstrisine kazandırdığı yeni işlevsel özellikler ile öne çıkan yenilikçi bir yaklaşım olarak dikkat çekmektedir. Özellikle leke tutmazlık, antibakteriyel aktivite, UV koruması ve su iticilik gibi fonksiyonlar, nanoyapılı liflerin sunduğu üstün performans sayesinde tekstil ürünlerine entegre edilebilmektedir. Bununla birlikte, çevresel sorunların giderek artması biyobozunur polimerlerin önemini artırmakta ve sürdürülebilir malzeme arayışlarında ön plana çıkarmaktadır. Bu bağlamda, polilaktik asit (PLA) gibi biyobozunur ve biyouyumlu polimerler, ekolojik avantajları nedeniyle dikkat çekici bir alternatif oluşturmaktadır. Bu çalışmada, PLA matrisi içerisine doğal bir lif olan kenevir eklenerek biyokompozit nanoliflerin üretimi hedeflenmiştir. Elektrospinning (elektro eğirme) yöntemi kullanılarak sentezlenen PLA–kenevir esaslı nanolifler morfolojik ve yapısal açıdan incelenmiş, liflerin homojenliği, çap dağılımı ve yüzey özellikleri değerlendirilmiştir. Ayrıca kenevir liflerinin eklenmesiyle kompozitin mekanik dayanım, biyobozunurluk ve biyouyumluluk özelliklerinde meydana gelen değişimler tartışılmıştır. Elde edilen bulgular, PLA–kenevir biyokompozitlerinin biyomedikal alanlarda dikiş iplikleri, doku mühendisliği iskeleleri ve ilaç salınım sistemleri gibi uygulamalarda kullanılabileceğini göstermektedir. Bunun yanı sıra, çevre dostu tekstil ürünleri için de sürdürülebilir bir alternatif sunduğu belirlenmiştir. Sonuç olarak, bu çalışmanın hem biyomühendislik hem de sürdürülebilir tekstil malzemeleri alanında yeni açılımlar sağlayabileceği değerlendirilmektedir.

Anahtar Kelimeler: Nanotekstil, PLA, kenevir lifi, biyopolimer, elektrospinning.

Hydrothermal coatings on aluminum alloys

[1,*]Ferda Mindivan, [2]Berat İnce, [3] Rachid Touzani
[1]Bilecik Şeyh Edebali University, Faculty of Engineering, Department of Bioengineering
[2]Bilecik Şeyh Edebali University, Faculty of Engineering, Department of Mechanical Engineering
[3]Mohammed Premier University, Faculty of Sciences, Department of chemistry, Oujda, Morocco.
***ferda.mindivan@bilecik.edu.tr**

Abstract: Aluminum alloys have emerged as alternatives to steel in recent years due to their favorable properties, including high specific strength, low density, good thermal and electrical conductivity, and recyclability. Despite these advantages, their practical applications—particularly in saline and corrosive environments—are significantly limited by their inherently poor corrosion resistance, low hardness, and inadequate wear resistance. Tribocorrosion, a phenomenon resulting from the synergistic effects of wear and corrosion, further compromises the performance and service life of aluminum alloys. Various surface engineering techniques have been developed to enhance the durability of aluminum alloys, thereby extending their service life, reducing maintenance and replacement costs, and enabling the use of more cost-effective substrate materials. This study provides a brief overview of coating methods aimed at improving the corrosion, wear, and tribocorrosion resistance of aluminum alloys, with a particular focus on hydrothermal coating technique as reported in the literature.

Keywords: Aluminum alloys, hydrothermal coating, Corrosion, Wear, Tribocorrosion.

Sustainability: Solid Waste Management

[1,*]R.M.Aadarsh Vel, [2]Dr.S.Ravichandran
[1]BBA Student in Airlines & Airport Management, Lovely Professional University
[2]Professor in Chemistry, St.Peter's Institute of Higher Education and Research
***aadarshhh001@gmail.com**

Abstract: Among the environmental issues, solid waste management has become a significant concern, mainly due to the rapid rise in the urban population. Solid waste is the discarded solid materials produced from domestic, residential, commercial or industrial activities. On the basis of types of material such plastic, paper, metal organic waste, glass, toxic, industrial waste, domestic waste etc. Over population, industrialization, urbanization are mainly responsible for increasing rate of solid wastes. About 7.9 million tonnes of wastes have been produced worldwide and out of which 15% of which have been recycled. The solid waste management includes the generation of waste, storage, collection, transportation, processing and disposal. Improper solid waste management degrades people health, environmental pollution, depletion of natural resources, climate change which greatly impacts the quality of life on this earth. In this book chapter, the solid waste types and the methods of solid waste disposal were discussed in detail.With the rapid growth of population and industrialization, the production of waste is rising at an alarming rate in urban areas. Human activities generate considerable amount of solid waste. Environmental degradation is always accompanied by the commonly practiced ways of solid waste disposal. Waste management encompasses strategies and actions taken to minimize waste generation, promote resource efficiency and ensure proper handling and disposal of waste. It addresses the detrimental impacts of waste on the environment, including ecosystem disruption, biodiversity loss, and climate change. The principles of waste management include waste prevention, reduction, reuse, recycling, energy recovery, and responsible disposal. Waste management and ethical consumption have emerged as critical areas of focus in response to pressing environmental challenges and the need for sustainable practices.

Keywords: Solid Waste Management, Generation of Waste, Collection, Disposal, Possible Solutions.

Application of chitosan-based hydrogel on the heavy metal removal by dispersive solid phase extraction method

[1,*]Gizem KAHVE YILDIRIM, [1,2]Yavuz SÜRME, [1]Mustafa UÇAN, [3]İbrahim NARİN
[1]Niğde Ömer Halisdemir University, Faculty of Science, Department of Chemistry
[2]Niğde Ömer Halisdemir University, Industrial Raw Materials and Construction Materials Application and Research Center
[3]Erciyes University, Faculty of Pharmacy, Basic Pharmacy Sciences
[*]gizemkahveyildirim@ohu.edu.tr

Abstract: Heavy metals pose a major threat to living things in the environment. In this study, a dispersive solid phase extraction method was developed to remove trace amounts of heavy metal ions such as Pb (II), Cr (III), Ni (II), Cd (II), Co (II) and Cu (II) in aqueous media. Chitosan-based hydrogel was synthesized to be used as solid phase in the dSPE method. The surface morphology of the hydrogel was determined by stereo microscope. The effect of solution pH was investigated in analyte solutions containing metal ions. The optimum solution pH was determined to be pH 6. The concentrations of heavy metal ions in the aqueous medium were determined by flame atomic absorption spectrophotometer.

Keywords: Heavy metal, Hydrogel, Dispersive solid phase extraction, Flame atomic absorption spectrophotometry.

Synthesis of complex compounds based on dibenzodiazacrown ether and study of their bioactivity potential

[1]* Ismayılova Shahnaz, [1]Badalova Kamala, [2]Abiyev Huseyn
[1]Pharmaceutical toxicology and chemistry department, Azerbaijan Medical University,
[2]Medical and biological physics department, Azerbaijan Medical University
***sahnaz.1977@mail.ru**

Abstract: Dibenzodiazacroanic esters belong to the category of macrocyclic ligands, containing nitrogen and oxygen donor atoms, and form effective complexes with metal ions (especially alkaline earth metals, transition metals). We investigated the complexation ability and bioactivity potential of synthetically obtained dibenzodiazacrown esters — we studied the properties of the molecules in terms of both structure and activity.

Modified derivatives of dibenzodiazacrown ethers, both symmetrical and with different radical groups, were synthesized, which has new prospects in the fields of analytical chemistry and pharmacy.

In structural analysis, every detail was carefully examined using methods such as UV-Vis, IR and NMR. In the complexes we obtained with metal ions (Cu^{2+}, Zn^{2+}, Co^{2+}, Ag^{+}, etc.), another interesting point emerged - the presence of cis- and trans-isomers. The change in the spatial structure of the molecule showed different properties depending on the bioactivity. The bioactivity of the substances was tested with certain tests (cytotoxicity test, disk diffusion antibacterial test, enzyme inhibition test). Moreover, we determined with computer models how the molecules interact with potential target proteins through molecular docking and *in silico* analysis.

In antibacterial tests, the potential of the complexes to kill bacteria in combination with hard metals and free radicals was of interest.

The dibenzodiazacrown esters we synthesized are not only chemical compounds, but also keys that open the doors of biology. Structural changes and the presence of isomers add a unique color to the bioactivity of the molecules. The cytotoxic and antibacterial potential of the complexes opens new perspectives in future drug development.

Keywords: Crown ether, complex compounds, macrocyclic, ligands, antibacterial tests

Study on the removal of color from textile wastewater by halloysite

[1]Nevin Eda Bayram, [1]Rabia Yeliz Altınkılıç, [1]Laçin Tepici, [1]Münevver Şeyma Karakaş, [2]Adem Pişkofoğlu, [3]Davut Laçin, [1]*NaimSezgin
[1]Istanbul University-Cerrahpasa, Engineering Faculty, Environmental Engineering Department
[2]Kadifeteks Mensucat San. A.Ş. Kuzuluk AR-GE Merkezi
[3]Istanbul University-Cerrahpasa, Engineering Faculty, Geological Engineering Department
***nsezgin@iuc.edu.tr**

Abstract: The direct discharge of wastewater from the textile industry into receiving environments poses serious risks to both human health and ecosystems. Therefore, such wastewater must be treated with appropriate methods before being released into the environment. Although various treatment methods are reported in the literature, adsorption stands out due to its low cost and practical applicability. In this study, the effectiveness of halloysite clay mineral, obtained from Soğucak village in Çanakkale province, for the color removal of textile wastewater was investigated. The structural properties of the adsorbent were characterized by X-ray diffraction (XRD) and scanning electron microscopy (SEM) analyses. In the adsorption experiments, the effects of parameters such as pH, halloysite concentration, contact time, and initial conditions on color removal efficiency were systematically examined. Optimization studies revealed that the highest removal efficiency was achieved at a halloysite concentration of 0.1 g/L, a contact time of 120 minutes, and pH 5. Furthermore, the experimental data were evaluated using Langmuir and Freundlich isotherm models, and the results indicated that the Freundlich model provided a better fit to the data. Overall, the findings demonstrate that halloysite clay mineral can be used as an adsorbent for color removal from textile wastewater; however, its effectiveness remains limited.

Keywords: Textile wastewater, Color removal, Adsorption, Halloysite clay.

Топырақтың геохимиялық ластануын анықтауда өсімдіктерді индикатор ретінде қолдану ерекшеліктері

[1,*] Сунакбаева Дилара Кахаровна
[1]кандидат технических Наук, Международный Казахско-Турецкий Университет Имени Ходжи Ахмеда Ясави, Туркестан, Казахстан
***dilara.sunakbayeva@ayu.edu.kz**

Аннотация: Мақалада қазіргі таңда қоршаған ортаның ластануын кешенді бағалау мәселесі ғылыми қауымдастықтың назарында. Әсіресе топырақтың геохимиялық ластануы табиғи экожүйелердің тұрақтылығына және адамның өмір сүру сапасына тікелей әсер етеді. Топырақ құрамында ауыр металдар мен тұздардың жиналуы, минералдық тепе-теңдіктің бұзылуы және антропогендік ықпалдың артуы аймақтық геоэкологиялық жағдайды бағалауда негізгі көрсеткіштердің бірі болып саналады. Осы орайда фитоиндикация әдісін қолдану өзектілікке ие. Өсімдіктер топырақтағы химиялық элементтердің мөлшеріне сезімтал болып, олардың артық шоғырлануына морфологиялық, физиологиялық және биохимиялық деңгейде жауап береді. Бұл ерекшелік өсімдіктерді табиғи индикатор ретінде қарастыруға мүмкіндік береді.

Зерттеу барысында өсімдік түрлерінің топырақтағы ауыр металдарға бейімделу қабілеті, элементтердің жапырақтар мен сабақтарда жинақталу динамикасы және олардың өсу қарқынына ықпалы қарастырылады. Сонымен қатар, белгілі бір өсімдік қауымдастықтарының таралуы сол аймақтағы геохимиялық ластану деңгейін сипаттайтын сенімді көрсеткіш ретінде бағалануы мүмкін. Мұндай тәсіл ластануды мониторингтеуде, экологиялық тәуекелдерді болжауда және топырақ ресурстарын ұтымды пайдалануда маңызды рөл атқарады.

Осылайша, өсімдіктерді индикатор ретінде қолдану топырақтың геохимиялық жағдайын бағалаудың тиімді әдісі болып табылады. Ол тек экологиялық тұрғыдан ғана емес, сонымен бірге геологиялық және геохимиялық зерттеулерде де кеңінен қолданылуы мүмкін. Алынған нәтижелер геотехникалық инженерия, инженерлік геология және ауыл шаруашылығы салаларында қоршаған ортаны қорғауға және жер ресурстарын тиімді пайдалануға бағытталған экологиялық тұрғыдан тұрақты шешімдерді әзірлеудің ғылыми-тәжірибелік негізін қалыптастыруға мүмкіндік береді.

Түйін сөздер: топырақ, геохимиялық ластану, фитоиндикация, өсімдіктер-индикаторлар, ауыр металдар.

Features of the use of plants as indicators in determining geochemical soil pollution

[1,*]Sunakbaeva Dilara Kakharovna
[1]Candidate of Technical Sciences, Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan
***dilara.sunakbayeva@ayu.edu.kz**

Abstract: At present, the issue of comprehensive assessment of environmental pollution remains at the center of scientific attention. In particular, the geochemical contamination of soils directly affects the stability of natural ecosystems and the quality of human life. The accumulation of heavy metals and salts in soils, the disruption of mineral balance, and the intensification of anthropogenic impacts are considered among the key indicators in assessing regional geoecological conditions. In this context, the use of phytoindication methods is of particular relevance. Plants are highly sensitive to the concentration of chemical elements in soils and respond to their excessive accumulation at morphological, physiological, and biochemical levels. This feature allows plants to be regarded as reliable natural indicators.

The study examines the adaptive capacity of plant species to heavy metals in soils, the dynamics of element accumulation in leaves and stems, as well as their influence on plant growth rates. Furthermore, the distribution patterns of certain plant communities can serve as dependable indicators characterizing the level of geochemical contamination in a given area. Such an approach plays an important role in pollution monitoring, ecological risk prediction, and the rational use of soil resources.

Thus, the application of plants as indicators represents an effective method for assessing the geochemical state of soils. This approach is valuable not only from an ecological standpoint but also in geological and geochemical research. The findings may provide a scientific and practical basis for developing environmentally sustainable solutions in geotechnical engineering, engineering geology, and agriculture aimed at environmental protection and the rational utilization of land resources.

Keywords: Soil, Geochemical contamination, Phytoindication, Indicator plants, Heavy metals.

Immobilization of β-Galactosidase on corn silk: A biodegradable and cost-effective carrier system

[1*]Sude ANAÇ, [1]Ceyhun IŞIK, [1]Mustafa TEKE
[1]Department of Chemistry, Muğla Sıtkı Koçman University, Muğla 48000, Türkiye
***sudeanac@icloud.com**

Abstract: Corn silk, the silky stigma that extends from the tip of the corn cob and can reach up to 20 cm in length, is a naturally fibrous, cellulose-rich structure varying in color depending on the corn variety. Its primary structural component is cellulose, a polysaccharide that gives corn silk its fibrous architecture. Additionally, corn silk contains hemicellulose, lignin, and pectin, which together contribute to its complex chemical structure and functional properties.

β-Galactosidase (lactase) is a hydrolase enzyme that catalyzes the hydrolysis of lactose into glucose and galactose. It is structured as a homotetramer, composed of four identical polypeptide chains, and is commonly found in microbial, plant, and animal sources.

In this study, β-galactosidase was immobilized onto corn silk, a water-insoluble, biodegradable, and naturally occurring support material. Immobilization was achieved through adsorption followed by cross-linking, using glutaraldehyde as the cross-linking agent. Key parameters such as corn silk amount (10 mg), enzyme concentration (0.4 mg/mL), adsorption time (45 min), and glutaraldehyde ratio (2%) were optimized to ensure maximum efficiency. The immobilized enzyme was characterized in terms of optimum temperature and pH, thermal and pH stability, kinetic behavior, and reusability, and compared to the free enzyme. The results suggest that corn silk is a promising low-cost, biodegradable, and biocompatible carrier for enzyme immobilization.

Keywords: β-galactosidase, corn silk, immobilization.

Note: This study was derived from the master's thesis of Sude ANAÇ.

Deneysel ve yapay zekâ tabanlı yöntemlerle *Potentilla aladaghensis* bitkisi uçucu yağ bileşenlerinin belirlenmesi

[1,*]Rifat Battaloğlu
[1] Niğde Ömer Halisdemir Üniversitesi, Fen Fakültesi, Kimya Bölümü
[*]rbattaloglu@ohu.edu.tr

Özet: Potentilla aladaghensis Leblebici, Türkiye'nin Aladağlar bölgesine endemik bir türdür. Endemik türlerin fitokimyasal karakterizasyonu, hem biyolojik çeşitliliğin korunması hem de farmasötik ve endüstriyel potansiyelin anlaşılması açısından kritik öneme sahiptir. Bu çalışmada, söz konusu türün uçucu yağ bileşenlerini ortaya koymak amacıyla hibrit bir yaklaşım benimsenmiştir. Deneysel analizler Gaz Kromatografi–Kütle Spektrometresi (GC–MS) ile gerçekleştirilirken, aynı zamanda yapay zekâ (YZ) tabanlı bir tahmin modeli kullanılarak elde edilen veriler desteklenmiştir. Uçucu yağ bileşenleri deneysel olarak mikrodalga destekli hidrodistilasyon (MAHD) yöntemiyle belirlenmiştir. Bu yöntem, klasik hidrodistilasyona kıyasla daha kısa sürede, düşük enerji kullanımıyla ve termal bozulma riskini en aza indirerek yaklaşık %4–6 (v/a) verim sağlamıştır. Elde edilen uçucu yağlar GC–MS cihazında analiz edilmiş ve toplam 70 bileşik tanımlanmıştır. Bu bileşikler yağın %98,5'ini temsil etmektedir. Kimyasal kompozisyonda baskın olarak kafur (%8,9), dekanal (%8,5) ve dekanol (%6,4) öne çıkmıştır. Ayrıca monoterpenler ve seskiterpenler toplam bileşimin %80'den fazlasını oluşturmuş, bu da türün zengin bir terpenoid içeriğine sahip olduğunu göstermiştir. YZ tabanlı model ise taksonomik sıklık, biyosentetik olasılık ve ekolojik veriler temel alınarak geliştirilmiş ve toplam 80 potansiyel bileşik öngörmüştür. Bu bileşiklerden 41'i GC–MS sonuçlarıyla örtüşmüştür. Özellikle kafur, β-kariofilen ve α-kadinol gibi ana bileşikler yüksek doğrulukla tahmin edilmiş, farklılıklar ise esas olarak minör bileşiklerde gözlenmiştir. Deneysel ve tahmini bolluk değerleri arasında anlamlı bir korelasyon saptanmıştır ($r = 0,72$, $p < 0,01$). Bu çalışma, P. aladaghensis'in bu şekilde uçucu yağlarının ilk kez rapor edilmesini sağlamış olup, deneysel yöntemler ile YZ tabanlı yaklaşımların entegrasyonunun endemik bitkilerin kimyasal bileşik profillemesinde uygulanabilirliğini göstermektedir.

Anahtar Kelimeler: Potentilla aladaghensis, GC–MS; Yapay Zekâ, Uçucu Yağ Bileşenleri.

Enerji depolama uygulamaları için pentadekan mikrokapsüllerinin geliştirilmesi ve karakterizasyonu

[2,4,*]Shahin ZALOV, [1,3]Yeliz KONUKLU
[1]Niğde Ömer Halisdemir Üniversitesi, Fen Edebiyat Fakültesi, Kimya Bölümü
[2]Niğde Ömer Halisdemir Üniversitesi, Fen Bilimleri Enstitüsü, Enerji Bilimi ve Teknolojileri Anabilim Dalı
[3]Niğde Ömer Halisdemir Üniversitesi, Nanoteknoloji Uygulama ve Araştırma Merkezi
[4]Azərbaycan Texniki Universiteti, Xüsusi Texnika və Texnologiyalar Fakültəsi, Silah ve Silah Sistemlerinin İstehsal Texnologiyası
***shahinzalov@gmail.com**

Özet: Pentadekan, düşük erime sıcaklığı ve yüksek gizli ısı kapasitesi nedeniyle termal enerji depolama uygulamalarında öne çıkan bir faz değiştiren malzemedir. Bu çalışmada, yüzey alanını artırmak ve homojen dağılım sağlamak amacıyla pentadekan mikrokapsüllenmiştir. Güvenli kullanım için kapsülleme dış duvar polimeri olarak jelatin ve Arap zamkı tercih edilmiştir. Elde edilen mikrokapsüller diferansiyel taramalı kalorimetri (DSC) ile karakterize edilmiş olup 8,06 °C erime sıcaklığı ve 113 J/g faz değiştirme entalpisi sergilemiştir. Sonuçlar, geliştirilen mikrokapsüllerin düşük sıcaklık enerji depolama uygulamalarında sızıntısız ve güvenilir bir şekilde kullanılabileceğini ortaya koymaktadır.

Anahtar Kelimeler: Termal Enerji Depolama, Mikrokapsül, Pentadekan, Gelatin, Arap zamkı

Laurik ve palmitik asit ötektik karışımların hazırlanması ve termal karakterizasyonu

[2,4,*]Shahin ZALOV, [1,3]Yeliz KONUKLU
[1]Niğde Ömer Halisdemir Üniversitesi, Fen Edebiyat Fakültesi, Kimya Bölümü
[2]Niğde Ömer Halisdemir Üniversitesi, Fen Bilimleri Enstitüsü, Enerji Bilimi ve Teknolojileri Anabilim Dalı
[3]Niğde Ömer Halisdemir Üniversitesi, Nanoteknoloji Uygulama ve Araştırma Merkezi
[4]Azərbaycan Texniki Universiteti, Xüsusi Texnika və Texnologiyalar Fakültəsi, Silah ve Silah Sistemlerinin İstehsal Texnologiyası
***shahinzalov@gmail.com**

Özet: Termal enerji depolama uygulamalarında faz değiştiren malzeme (FDM) seçiminde en önemli kriterler, hedef uygulamaya uygun erime noktası ve yüksek gizli ısı kapasitesidir. Bu çalışmada, laurik asit ve palmitik asit kullanılarak ötektik bir karışım hazırlanmıştır. Elde edilen karışımın termal özellikleri diferansiyel taramalı kalorimetri (DSC) ile belirlenmiş ve faz değişim davranışları incelenmiştir. Analizler, hazırlanan ötektik karışımın uygun erime sıcaklığına ve yüksek faz değiştirme entalpisine sahip olduğunu göstermiştir. Sonuçlar, geliştirilen yağ asidi bazlı ötektik karışımın düşük ve orta sıcaklık aralığındaki termal enerji depolama uygulamaları için güçlü bir aday olduğunu ortaya koymaktadır.

Anahtar Kelimeler: Termal Enerji Depolama, Yağ Asitleri, Ötektik Karışım

Комплексная оценка технологии проращивания зерен с учётом геохимического фона почв

[1,*]Сунакбаева Дилара Кахаровна
[1]кандидат технических Наук, Международный Казахско-Турецкий Университет Имени Ходжи Ахмеда Ясави, Туркестан, Казахстан
***dilara.sunakbayeva@ayu.edu.kz**

Аннотация. В настоящей работе проведена комплексная оценка усовершенствованной технологии получения экологически чистых и функционально обогащённых продуктов из пророщенных зерен пшеницы, маша и черноглазой фасоли с учётом геоэкологических факторов. Основное внимание уделено разработке методов проращивания, направленных на сохранение нутритивного потенциала зерновых культур и повышение биологической доступности витаминов, минералов и антиоксидантов. Особое место в исследовании занимает анализ влияния минерального состава почв и геохимических особенностей регионов произрастания на питательную ценность зерна.

Установлено, что проращивание приводит к значительному повышению содержания белков, аминокислот, клетчатки, а также микроэлементов (Ca, Mg, Fe, Zn), аккумулированных растениями в зависимости от геологического фона и геохимической среды. Технология включает оптимизацию условий проращивания (температурные режимы, влажность, продолжительность процесса), что позволяет учитывать как биологические особенности каждой культуры, так и исходный минеральный состав зерна.

Использование инновационных, экологически чистых методов обработки минимизирует воздействие химических реагентов и способствует получению продуктов с высокой степенью натуральности, экологической безопасности и функциональной ценности. В работе проведён сравнительный анализ качественных характеристик продукции, полученной по усовершенствованной технологии, и традиционных методов обработки зерновых культур.

Результаты исследования подтвердили эффективность разработанной технологии, а также выявили значительную роль геологических и геохимических факторов в формировании нутритивных свойств пророщенных зерен. Практическая значимость работы заключается в возможности внедрения предложенной технологии в производство инновационных продуктов питания, ориентированных на укрепление здоровья и обеспечение принципов устойчивого развития.

Ключевые слова: маш, питательные вещества, пророщенные зерна, пшеница, усовершенствованная технология.

Comprehensive assessment of grain germination technology considering the geochemical background of soils

[1,*]Sunakbaeva Dilara Kakharovna
[1]Candidate of Technical Sciences, Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan
***dilara.sunakbayeva@ayu.edu.kz**

Abstract This study presents a comprehensive assessment of an improved technology for producing environmentally friendly and functionally enriched food products from germinated grains of wheat, mung bean, and cowpea, taking into account geoecological factors. The research focuses on the development of germination methods aimed at preserving the nutritional potential of cereal crops and enhancing the bioavailability of vitamins, minerals, and antioxidants. A particular emphasis is placed on the influence of soil mineral composition and geochemical characteristics of the growing regions on the nutritional properties of the grains.

It was established that germination leads to a significant increase in the content of proteins, amino acids, dietary fiber, as well as essential microelements (Ca, Mg, Fe, Zn) accumulated by plants in accordance with the geological background and geochemical environment. The technology involves the optimization of germination conditions (temperature regimes, humidity, and duration), allowing consideration of both the biological specificity of each crop and the initial mineral composition of the grains.

The application of innovative, eco-friendly processing methods minimizes the impact of chemical agents and ensures the production of foods with high levels of naturalness, ecological safety, and functional value. A comparative analysis of the qualitative characteristics of products obtained using the improved technology and those derived from conventional grain processing methods was carried out.

The results confirmed the effectiveness of the proposed technology and demonstrated the significant role of geological and geochemical factors in shaping the nutritional properties of germinated grains. The practical importance of the research lies in the potential implementation of this technology in the production of innovative food products aimed at promoting health and supporting the principles of sustainable development.

Keywords: Black-eyed peas, Eco-friendly products, Improved technology, Mung beans, Nutrients.

In-situ synthesis of silver nanoparticles and extraction of essential oils from the walnut leaves

[1,*]Emil Omurzak, [1]Ferhan Tumer, [1]Kalipa Salieva, [1]Adilet Zhakypbekov, [2]ALTYNAI Abdirashit, [3]Sabahattin Comertpay, [3]Abdulmecit Gul, [1]Aydaykan Kasymakunova, [1]Ruslan Adil Akay Tegin
[1]Kırgızistan-Türkiye Manas Üniversitesi, Mühendislik Fakültesi, Kimya Mühendisliği Bölümü
[2]Kyushu University
[3]Kahramanmaraş Sütçü İmam Üniversitesi, Ziraat Fakültesi, Tarımsal Biyoteknoloji Bölümü
***emil.omurzak@manas.edu.kg**

Abstract: The synthesis of silver nanoparticles from walnut leaf extract using pulsed plasma has not been studied to date for the recycling of walnut waste and the production of a useful product. Furthermore, the two processes were carried out simultaneously to reduce fluidity, processing time, and overall cost. Consequently, silver and copper powders synthesized from walnut waste extracts were obtained. These powders were characterized using X-ray diffractometry, scanning electron microscopy, and infrared spectrometry. Their cytotoxicity and wound healing properties were also investigated.

Keywords: Antimicrobial material, metal nanomaterials, nanotechnology, environmental safety

Schiff bazı ve metal kompleksinin sentezi, karakterizasyonu ve kuantum kimyasal hesaplamaları

[1,*]Yasemin UÇAR, [2]Emel BAYOL, [3]Fatma KANDEMİRLİ
[1]Niğde Ömer Halisdemir Üniversitesi, Fen Bilimleri Enstitüsü, Kimya Anabilim Dalı
[2]Niğde Ömer Halisdemir Üniversitesi, Fen Fakültesi, Kimya Bölümü
[3]Kastamonu Üniversitesi, Mühendislik ve Mimarlık Fakültesi, Biyomedikal Mühendisliği Bölümü
[*]ysmnucr378737@gmail.com

Özet: Bu çalışmada, N,N-bis(salisilidin)-(3,3'-diaminobenzidin) Schiff bazı ligantı ve bu ligantın Pb(II) kompleksi sentezlenmiş ve yapıları FT-IR, SEM, EDX, ^{1}H-NMR*, ^{13}C-NMR,* UV-Vis ile aydınlatılmış, kondüktometrik ölçümler ve floresans çalışmaları yapılmıştır. Kuantum kimyasal hesaplamalar Gaussian G09W paket programıyla B3LYP metodunda LANL2DZ, DGDZVP ve 6-311g baz setleri kullanılarak yapılmıştır. HOMO ve LUMO*,* ΔE, η, σ, χ, bağ uzunluğu, bağ açısı, Mulliken ve natural yükleri hesaplanmıştır.

Anahtar Kelimeler: Schiff Bazı, Metal Kompleksi, Kuantum Kimyasal Hesaplama.

Sentetik hibrit yapıların sentezi ve kolinesteraz inhibisyon özelliklerinin incelenmesi

[1,*]Sultan ONUR, [1]Mustafa ÇEŞME, [1,2]Ferhan TÜMER
[1]Kahramanmaraş Sütçü İmam Üniversitesi, Fen Fakültesi, Kimya Bölümü
[2]Kırgızistan-Türkiye Manas Üniversitesi, Mühendislik Fakültesi, Kimya Mühendisliği Bölümü
[*]sultanakarr@gmail.com

Özet: Bu çalışmada, Alzheimer hastalığının tedavisinde asetilkolinesteraz (AChE) ve bütirilkolinesteraz (BuChE) enzimlerini inhibe edebilecek potansiyele sahip yeni 1,2,3-triazol türevi hibrit bileşikler sentezlenmiş ve biyolojik aktiviteleri değerlendirilmiştir. Ellman yönteminde yapılan küçük modifikasyonlarla gerçekleştirilen enzim inhibisyon testlerinde, sentezlenen bileşiklerin AChE ve BuChE üzerindeki inhibitör etkileri belirlenmiştir. Özellikle ester grubu taşıyan **5g** bileşiği, her iki enzime karşı da en yüksek inhibitör aktiviteyi göstermiştir (AChE IC_{50} = 1,57 μM; BuChE IC_{50} = 22,85 μM), buna karşın keto grubu içeren **5h** bileşiği en düşük aktiviteye sahiptir. Elektron verici ve çekici grupların enzim aktivitesi üzerindeki etkileri değerlendirilmiş ve para konumundaki ester grubunun inhibitör etkinliği artırdığı görülmüştür. Ayrıca, bazı bileşiklerin AChE'ye karşı daha seçici olduğu gözlemlenmiştir. Genel olarak sentezlenen triazol türevleri, AChE'ye karşı BuChE'ye kıyasla daha yüksek inhibitör aktivite göstermiştir. Bu sonuçlar, triazol temelli hibrit bileşiklerin Alzheimer tedavisinde kullanılabilecek potansiyel ajanlar olabileceğini göstermektedir.

Anahtar Kelimeler: Propargil, Triazol, Fenol, AChE, BuChE.

Hidrokinon temelli yeni 1,2,3-Triazol türevlerinin sentezi, antioksidan ve ADMET özelliklerinin incelenmesi

[1,*]Sultan ONUR, [1]Mustafa ÇEŞME, [2]Ferhan TÜMER
[1]Kahramanmaraş Sütçü İmam Üniversitesi, Fen Fakültesi, Kimya Bölümü
[2]Kırgızistan-Türkiye Manas Üniversitesi, Mühendislik Fakültesi, Kimya Mühendisliği Bölümü
[*]sultanakarr@gmail.com

Özet: Hidrokinon bileşiğinin bazik ortamda propargil bromür ile reaksiyonundan simetrik propargil fonksiyonel grubu barındıran bileşik (2) sentezlenmiş ve arilazid bileşikleri (4a-h) ile klik reaksiyonundan 1,2,3-triazol türevlerinin (5a-e) (6a-e) sentezleri başarıyla gerçekleştirilmiş ve yapıları karakterize edilmiştir (Şekil 1). Tüm bileşiklerin in vitro ortamda antioksidan aktiviteleri ve ADMET özellikleri de incelenmiştir. DPPH• radikal giderme aktivite sonuçlarına göre; 6b ve 6e bileşiklerinin standart ilaç β-karoten'den daha yüksek aktivite sergilediği görülmüştür. ABTS•+ radikali giderme aktivite sonuçlarında ise, 6b, 5d, 5e, 5c, 6c ve 5a bileşiklerinin yine standart ilaç β-karoten'den daha yüksek antioksidan aktiviteye sahip oldukları belirlenmiştir.

Anahtar Kelimeler: Propargil, Triazol, Antioksidan, ADMET, Docking.

Green nanotechnology approach for Bi_2O_3 composites functionalized with biomass-derived carbon dots

[1,*]İnci Ünlü, [1]Rifat Battaloğlu
[1]Niğde Ömer Halisdemir University, Faculty of Science, Department of Chemistry
[*]inci.unlu@ohu.edu.tr

Abstract: In this study, bismuth oxide (Bi_2O_3) structures were synthesized via a hydrothermal method and subsequently functionalized with biomass-derived carbon dots (CDs) in an environmentally friendly approach. For the synthesis of CDs, mandarin peels were used as a sustainable carbon source; they were dried, ground, and subjected to aqueous extraction followed by a carbonization process. The resulting Bi_2O_3/CDs composite structures were characterized using FTIR and XRD analyses. FTIR results confirmed the successful attachment of carbon dots onto the Bi_2O_3 surface through the presence of characteristic functional groups, while XRD data indicated that the crystalline structure of Bi_2O_3 was preserved despite the integration of CDs. These bio-based composite materials are considered promising candidates for applications such as photocatalysis, sensor development, and antibacterial systems. The study demonstrates the potential of converting agricultural waste into value-added nanomaterials with multifunctional properties.

Keywords: Carbon dots, biomass-derived nanomaterials, mandarin peel extract, hydrothermal synthesis.

Study of sorbents by the thermogravımetrıc method

[1,*]Nazile Huseynova
[1]Azerbaijan Medical University, department of Pharmaceutical toxicology and chemistry
*** nhuseynova@amu.edu.az**

Abstract: The synthesis of silver nanoparticles from walnut leaf extract using pulsed plasma has not been studied to date for the recycling of walnut waste and the production of a useful product. Furthermore, the two processes were carried out simultaneously to reduce fluidity, processing time, and overall cost. Consequently, silver and copper powders synthesized from walnut waste extracts were obtained. These powders were characterized using X-ray diffractometry, scanning electron microscopy, and infrared spectrometry. Their cytotoxicity and wound healing properties were also investigated.

Keywords: Polymer Sorbents, Thermogravimetric Analysis

The harmful impacts of noise pollution and its control measures

[1]Vaishnavi, [2,*]S.Ravichandran
[1]B.Tech., Student in Biomedical Engineering, St.Peter's Institute of Higher Education and Research
[2]Professor and Head in Chemistry,St.Peter's Institute of Higher Education and Research
***drravichandran@spiher.ac.in**

Abstract: In the past, life evolved on earth and it is the place in the universe where human beings and other life forms evolved and started to survive depending on the environment of the earth. The word environment originated from the French word 'Environment' meaning to encircle or to surround. Presently, pollution occurs in an unprecedented scale around the globe. Elements of the environment including water, land, and the ecosystem is hampered by man which results in pollution. Noise impacts on human health in the world resulting hearing loss, sleep disorder, cardiovascular disease, reduce productivity and negative behavior. Our environment has been degrading due to noise pollution. Unwanted human activities are the major sources of noise pollution. The root cause of environmental noise degradation is modern technological advancement. Urbanization, population growth, increased vehicle usage and agricultural practices are all contributing to noise pollution. Noise pollution is a rising concern in today's society, with serious consequences for human health and the environment. The presence of undesired or excessive sound that has a negative impact on humans, animals, or the environment is referred to as noise pollution. It can be induced by a multitude of factors, including transportation, industrial activity, building sites and leisure activities.

Keywords: Noise Pollution, Environmental Health

Sustainability through environmental laws protection

[1,*]R.Hanna Raghavi, [2]S. Ravichandran
[1]B.Tech., Biomedical Engineering, St.Peter's Institute of Higher Education and Research
[2]Professor and Head in Chemistry,St.Peter's Institute of Higher Education and Research
***hannaraghavi@gmail.com**

Abstract: Environment protection has become concerns for world community. Environmental law plays a very crucial and powerful role in regulating the use of natural resources and in protecting the environment. The success of environmental laws mainly depends on the way they are enforced. Legislation also serves as a valuable tool for educating people about their responsibility in maintaining healthy environment. It is very important task while fulfilling the present generation needs, to protect environment for future generation. The environmental pollution has resulting so many health issues and environmental degradation. It is the duty of all people on the earth, Government of all nations to make collective effort to protect Environment. Environment consists of natural resources like land, water, air, plants and animals. When environmental imbalance happens it leads to earth quakes, cyclones and, threat for the human life.To give effect to the provisions of the Stockholm declaration of 1972, the water (prevention And control of pollution) Act 1974 was passed, the Air (prevention and control) Act 1981 passed. After Bhopal gas leak disaster of Dec 1984, Environment (protection Act 1986 was passed. There is close relationship between protection of Environment and Sustainable development. Most of the nations have enacted environmental protection laws to ensure sustainable development. Various legal provisions and policies have been discussed in this paper.

Keywords: Sustainable Development, Environmental Protection, Pollution, legal provisions.

Eco-friendly environment through green chemistry

[1]Ferana, [2,*]S. Ravichandran
[1]B.Tech., Student in Biomedical Engineering, St.Peter's Institute of Higher Education and Research
[2]Professor and Head in Chemistry,St.Peter's Institute of Higher Education and Research
***drravichandran@spiher.ac.in**

Abstaract: Green chemistry represents the pillars that hold up our sustainable future. It is clear that many industries and research of many academics recognize the significance of green chemistry. In the practice of green chemistry a set of principles that reduces or eliminates the use of hazardous substance in the design, manufacture and applications of chemical products are utilized. Chemistry is really very helpful to us as its applications are used worldwide for several purposes. We cannot really imagine a world without chemistry and its applications. However, we should now concentrate on green chemistry, or sustainable chemistry, which refers to reducing or stopping the damage done to the environment around us. Hence, green chemistry could include anything from reducing waste to even disposing of waste in the correct manner. Chemical derivatives must be avoided as far as possible in any type of application as they often prove to be harmful. All chemical wastes should be disposed off in the best possible manner without causing any damage to the environment and living beings. Green chemistry and sustainability essentially go hand in hand. Sustainable development is meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. We need greener chemistry-chemistry that efficiently use renewable raw materials, eliminates waste and avoids the use of toxic and or hazardous solvents and reagents in order to achieve this noble goal. Green chemistry is one of the most fundamental and powerful tools to use on the path to sustainability. In fact, without green chemistry and green engineering, there is no path to sustainability.

Keywords: Sustainable development, Green chemistry

6 CIVIL ENGINEERING

Buzlanma kaynaklı trafik kazalarının azaltılmasında çevreci bir yaklaşım: Asfalt betonu yüzeylerinin donmasının kenevir ikamesi ile geciktirilmesi

[1,*]Halil İbrahim Yumrutaş, [2] Mustafa Yurdabal Apak, [1] Ahmad Kaleem Kamel, [1] Isxaq Osman Abdirahman
[1] Karabük Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
[2] İstanbul Gelişim Üniversitesi, İnşaat Mühendisliği Bölümü
***iyumrutas@karabuk.edu.tr**

Özet: Asfalt kaplama yüzeylerinde meydana gelen donma/buzlanma nedeniyle, kış koşullarının şiddetli olduğu bölgelerde sıklıkla trafik kazaları meydana gelmektedir. Özellikle köprü ve viyadüklerdeki asfalt kaplamalar, tabliyenin alt tarafı açıkta kaldığı için hava sıcaklığından daha fazla etkilenmekte ve bu nedenle karayolunun diğer kısımlarına kıyasla daha hızlı bir donma/buzlanma süreci yaşamaktadır. Bu çalışmada, asfalt kaplama yüzeylerinde buzlanmayı geciktirmek için kenevirin düşük ısı iletkenliğinden faydalanılması amaçlanmıştır. Buna göre, %5, %10 ve %20 oranlarında kenevir ikamesi ile üretilen asfalt kaplamaların geleneksel asfalt kaplamalara kıyasla ne kadar çabuk donmaya başlayacağı ve hava sıcaklığından ne ölçüde etkileneceği belirlenmiştir. Bu sayede, soğuk iklimlerde ve kış koşullarında karşılaşılan buzlanmadan kaynaklanan trafik kazaları, çevre dostu ve yenilikçi bir yöntemle en aza indirilecektir. Bu kapsamda EN 12697-34 (Marshall), EN 12697-10 (Sıkıştırılabilirlik), ve EN 12697-8 (Bitümlü Karışımların Boşluk Karakteristiklerinin Belirlenmesi) standartlarına uygun olarak mekanik performans testleri gerçekleştirilmiştir. Ayrıca, buzlanmanın gecikmesini ve sıcaklık farklılıklarını gözlemlemek amacıyla optimum numune/ler üzerinde ısı testleri (donma/buzlanma ve termal kamera ölçümleri) yapılmıştır. Mekanik deney sonuçları kenevirin asfalt kaplamalarda ikame bir malzeme olarak kullanılabileceğini, ısı testleri ise kenevir ikamesinin asfalt kaplamalarda buzlanmayı geciktirmede dikkate değer oranda başarılı olduğunu ortaya koymuştur. Bu çalışma, özellikle köprü ve viyadük asfalt kaplamaları için, kaplamaya/çevreye zararsız, daha ekonomik, yenilikçi ve çevre dostu aktif bir buzlanma önleme yaklaşımı içermektedir. Bu çalışmadan elde edilen olumlu sonuçlar ile, Avrupa Yeşil Mutabakatı'nda yer alan "doğal kaynakların verimli kullanımı", "iklim değişikliğine uyum", "sürdürülebilir ulaşım ve karbon ayak izinin azaltılması" ve Birleşmiş Milletler (BM) Sürdürülebilir Kalkınma Hedefleri içerisinde yer alan "dayanıklı altyapı inşa etme, kapsayıcı ve sürdürülebilir sanayileşmeyi teşvik etme ve inovasyonu destekleme" ilkelerine katkıda bulunulması umulmaktadır.

Anahtar Kelimeler: Buzlanma önleme, Buzlanma giderme, Asfalt kaplama, Karayolu güvenliği, Kenevir

Teşekkür: Söz konusu çalışma Karabük Üniversitesi Bilimsel Araştırma Koordinasyon Birimi KBÜBAP-25-YL-153 numaralı projesi ile desteklenmiştir.

The knowledge and perception of vertical traffic signage in road traffic safety: the case of Şanlıurfa province

[1]Tahsin Durmus, [2,*]Emine Coruh
[1]Gümüşhane University, Graduate Education Institute
[2]Gümüşhane University, College of Engineering and Natural Science, Department of Civil Engineering
***eminecoruh@gumushane.edu.tr**

Abstract: : Subject: Various rules exist for safe driving, and road signage provides a visual language that road users interpret to follow them. As in the rest of the world, traffic accidents in Turkiye increase alongside the growing number of vehicles. A significant proportion of these accidents are linked to road users' misperceptions of traffic signage or failure to comply with them. Vertical traffic signage, as essential elements of the road safety system, is designed to guide, warn, and regulate road user behavior.

Purpose: This study investigates road users' knowledge and perception of vertical traffic signage in Şanlıurfa Province, Turkiye, aiming to identify gaps between knowledge of signage and its application during actual driving.

Method: A survey was conducted with 480 road users who regularly use a specific road section in the region. The questionnaire focused on compliance with traffic rules and perceptions of the adequacy and visibility of vertical signage. Ethical approval was obtained from Gümüşhane University's ethics committee, and all participants took part voluntarily.

Findings: Results show that the majority of respondents were male (82.7%) and mainly between 25–34 years old (46.2%). More than half (53.5%) considered traffic signage sufficient, while 44.2% reported concerns about visibility and maintenance. Additionally, 27.4% had been involved in at least one traffic accident as drivers, most often due to speeding (52.3%).

Conclusion: Although knowledge of vertical traffic signage exists at a general level among drivers, gaps remain in their adequacy, visibility, and maintenance. These findings highlight the importance of improving the quality and visibility of signage, alongside strengthening driver education, to enhance overall traffic safety.

Keywords: Vertical traffic signage, Road user behavior, Traffic safety, Knowledge of signage.

Lamine ahşap ile masif ahşabın karşılaştırılması

[1,*] Gökhan Şakar
[1]Dokuz Eylül Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
***gokhan.sakar@deu.edu.tr**

Özet: Bu çalışma, yapı ve tasarım alanlarında yaygın olarak tercih edilen iki temel ahşap malzeme türü olan masif ahşap ve lamine ahşabın teknik, fiziksel ve çevresel açılardan karşılaştırmasını içermektedir. Masif ahşap, doğal ağaç kütlesinden tek parça olarak elde edilen geleneksel bir malzeme olup; estetik bütünlüğü, doğal dokusu ve kolay işlenebilirliği ile öne çıkmaktadır. Buna karşılık, lamine ahşap (glulam), farklı yönlerde yerleştirilmiş ve endüstriyel yöntemlerle yapıştırılmış ve sıkıştırılmış ince ahşap katmanlarından oluşmakta, yüksek mekanik dayanım, boyutsal stabilite ve uzun açıklıkları geçebilme kabiliyeti gibi üstün yapısal özellikler sergilemektedir. Çalışmada her iki malzeme; üretim süreci, mekanik performans, kullanım alanları, sürdürülebilirlik ve maliyet açısından değerlendirilmiş ve kullanım amacına bağlı olarak malzeme tercihine ilişkin öneriler sunulmuştur. Sonuç olarak, masif ve lamine ahşap malzemelerin, farklı mimari ve mühendislik gereksinimlerine uygun olarak mühendislik kriterleri göz önüne alınarak seçilmesinin, yapı performansı ve çevresel sorumluluk açısından kritik öneme sahip olduğu vurgulanmaktadır.

Anahtar Kelimeler: Masif ahşap, Lamine ahşap, Sürdürülebilirlik, Küresel ısınma

Çimento esaslı kontrol harcı ile SD esaslı geopolimer harçların özelliklerinin karşılaştırılması

[1] Mustafa Sarıdemir, [1*]Metehan Bulut
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
[*]mbulut@ohu.edu.tr

Özet: Bu çalışmada, ortam sıcaklığında kür edilen silis dumanı (SD) esaslı geopolimer harçların (GH) özellikleri Portland çimentosu (PÇ) esaslı kontrol harcının (KH) özellikleri ile karşılaştırılmıştır. SD esaslı GH karışımları toplam bağlayıcının ağırlıkça %8, %9 ve %10 oranında sodyum (Na) kullanılarak hazırlanmıştır. Tüm karışımlar aynı su/bağlayıcı oranına ile üretilmiştir ve numuneler üzerinde sertleşmiş birim ağırlık, eğilme dayanımı ve basınç dayanımı deneyleri gerçekleştirilmiştir. Ayrıca mikroyapısal özelliklerin belirlenmesi amacıyla taramalı elektron mikroskobu (SEM) analizleri yapılmıştır. Sonuçlar, GH'lerin eğilme ve basınç dayanımı değerlerinin KH'ya kıyasla belirgin şekilde daha yüksek olduğunu göstermiştir. En yüksek basınç ve eğilme dayanımı % 8 Na içeriği ile üretilen GH'den elde edilmiştir. SEM analizleri, % 8 Na içeren GH'nin kompakt ve homojen arayüzey yapısının olduğunu göstermiştir. Bu durum ortaya çıkan yüksek mekanik dayanımı desteklemektedir.

Anahtar Kelimeler: Geopolimer harç, Silis dumanı, Mekanik özellik

Atık pet agregalı harçların yüksek sıcaklık dayanımı

[1,*]Kubilay Akçaözoğlu, [2]Semiha Akçaözoğlu, [3]Sümeyye Özcan
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
[2]Niğde Ömer Halisdemir Üniversitesi, Mimarlık Fakültesi, Mimarlık Bölümü
[3]Niğde Ömer Halisdemir Üniversitesi, Teknik Bilimler MYO, İnşaat Bölümü
[*]ozoglu@ohu.edu.tr

Özet: Bu çalışmada yüksek sıcaklığın atık PET agregalı harçların dayanımına etkisi deneysel olarak araştırılmıştır. Atık PET agregalı numuneler, atık PET kırıklarının şahit numunede bulunan doğal agrega ile hacimce %20 ve %40 oranlarında yer değiştirilmesiyle elde edilmiştir. Böylece, şahit numuneyle birlikte toplam 3 farklı karışım elde edilmiştir. Elde edilen numuneler kür havuzunda 28 gün boyunca 20±2 °C sıcaklıkta kür edilmiştir. Daha sonra 90 güne kadar laboratuvar ortamında bekletilen numuneler 100, 150, 200, 250 °C sıcaklıklara 2 saat boyunca maruz bırakılmıştır. Oda sıcaklığına kadar soğutulan numuneler üzerinde eğilmede çekme dayanımı ve basınç dayanımı deneyleri yapılmıştır. Deneyler sonucunda karışımlardaki atık PET agrega oranının artması ile numunelerin eğilmede çekme ve basınç dayanımlarının düştüğü görülmüştür. Ancak 100 °C ve 150 °C sıcaklıklarda, atık PET agregalı numunelerin eğilmede çekme ve basınç dayanımları belirgin olarak düşmesine rağmen, 200°C ve 250 °C sıcaklıklarda ise daha az miktarda dayanım kaybı gözlenmiştir.

Anahtar Kelimeler: Atık PET agrega, Yüksek sıcaklık, Basınç dayanımı, Eğilmede çekme dayanımı

Tünel kalıp sistemlerle inşa edilecek olan betonarme binaların nonlineer analizi

[1,*]Edvin Thana, [2]Metin Hakan Severcan, [3]Besian Sinani, [4]İlker Fatih KARA
[1]BB Architects Sh.p.k, Priştina, Kosova
[2]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
[3]UBT- Higher Education Institution, Faculty of Engineering, Civil Engineering
[4]Mersin Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
***edvinthana@gmail.com**

Özet: Deprem hareketliliği bakımından aktif bir coğrafi bölge olan ve son zamanlarda meydana gelen depremler göz önünde bulundurulduğunda, Türkiye de inşa edilecek olan yapıların depreme dayanıklı yapılar olması, sadece bir gereksinim değil, bir zorunluluk haline getirmiştir. Türkiye gibi betonarme yapıların yaygın olduğu ülkelerde, çok katlı yapıların taşıyıcı sistem tasarımında betonarme perde duvarlar yaygın olarak tercih edilmektedir. Deprem esnasında oluşan kuvvetlerin tamamının betonarme perdelerle karşılanması, çerçeve sistemlerle karşılaştırıldığında binanın yatay rijitliğinin çok daha yüksek olduğunu göstermiştir. Bu tür taşıyıcı sistemleri elde etmek için en yaygın kullanılan kalıplama sistemi ise tünel kalıp sistemlerdir.

Bu çalışma kapsamında, tünel kalıp sistemi ile inşa edilmesi planlanan dikdörtgen geometriye sahip toplam yüksekliği 57m olan bir betonarme bina modeli, ETABS bilgisayar programı kullanılarak modellenip Türkiye Bina Deprem Yönetmeliği 2018'de (TBDY 2018) belirlenen tasarım esasları baz alınarak tasarlanmış ve yönetmeliğin öngördüğü doğrultuda analiz edilmiştir.

Deprem analizleri, doğrusal olmayan hesap yöntemlerinden zaman tanım alanında hesap yöntemi kullanılarak gerçekleştirilmiştir. Analizlerde, on bir adet gerçek deprem takımının ivme kayıtları kullanılarak yapıya birbirine dik iki yatay doğrultuda etki sağlanmıştır. Bu analizler kapsamında, yapının taban kesme kuvveti, kat deplasmanları ve göreli kat öteleme gibi kriterler kontrol edilmiştir.

Anahtar Kelimeler: Tünel kalıp sistemler, perde elemanlar, nonlineer analiz, deprem yükleri

Urban street performance: a clustering-based method for establishing level of service criteria in Pristina

[1]Yusuf Kagan Demir, [2],*Flamur Salihu, [1]Hatice Göçmen Demir
[2]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Civil Engineering, Niğde, Turkey
[2]University of Applied Sciences in Ferizaj, Faculty of Engineering and Informatics, St. Universiteti, p.n. Ferizaj, Kosovo
***flamur.salihu@ushaf.net**

Absract: In urban transportation system planning, the concurrent increase in automobile users and the insufficiency of urban space are forcing engineers to deviate from standard design criteria for urban roads. This leads to issues such as inappropriate intersection types, narrow lanes for cars, buses, or bicycles, and lanes shared by opposing traffic flows.

Travel speed is a fundamental factor in measuring the Level of Service (LOS) on urban roads. Although Level of Service criteria for urban streets, derived from the Highway Capacity Manual (HCM), are used to measure traffic operation performance, a discrepancy exists between the manual's criteria and the conditions in the country where this study was conducted. The aim of this study is to define LOS criteria that classify streets based on average speeds, reflecting real-world measurements of existing traffic and infrastructure conditions in Pristina. Second-by-second speed data were collected using OBD with GPS on five main roads during various peak and off-peak periods. Free Flow Speed (FFS) was measured during low-traffic conditions, either late at night or in the early morning, to reflect the drivers' free choice of speed.

A clustering method was used to classify FFS into street classes and to define average speed ranges corresponding to the geometric and functional characteristics of these classes under existing conditions. It was found that the FFS and average speed ranges for these street classes differ from those in the HCM 2000.

Keywords: Urban streets, LOS criteria, performance measure, OBD, clustering method, Pristina

Alkali aktivatörler ile üretilen atık kalsitli harçların mekanik özellikleri

[1]Ahmet Bilgil, [2,*]Ergün Yeşilyurt
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
[2]Kayseri Üniversitesi, Teknik Bilimler Meslek Yüksekokulu, İnşaat Bölümü
***ergun.yesilyurt@kayseri.edu.tr**

Özet: Çalışmada, Niğde ili Hıdırlık mevki kalsit ocağında çevre sorunu oluşturan ocak atığını ürüne dönüştürerek inşaat sektöründe kullanılabilecek hale getirmek için geopolimer beton üretimi amaçlanmıştır. Karışımda, ağırlık esasına göre kalsit atığı ağırlığının %20, 30 ve 40 oranında Sodyum Silikat aktivatörü kullanılmış ve 40*40*160 mm boyutlarında numuneler üretilmiştir. Her bir numune karışım grubunun optimum kür sıcaklığının belirlenmesi için 75, 100, 125 ve 150 0C'de 48 saat süre ile kürlenmiştir. Eğilmede çekme dayanımı bütün karışımlarda ve kür sıcaklıklarında 1 MPa değerinden küçük ölçülmüştür. Numunelerin eksenel basınç gerilme değerleri ise en yüksek %40 aktivatör karışımlı ve 100 0C'de kürlenen numunede 14,23 MPa, olarak ölçülmüştür. Elde edilen sonuçlara göre, kalsit ocağı atıklarının yapı endüstrisine detay malzemesi olarak kazandırılabileceği kanaatine varılmıştır.

Anahtar Kelimeler: Kalsit ocağı atığı, Sodyum silikat, Geopolimer

Mechanical properties of waste calcite mortars produced with alkaline activators

[1]Ahmet Bilgil, [2]Ergün Yeşilyurt,
[1]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Civil Engineering
[2]Kayseri University, Technical Sciences Vocational School, Department of Construction
***ergun.yesilyurt@kayseri.edu.tr**

Abstract: The study aimed to produce geopolymer concrete to convert the calcite quarry waste, which poses an environmental problem at the Hıdırlık district of Niğde province, into a product that can be used in the construction industry. Sodium silicate activator was used in the mixture at 20, 30, and 40% of the calcite waste weight, and samples with dimensions of 40*40*160 mm were produced. To determine the optimum curing temperature for each mixture group, each sample was cured at 75, 100, 125, and 150 OC for 48 hours. Flexural-tensile stresses were measured to be less than 1 MPa for all mixtures and curing temperatures. The highest axial compressive stress was measured as 14.23 MPa for the sample cured at 100 OC with a 40% activator mixture. According to the results obtained, it was concluded that calcite quarry wastes can be used as detail material in the construction industry.

Keywords: Calcite quarry waste, sodium Silicate, Geopolymer

Depremlerin Büyüklük ve Zamansal Dağılım İlişkisi

[1,*]Hakan Karaca,
[1]Niğde Ömer Halisdemir Üniversitesi, Mimarlık Fakültesi, Mimarlık Bölümü
[*]hakan.karaca@ohu.edu.tr

Özet: Depremlerin zaman alanında dağılımı ile ilgili olarak üretilen her bilgi sismik tehlike analizleri ve deprem tahminleri ile ilgili hesaplamaları da geliştirecektir. Halihazırda elde edilen bulgular ile kesin olarak sismik tehlike analizi gerçekleştirilememekte, deprem tahminleri ise sadece eğitilmiş tahmin seviyesinde kalmaktadır. Bu nedenle, özellikle sismik tehlike analizleri için bazı temel kabuller zorunlu olarak yapılmaktadır. Bu kabullerden en önemlisi ise depremlerin zaman alanında Poisson dağılımı izledikleri ve bir sonraki depremin önceki depremlerden her bakımdan bağımsız olduğudur. Bu kabul zaman zaman meydan okumalar ve sorgulamalara maruz kalsa da halen geçerliliğini korumaktadır. Bu çalışmada da bu kabul ile ilgili çözümlemeler yapılmış, Türkiye'de meydana gelen depremlerin zaman alanında dağılımının Poisson dağılımı ile uyumu incelenmiştir. Sonuç olarak, Poisson dağılımı tam olarak ifade edememekte ancak depremlerin büyüklükleri arttıkça, dağılımın Poisson dağılımından uzaklaştığı anlaşılmaktadır

Anahtar Kelimeler: Türkiye, Deprem, Zamansal Dağılım, Poisson Dağılımı

Teşekkür

Çalışmada kullanılan verileri sağlayan Kandilli Rasathanesi Müdürlüğüne teşekkür ederim.

Waste-slag/glass powder concrete under hybrid activation: 60-day compressive strength

[1,*]Y Mahir Oğuz Aliyev, [2*] Meral Oltulu, [3] İbrahim Alameri
[1]Bakü Engineering University, Engineering Faculty, Department of Civil Engineering
[2]Atatürk Üniversitesi, Engineering Faculty, Department of Civil Engineering
[3]Sana'a Üniversitesi, Engineering Faculty, Department of Civil Engineering
***mroltulu@atauni.edu.tr**

Abstract: Reducing the clinker factor in concrete is imperative to minimise the industry's carbon footprint while maintaining performance. In this study, the 60-day compressive strength of concrete in which Ordinary Portland cement (OPC) was partially replaced by ground granulated blast furnace slag (BFS) and waste glass powder (GP), activated with sodium silicate (SS), sodium carbonate (SC) or their hybrid mixture (SS + SC) was investigated. Fifteen concrete mixes were produced at a constant W/C ratio (0.40). Compressive strength was measured after a curing regime that included 24 h demoulding, 1 day of holding at 40°C, and storage at room temperature for up to 60 days. The results demonstrate that all BFS/GP mixes surpassed the control mix in compressive strength. The 7.5% BFS + 7.5% GP co-replacement mixture without an activator achieved the highest strength, increasing by 46.6% compared to the control group. Among the activated groups, the hybrid activated BFS-GP mixture (BFS7.5-GP7.5-SS1SC1) showed a 42.0% increase in strength. The results support a synergistic mechanism, whereby fine GP enhances particle aggregation and contributes to pozzolanic reactions, while hybrid alkali activation improves slag reaction kinetics. Thus, BFS-GP hybrid activated concrete is a practical method for reducing cement content and improving mechanical performance, requiring further evaluation for sustainable construction applications.

Anahtar Kelimeler: Sustainable Concrete; Alkali Activation; Blast Furnace Slag; Glass Powder; Compressive Strength; Waste Recycling.

Kumlu zeminlerde atık lastik katkısının darbe enerjisi sönümleme davranışına etkisi: deneysel bir yaklaşım

[1,*]Selman Kahraman, [1]Dahır Hassan Mohamud, [1]İnan Keskin, [1]Halil İbrahim Yumrutaş, [2]İsmail Esen
[1]Karabük Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
[2]Karabük Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği Bölümü
***selmankahraman@karabuk.edu.tr**

Özet: Artan araç kullanımına bağlı olarak ortaya çıkan atık lastiklerin çevresel sorunlara yol açmasını azaltmaya yönelik sürdürülebilir bir çözüm önerisi sunmaktadır. Araştırmada, ince taneli kum zeminlere belirli oranlarda (%5, %10, %15 ve %20) granül formda atık lastik katkısı eklenerek darbe enerjisi sönümleme kapasiteleri laboratuvar ölçeğinde değerlendirilmiştir. Deneysel süreçte farklı bağıl sıkılıklar (%40, %70, %90) ve su içerikleri (kuru, optimum, ıslak) dikkate alınmış; özel olarak tasarlanmış bir darbe düzeneği kullanılarak yük-zaman ve yük-deplasman ilişkileri analiz edilmiştir. Elde edilen bulgular, optimum su içeriğinde düşük bağıl sıkılığa sahip numunelerin en yüksek enerji sönümleme kapasitesine ulaştığını göstermiştir. Atık lastik katkısı, özellikle %5–%15 oranlarında enerji sönümleme kapasitesinde belirgin şekilde artırmıştır. Yüksek bağıl sıkılık koşullarında katkının etkisi sınırlı kalırken, düşük ve orta sıkılıklarda performans artışı dikkat çekici bulunmuştur. Granül lastik parçacıklarının zemin boşluk oranını ve deformasyon kabiliyetini iyileştirmesi, enerji sönümleme davranışının güçlenmesine katkıda bulunmuştur.

Anahtar Kelimeler: Darbe Enerjisi, Enerji Sönümleme, Kumlu Zemin, Atık Lastik

Özel Tematik Oturum Önerisi (İsteğe Bağlı): Özetin dahil olabileceği oturum başlığı, oturum başkanı ve temanın belirtilmesi)

Teşekkür

Bu çalışma kapsamında, Karabük Üniversitesi Bilimsel Araştırma Koordinatörlüğü tarafından KBÜBAP-23-DR-033 numaralı proje ile Türkiye Bilimsel ve Teknolojik Araştırma Kurumu (TUBİTAK) tarafından 224M457 numaralı proje kapsamında desteklenmiştir.

Tuzlu su karışımı ile üretilen betonların mekanik özellikleri

[1,*]Ergün Yeşilyurt, [2]Ahmet Bilgil
[1]Kayseri Üniversitesi, Teknik Bilimler Meslek Yüksekokulu, İnşaat Bölümü
[2]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
***ergun.yesilyurt@kayseri.edu.tr**

Özet: Çalışmada beton karışımında kullanılan tuşlu suyun betonun mekanik özelliklerine etkisi incelenmiştir. Karışım suyuna %10 ve 20 oranında sofra tuzu ilave edilmiş ve tatlı su ile üretilen betonla mekanik özellikleri karşılaştırılmıştır. 28 günlük eğilmede-çekme gerilmelerinde Sırasıyla %10 ve 20 tuzlusu karışımlı numunelerde %23 ve 46, basınç gerilmelerinde %11 ve 30 kayıplar gözlenmiştir. Ancak, karışım suyuna %10 a kadar tuz su ile üretilen betonlarda hedef betonlarına göre önemli kayıplar gözlenmemiş ve taşıyıcı olmayan alanlarda kullanılabileceği sonucuna varılmıştır.

Anahtar Kelimeler: Tuzlu su karışımlı beton

Mechanical properties of concrete produced with salt water mixture

[1,*]Ergün Yeşilyurt, [2]Ahmet Bilgil

[1]Kayseri University, Technical Sciences Vocational School, Department of Construction
[2]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Civil Engineering
***ergun.yesilyurt@kayseri.edu.tr**

Abstract: This study investigated the effect of saltwater used in the concrete mix on its mechanical properties. The mechanical properties of concrete prepared with 10% and 20% table salt were compared with those of freshwater. At 28 days, 23% and 46% losses in flexural and tensile stresses were observed in samples mixed with 10% and 20% saltwater, respectively, and 11% and 30% in compressive stresses. However, no significant losses were observed in concretes prepared with up to 10% saltwater compared to the target concretes, and it was concluded that they can be used in non-load-bearing areas.

Keywords: Saltwater mized concrete

Nano-SiO_2 ve yüksek fırın cürufu katkılarının yüksek plastisiteli killerin erken dayanımına etkilerinin incelenmesi

[1,*]Firdevs Uysal, [2]Resul Mut
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
[2]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
[*]firdevsuysal@ohu.edu.tr

Özet: Bu çalışmada, yüksek plastisiteli killerin erken dayanımının geliştirilmesi amacıyla yüksek fırın cürufu (YFC) ve nano-silika (nano-SiO_2) katkılarının etkileri ayrı ayrı ve birlikte incelenmiştir. Deneylerde %75 kaolen ve %25 bentonitten oluşturulan yapay zemine %0–40 oranlarında YFC ve %1–1.5 oranlarında nano-SiO_2 eklenmiştir. Standart Proktor deneyleri, YFC'nin optimum su muhtevasını azaltıp yoğunluğu artırdığını, nano-SiO_2'nin ise su tutma kapasitesini yükselttiğini ortaya koymuştur. Serbest basınç deneyleri, katkısız zemine kıyasla YFC'nin dayanımı artırıcı etkisini açıkça göstermiştir. Nano-SiO_2 ilavesiyle tüm karışımlarda dayanımda belirgin iyileşmeler sağlanmış, özellikle yüksek katkı oranlarında bu artış daha dikkat çekici hale gelmiştir. Bulgular, YFC ve nano-SiO_2'nin birlikte kullanımının sinerjik bir etki yaratarak yüksek plastisiteli killerin kısa vadeli dayanımını geliştirdiğini ortaya koymaktadır.

Anahtar Kelimeler: Zemin Stabilizasyonu, Yüksek Plastisiteli Kil, Nano-SiO_2, Yüksek Fırın Cürufu, Serbest Basınç Dayanımı

İnşaat ekonomisinde insan sermayesinin geliştirilmesi

[1,*]Arzu Rzayeva
[1]Azerbaijan Technical University
***Arzurzayeva97@gmail.com**

Özet: İnşaat sektörü, emek yoğun yapısı ve ekonomik büyümeye olan katkısıyla birçok ülkede stratejik öneme sahip bir alandır. Ancak son yıllarda yaşanan dijital dönüşüm, sürdürülebilir kalkınma hedefleri ve değişen iş gücü dinamikleri, sektörün insan kaynağına olan yaklaşımını köklü bir şekilde yeniden şekillendirmektedir. Bu bağlamda, insan sermayesinin geliştirilmesi, yalnızca bireysel istihdam edilebilirliği artırmakla kalmamakta, aynı zamanda sektör genelinde verimlilik, kalite ve güvenlik düzeylerini de doğrudan etkilemektedir. İnşaat ekonomisinin dijitalleşmesiyle birlikte, geleneksel mesleki becerilere ilave olarak, dijital okuryazarlık, yapay zekâ destekli proje yönetimi, veri analizi ve BIM (Building Information Modeling) gibi teknolojilere hâkimiyet sektörde ön plana çıkmaktadır. Mimarlar, mühendisler ve saha çalışanlarının bu yeni teknolojilere adapte olabilmesi için kapsamlı ve güncel eğitim programlarına ihtiyaç duyulmaktadır. Aynı zamanda, sürdürülebilir inşaat ilkeleri çerçevesinde enerji verimliliği, çevre dostu malzeme kullanımı ve yeşil bina standartlarına (LEED, BREEAM vb.) yönelik bilgi ve beceriler de insan sermayesinin temel unsurlarına dönüşmektedir. Yaşam boyu öğrenme (lifelong learning) yaklaşımı, inşaat sektörü çalışanlarının hızlı teknolojik değişimlere uyum sağlayabilmesi açısından kritik öneme sahiptir. Sürekli mesleki gelişim, yalnızca teknik yeterliliklerin güncellenmesini sağlamakla kalmamakta, aynı zamanda iş sağlığı ve güvenliği kültürünün yerleşmesini de desteklemektedir. Sanal gerçeklik (VR), artırılmış gerçeklik (AR) ve simülasyon tabanlı eğitim teknikleri, bu bağlamda yenilikçi öğretim araçları olarak sektöre entegre edilmektedir. İş sağlığı ve güvenliği, insan sermayesinin niteliğinin ayrılmaz bir parçası olarak değerlendirilmelidir. İnşaat sektörü, iş kazalarının ve meslek hastalıklarının en sık yaşandığı alanlardan biri olduğundan, güvenlik farkındalığına sahip çalışanların yetiştirilmesi büyük önem taşımaktadır. Bu doğrultuda sertifikalı güvenlik eğitimleri ve zorunlu mesleki yeterlilik belgeleri, sektörde standartlaşmayı teşvik etmektedir. Sonuç olarak, inşaat ekonomisinin rekabet gücünü artırmak ve sürdürülebilir kalkınma hedeflerine ulaşmak için insan sermayesinin çok boyutlu olarak güçlendirilmesi gerekmektedir. Kamu kurumları, özel sektör ve eğitim sağlayıcıları arasında kurulacak güçlü iş birlikleri, sektörde nitelikli iş gücü arzını güvence altına almanın anahtarıdır. Bu çalışma, inşaat sektörünün değişen yapısı karşısında insan sermayesine yatırımın kritik rolünü vurgulamakta ve stratejik öneriler sunmaktadır.

Anahtar Kelimeler: İnşaat ekonomisi, İnsan sermayesi, Dijital dönüşüm, Mesleki eğitim, Yeşil bina, İş sağlığı ve güvenliği

Effect of coal gangue on the properties of geopolymers

[1,*]Celina Ziejewska, [2]Marek Hebda
[1]Cracow University of Technology, Faculty of Mechanical Engineering
[2]Cracow University of Technology, Faculty of Materials Engineering and Physics
***celina.ziejewska@pk.edu.pl**

Abstract: In recent years, eco-friendly materials with the potential to reduce carbon dioxide emissions into the atmosphere have been intensively developed. An extremely promising substitute for commonly used Portland cement is geopolymer, an inorganic polymer obtained from silica-aluminate sources such as clay, metakaolin, fly ash, slag, and gangue. However, geopolymers are still not as widely used as conventional materials such as concrete, highlighting the necessity for further investigations to determine their properties depending on various variables and, as a result, enable their market expansion.

One of the most significant problems of the current century is the production of huge amounts of waste, the disposal of which is harmful to the environment, including soil degradation. Coal gangue, a solid waste generated during coal raising, constitutes approximately 15-20% of the extracted material. In addition, coal gangue has the capacity to self-ignite under air conditions, which poses a threat to people and the environment. Therefore, the present study explores the possibility of manufacturing geopolymers using coal gangue.

Keywords: geopolymer, waste, coal gangue, carbon dioxide

Acknowledgement: The authors are grateful to the National Centre for Research and Development, Poland for support from the projects: “Development of 3D printing technology for construction and facade prefabricated elements made of concrete composites and geopolymers” project no. POIR.04.01.04-00-0096/18.

Uçucu kül esaslı geopolimer harçların erken yaş dayanım özellikleri üzerine atık granit tozu etkisinin araştırılması

[1,*]Serhat ÇELİKTEN, [1]Bilal BARAN
[1]Nevşehir Hacı Bektaş Veli Üniversitesi, Mühendislik Mimarlık Fakültesi, İnşaat Mühendisliği Bölümü
[*]scelikten@nevsehir.edu.tr

Özet: Bu çalışmada, bir alüminosilikat kaynağı olan atık granit tozunun uçucu kül esaslı geopolimer harçların erken yaş dayanım özellikleri üzerine etkisi araştırılmıştır. Atık granit tozu ikame oranına (%0-20-40) ve kür süresine (4-24 saat) bağlı olarak 6 farklı geopolimer harç numunesi üretilmiştir. Karışımlarda sabit olarak 500 gr bağlayıcı toz malzeme kullanılmıştır. 4*4*16 cm boyutlarında üretilen numunelere standartlara uygun olarak eğilme ve basınç testleri 7. ve 28. günlerde gerçekleştirilmiştir. Çalışma sonucunda, atık granit tozunun geopolimer üretimi için kullanım potansiyelinin yüksek olduğu tespit edilmiştir. Atık granit tozu içeren numunelerde dahil olmak üzere, 4 saat ısıl kür işlemine tabi tutulan karışımlar düşük erken yaş dayanımlarına sahip olmakla birlikte, 28 günde hem eğilme hem de basınç dayanımlarında belirgin bir artış eğilimi sergilemişlerdir. Buna karşılık olarak, 24 saat ısıl kür işlemine tabi tutulan karışımlar hem 7 günde hem de 28 günde daha yüksek dayanım değerleri vermiş, ancak göreli artış oranları daha düşük kalmıştır. Bu çalışma kapsamındaki kür süreleri (4–24 saat) ve 90 °C sıcaklık koşulları altında, %40 oranında atık granit tozu ikamesi yapılan numunelerin 36.85 MPa'a ulaşan basınç dayanımı ile en yüksek mekanik performansı sergilediği belirlenmiştir.

Anahtar Kelimeler: Atık granit tozu, Uçucu kül, Geopolimer

Additive manufacturing in construction – new technologies for prefabrication from concrete and geopolymers

[1],*Joanna Marczyk, [2]Marek Hebda
[1]Cracow University of Technology, Faculty of Mechanical Engineering
[2]Cracow University of Technology, Faculty of Materials Engineering and Physics
***joanna.marczyk@pk.edu.pl**

Abstract: The search for new ideas and original solutions fosters the development of innovative technologies that play a key role in the contemporary development of many industries. Recently, additive manufacturing has gained a decisive advantage over conventional techniques due to the elimination of costly molds, the ability to create complex shapes, lower material consumption, and faster, more automated production, making it a more efficient and environmentally friendly solution in construction. An excellent example of the use of this potential is the development of 3D printing technology using concrete or geopolymer materials, as well as concrete-geopolymer hybrids. The properties of the materials produced allow for the creation of highly efficient and durable parts characterized by both high fire resistance and frost resistance. Parts produced in this way are an excellent solution for printing prefabricated elements used in construction.

This work is a summary of research that successfully developed geopolymer and concrete-geopolymer mixtures for 3D printing, using raw materials such as fly ash and metakaolin. The impact of reinforcement on the properties of the samples produced was also assessed. In addition, a series of tests were carried out to determine the impact of selected parameters on the mechanical and structural properties of the manufactured elements, which yielded promising results. This clearly confirms the validity of the experimental research conducted.

Keywords: 3D printing, additive manufacturing, construction, concrete, geopolymer

Acknowledgement: This research has been supported by the Growth Operational Programme 2014–2020, IV Increasing the research potential, 4.1.4: ‘Application projects’, funded by the National Centre for Research and Development in Poland, within the framework of the grant: “Development of 3D printing technology for construction and facade prefabricated elements made of concrete composites and geopolymers”, grant no. POIR 04.01.04-00-0096/18-00.

Portable properties of the reservoir waters used in power system

[1]Hasanov V.H., [2,*]Mammadov N. Y., [1]Hajiyev N.I., [1]Muslumov A.H., [1]Hasanli F.A.
[1]Azerbaijan Technical University,
[2]Azerbaijan University of Architecture and Construction
***nurmammad.mammadov@azmiu.edu.az**

Abstract: Measurements of the viscosity of reservoir waters by remote capillary in the temperature interval of (298.15 to 598.15) K and the pressure of (0.1 to 40) MPa are reported. The relative uncertainty in the viscosity does not exceed ± 1.8 %. An equation describing viscosity of the studied reservoir waters and the dependence with the mineralization, pressure and temperatures is given.

Keywords: Viscosity, Measurements, Reservoir waters, Pressure, Temperatures

Evaluation of constraint modulus of clay layers beneath a test embankment

[1,*]Erdal Cokca and [1]Caglar Guner
[1]Middle East Technical University, Department of Civil Engineering
***ecokca@metu.edu.tr**

Abstract: The article presents a method to determine the clay oedometric (constraint) modulus M (Eoed) based on settlement and pore water pressure measurement of the test embankment load, This study presents an evaluation of field measurement data from a test embankment, constructed on a soil profile improved with deep soil mixing columns (DSM), to determine the oedometric deformation moduli M of underlying clay layers. The soil improvement by DSM, extending to a depth of 15m was implemented to mitigate liquefaction risks. This depth of improvement dictated the subsequent behavior of deeper soil strata. The research revealed that the soil profile consisted of interbedded sandy and clayey alluvial deposits down to the improved depth, transitioning to a more homogeneous geological structure at greater depths. The test embankment was designed to simulate realistic behavior under project structures. Prefabricated vertical drains (PVDs) were installed to accelerate consolidation. Pore pressure was recorded using piezometers and settlement measurements using magnetic extensometers, and settlement plates. Oedometric deformation modulus M obtained using correlations and oedometric modulus M derived from in-situ compression and pore water pressures are presented. Determining clay oedometric modulus M from the settlement and piezometer results of the clay soil under the test embankment gives more precise results than correlations.

Keywords: Clay, Consolidation, Field Measurement, Oedometric Modulus, Vertical Deformation

Lif takviyeli geopolimerler: Sıcak su altında yarı hafif kompozitlere doğru

[1,*]Aydan Özçapkurt, [1]Hatice Öznur Öz, [2] Tamer Dirikgil
[1*]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
[2] Erciyes Üniversitesi, Mühendislik Fakültesi, İnşaat Mühendisliği Bölümü
[*]ozcapkurtaydan@gmail.com

Özet: Yüksek enerji tüketimi ve CO_2 salımı nedeniyle çevresel baskı altında olan çimento endüstrisine alternatif olarak geliştirilen geopolimer bağlayıcı sistemler, endüstriyel atıkların yeniden değerlendirilmesi açısından dikkat çekmektedir. Bu çalışmada, uçucu kül (UK) ve öğütülmüş yüksek fırın cürufu (ÖYFC) esaslı geopolimer harçlara farklı oranlarda (%0.2, %0.6 ve %1.0) polipropilen (PPF) ve bazalt lif (BF) ilavesinin mekanik ve fiziksel özelliklere etkisi değerlendirilmiştir. Toplam 7 farklı karışım tasarlanmış ve numuneler 28 gün boyunca 60 °C'de sıcak su kürüne tabi tutulmuştur.

Deneysel sonuçlara göre, en yüksek basınç dayanımı %0.2 BF katkılı GP-BF0.2 numunesinde 65.28 MPa ile elde edilmiş olup, kontrol karışımına kıyasla %4.9'luk bir iyileşme sağlanmıştır. Buna karşılık, %1.0 PPF içeren karışımda dayanım %26 azalarak 46.02 MPa'ya düşmüştür. Bu durum, düşük oranda BF lifinin karışımın bütünlüğünü artırdığını ve yüksek PPF içeriğinin ise işlenebilirlik sorunları sebebiyle dayanımı zayıflattığını göstermektedir.

Su emme sonuçları değerlendirildiğinde, sıcak su kür koşulunda kontrol numunesinin %11.73 iken BF0.2 %10.70 ile en düşük değere ulaşmıştır. Buna karşın PPF1.0 %15.23 ile en yüksek emme oranını göstermiştir.

Sonuçlar, düşük oranlı bazalt liflerinin geopolimer kompozitlerin mekanik bütünlüğü artırırken, yüksek PPF katkılarının performansı olumsuz etkilediğini göstermektedir. Bu bağlamda, lif tipi ve miktarının dikkatli seçimi çevresel açıdan sürdürülebilir ve dayanıklı yarı hafif kompozit geopolimer malzemelerin geliştirilmesinde kritik öneme sahiptir.

Anahtar Kelimeler: Geopolimer, Bazalt lif, Polipropilen lif, Sıcak kür, Yarı hafif kompozit.

Natural fiber ıntegration in 3d-printed geopolymers as circular economy solutions for sustainable construction

[1]Szymon Gądek, [1]Kacper Oliwa, [1]Marek Nykiel, [2]Marta Choinska, [1,*]Kinga Korniejenko
[1]Cracow University of Technology, Faculty of Materials Engineering and Physics, Department of Materials Engineering
[2]University of Nantes, IUT Saint-Nazaire, Research Institute in Civil and Mechanical Engineering GeM
***kinga.korniejenko@pk.edu.pl**

Abstract: The integration of natural fibers into 3D-printed geopolymers represents a crucial innovation for advancing the circular economy within the construction industry. Incorporating natural fibers—like hemp, flax, and cotton—into geopolymer composites for 3D printing fosters a closed-loop system that minimizes waste, reduces reliance on non-renewable synthetics, and highlights the reusability of materials at end-of-life. The use of these renewables results in lower carbon emissions, enhanced material efficiency, and improved insulation, all of which are integral to sustainable construction. Moreover, such composites facilitate easier recycling and disassembly, reinforcing circular material flows throughout the construction lifecycle. This work aims to analyse the possibilities of implementing natural fibres as an element of a geopolymer composite dedicated to additive manufacturing technology with taken into consideration the circular economy goals. The research method used in this article is a critical analysis of the up-to-date literature and case studies. The main findings show that there is a small number of studies using geopolymer composite reinforced with natural fibres for additive manufacturing technology. Despite clear environmental and circular benefits, literature reveals that only a limited range of natural fibers has been investigated for additive manufacturing applications (the most research based on hemp, flax and cotton). Key challenges—such as the heterogeneous nature and high water absorption of fibers—must be addressed to realize the full potential of circular practices in 3D printing. Future research should focus on overcoming these limitations to maximize the positive impact of renewable fiber integration for construction sustainability.

Keywords: 3D printing, geopolymer, natural fibre, additive manufacturing, circular economy.

Acknowledgment: This work was financed by the Polish National Agency for Academic Exchange in the framework of joint research projects between the Republic of Poland and the Republic of France under the grant “Tackling the decarbonization challenge-geopolymer composites with renewable fibers” (BPN/BFR/2024/1/00031/U/00001).

A comprehensive literature review on construction accident analysis and protective measures: A comparative study of Kosovo, Kazakhstan, Azerbaijan, and Turkey (2015-2025)

[1,*]Muhamet Ahmeti, [1]Arberesha Kastrati
[1]UBT - Higher Education Institution, Kosovo
***muhamet.ahmeti@ubt-uni.net**

Abstract: The construction industry remains one of the most hazardous sectors worldwide, with considerable variation in accident rates and safety practices across developing countries. This study systematically reviewed research on construction accidents and protective measures in Kosovo, Kazakhstan, Azerbaijan, and Turkey from 2015 to 2025. A total of 67 peer-reviewed articles were analyzed, identified through Scopus, Web of Science, PubMed, and regional databases, using PRISMA guidelines for quality assessment.The findings highlight substantial disparities in safety standards and implementation. Turkey demonstrated the most comprehensive framework, with accident rates declining from 8.2 per 1000 workers in 2015 to 5.1 per 1000 workers in 2024. Kazakhstan showed moderate improvements through the adoption of digital safety monitoring systems, while Azerbaijan's rapid oil-driven construction boom presented distinct safety challenges. Kosovo, in the context of post-conflict reconstruction, faced persistent limitations in regulatory enforcement and training.Across all countries, the most common accident types were falls from height (35–42%), being struck by objects (18–25%), and electrical incidents (8–15%). Despite contextual differences, shared systemic barriers included limited safety training, weak enforcement mechanisms, and underreporting of accidents.This review underscores the need for regional harmonization of construction safety standards and the transfer of successful practices. Turkey's regulatory model and Kazakhstan's digital innovations provide promising approaches for broader adoption. Strengthening worker training, expanding digital monitoring, and establishing regional frameworks could significantly enhance occupational safety outcomes in these developing economies.

Anahtar Kelimeler: Construction safety; Occupational accidents; Protective measures; Developing countries; Digital monitoring; Regional safety standards

Effects of calcium aluminate cement on the high-temperature performance of cementitious lightweight mortars developed with Nevşehir acidic pumice

[1]Muhammet Güneş, [2,*]Hasan Demirbağ, [1]İsmail İsa Atabey
[1]Nevşehir Hacı Bektaş Veli University, Faculty of Engineering & Architecture, Department of Civil Engineering
[2]Hatay Mustafa Kemal Unıversity, Kırıkhan Vocational School, Department of Property Protection and Security
***hasan.demirbag@mku.edu.tr**

Abstract: In this study, a cementitious lightweight mortar (LWM) was developed with Nevşehir acidic pumice (AP) aggregate. Calcium aluminate cement (CAC) was used in varying proportions (25%, 50%, 75%, and 100%) instead of Portland cement (PC) to improve the high-temperature performance of lightweight mortars. After determining the flow diameters of the lightweight mortars in their fresh state, their hardened properties were evaluated through unit weight, compressive strength, and flexural strength tests conducted at 7 and 28 days. Additionally, the 28-day-old specimens were subjected to heat treatment at 400°C and 800°C, after which the tests were performed to assess the effects of elevated temperatures on their mechanical properties. The results obtained before high-temperature exposure indicated that the combined use of PC and CAC did not result in a positive synergistic effect, as the mechanical strength of the mortars decreased with increasing CAC content. However, the mortar formulated using CAC as the sole binder achieved the highest compressive strength. Following exposure to 800°C, the residual compressive strength of the mortars was found to increase with higher CAC content, with the mixture containing 100% PC exhibiting the lowest compressive strength.

Keywords: Acidic pumice, Calcium aluminate cement, Elevated temperatures, Lightweight mortar, Strength

Optimal lane allocation in urban road networks with genetic algorithm and PTV visum integration

[1,*]Meriç KESİM, [2]Mehmet Metin MUTLU
[1] Civil Engineering Department, Graduate School of Natural and Applied Sciences, Aydın Adnan Menderes University
[2] Civil Engineering Department, Engineering Faculty, Aydın Adnan Menderes University
***mkesim56@gmail.com**

Abstract: Growing urbanization and vehicle use increase congestion and travel times. Lane allocation optimization stands out as an effective method for alleviating these problems. This study presents a bi-level optimization model for the Lane Allocation Problem (LAP), a subproblem of the Road Network Design Problem.

At the upper level, the model optimizes the lane allocation to minimize total travel time utilizing a Genetic Algorithm (GA). The lower level performs a static traffic assignment using PTV Visum to determine the total travel time under each lane configuration, and the results are input back into the upper-level model.

The model was tested on a hypothetical network with six nodes, 20 links, and two Origin-Destination demands. GA parameters were calibrated, and the optimal setting was determined as a population size of 10 and 50 generations.

The results showed that the total travel time is 385 hours for a uniform lane distribution across all links with an equal number of lanes for both directions. The optimal lane layout obtained using the proposed model reduced the total travel time by 48.19% achieving 199.45 hours. Model consistency was assessed through 10 independent runs, yielding an average objective value of 204.52 hours with a coefficient of variation of 2.25%. A coefficient of variation value less than 5% shows that GA can be considered reliable for solving the LAP.

Future work should extend the application of the model to larger-scale networks and incorporate dynamic assignment to enhance realism.

Keywords: Road Network Design Problem, Lane Allocation Problem, Genetic Algorithm, Bi-Level Optimization.

7 COMPUTER AND INFORMATICS ENGINEERING

A comparative analysis of lightweight deep learning models for driver distraction detection

[1,2,3]Gökhan Azizoğlu, [1,*]Ahmet Nusret Toprak
[1]Erciyes University, Faculty of Engineering, Department of Computer Engineering
[2]Erciyes University, Graduate School of Natural and Applied Sciences, Computer Engineering Graduate Program
[3]Sivas Cumhuriyet University, Faculty of Engineering, Department of Software Engineering
***antoprak@erciyes.edu.tr**

Abstract: Driver distraction is one of the leading causes of road accidents worldwide, making its accurate and efficient detection a critical component of intelligent transportation systems. While deep learning approaches have achieved strong performance in this domain, many state-of-the-art models are computationally expensive and unsuitable for deployment on embedded, real-time platforms. To address this challenge, this study presents a comparative analysis of lightweight deep learning models for driver distraction detection, focusing on the trade-offs between accuracy and computational efficiency. We evaluate ten popular lightweight architectures, which are MobileNetV2, MobileNetV3, MobileNetV4, ShuffleNetV2, SqueezeNet, EfficientNet-B0, ResNet18, MixNet, EfficientViT-B0, and GhostNetV2, using the AUC and the StateFarm distracted driver datasets. The models are assessed across key metrics, including accuracy, precision, recall, F1-score, inference speed (FPS), and parameter efficiency, with additional deployment experiments conducted on the NVIDIA Jetson Xavier platform. The results show that MixNet and ResNet18 achieve the highest accuracy on the more challenging AUC dataset, with 95.01% and 94.69%, respectively, while ShuffleNetV2 and MixNet reach near-perfect accuracy (99.96%) on the StateFarm dataset. In terms of efficiency, SqueezeNet delivers the fastest inference speed (116.61 FPS) with the smallest parameter count (0.74M), while MobileNetV4 provides a balanced trade-off between speed and accuracy. These findings highlight that the optimal model depends on deployment priorities: accuracy-focused applications may prefer MixNet, whereas resource-constrained, real-time systems benefit most from SqueezeNet or MobileNet variants. The study provides practical insights for integrating lightweight deep learning models into next-generation driver monitoring systems.

Anahtar Kelimeler: intelligent transportation, road safety, driver distraction, lightweight model, convolutional neural networks

MIMO-VLC Sistemlerinde Derin Öğrenme Tabanlı Gürültü Analizi ve SNR Tahmini

[1]Asuman Savaşcıhabeş
[1]Nuh Naci Yazgan Üniversitesi, Mühendislik Fakültesi, Elektrik-Elektronik Mühendisliği Bölümü
[1]ahabes@nny.edu.tr

Özet: Bu çalışmada, görünür ışık iletişimi (VLC) tabanlı çoklu giriş çoklu çıkış (MIMO) sistemlerinde kanal gürültüsünün etkileri incelenmiş ve alıcı sinyallerinden doğrudan sinyal-gürültü oranı (SNR) kestirimi yapılabilmesi için derin öğrenme tabanlı bir yaklaşım geliştirilmiştir. Çalışma kapsamında, farklı SNR seviyelerine sahip OOK modülasyonlu sinyaller AWGN ortamında MATLAB üzerinden üretilmiş ve bu sinyaller bir veri kümesi oluşturmak için kullanılmıştır.

Sinyallerdeki gürültü karakteristiklerini öğrenmek amacıyla Convolutional Neural Network (CNN) mimarisi tasarlanmış ve SNR tahmini bir regresyon problemi olarak modellenmiştir. Eğitim sürecinde kayıp fonksiyonu kararlı bir biçimde azalmış, test aşamasında ise ortalama mutlak hata (MAE) 1.83 dB, kök ortalama kare hata (RMSE) 2.26 dB ve R^2 skoru 0.93 olarak elde edilmiştir. Bu bulgular, CNN modelinin MIMO-VLC sistemlerindeki gürültü davranışını başarıyla modelleyebildiğini göstermektedir. Ayrıca sınıflandırma temelli değerlendirmeler, modelin yalnızca SNR tahmininde değil, aynı zamanda kanal kalitesinin kategorize edilmesinde de etkin olduğunu ortaya koymuştur.

Önerilen yaklaşım, değişken kanal koşullarında sistem farkındalığını artırarak adaptif bağlantı tekniklerine katkı sağlayabilecek niteliktedir. Gelecekte, ortam ışığı paraziti, yansıma etkileri ve shot noise gibi daha karmaşık gürültü modellerinin eklenmesi ve alternatif derin öğrenme mimarilerinin (ör. LSTM, Transformer) incelenmesi planlanmaktadır.

Anahtar Kelimeler: Görünür Işık Haberleşmesi (VLC), MIMO Sistemleri, Kanal Gürültü Modelleme, Derin Öğrenme (DL), Convolutional Neural Networks (CNN)

A Study of AI's and Advanced Mathematical Solvers Role in Shaping High School Students' Arithmetic Thinking

[1] Rudy Baez, [2]Alma Lama PhD, [1]Henry Sanchez, [1,*]Duli Pllana
[1]Jose Marti STEM Academy, Union City, NJ, USA
[2]UBT University in Kosovo
[*]dulipllana65@gmail.com

Abstract: This paper focuses on arithmetic thinking and the integration of AI-powered math solvers and platforms. Arithmetic thinking involves understanding mathematical concepts, demonstrating flexibility by solving problems using multiple methods, developing number sense through the use of arithmetic properties and the hierarchy of operations, and justifying solutions through reasoning. While math solvers assist in solving arithmetic problems and providing answers, they often lack explanation of why a particular solution makes sense. The steps shown typically illustrate how to solve a problem but do not develop arithmetic thinking. On the other hand, most AI platforms offer procedural methods for solving arithmetic problems and engaging students in deeper conceptual understanding. However, when students input questions into AI chatbots and ask for explanations behind arithmetic solutions, the AI can provide clear reasoning based on arithmetic concepts. AI can significantly enhance arithmetic thinking. The involvement of educators and researchers in the development and integration of AI in education has the potential to make a meaningful, positive difference—particularly in the realm of arithmetic and arithmetic thinking..

Keywords: Arithmetic, Arithmetic Thinking; AI platforms; Math Solver; Conceptual Knowledge.

Development of school students' digital competence through artificial intelligence

[1]Koshanova Gulnazira Danebekovna, [2]Zhumabay Nuray Zhumagaliqyzy
[1]Akhmet Yassawi International Kazakh-Turkish University, Faculty of Natural Sciences, Department of Mathematics
[2]Akhmet Yassawi International Kazakh-Turkish University, Faculty of Natural Sciences, Department of Mathematics
***nurayjumabay07@gmail.com**

Abstract: This article analyzes the impact of digital transformation on the education sector and examines the role of artificial intelligence in developing the digital competence of school students. The experiences of China, Estonia, Singapore, Finland, and Japan are reviewed, with a focus on the specific features of integrating artificial intelligence elements into their educational systems. Recommendations for Kazakhstan are provided, highlighting infrastructure shortages in rural schools and the need to improve teachers' digital competence. The risks of excessive use of artificial intelligence are also discussed, and the importance of its responsible and purposeful application is emphasized. The findings of the study indicate that the integration of artificial intelligence into the educational process significantly enhances students' digital competence, motivation, and critical thinking skills, especially when supported by well-trained teachers and adequate digital infrastructure.

Keywords: artificial intelligence, digital competence, school students, education system, pedagogical innovations

Аңдатпа: Бұл мақалада цифрлық трансформацияның білім беру саласына ықпалы талданып, мектеп оқушыларының цифрлық құзыреттілігін дамытуда жасанды интеллектінің рөлі қарастырылады. Қытай, Эстония, Сингапур, Финляндия және Жапония мемлекеттерінің тәжірибелері сараланып, олардың білім беру жүйесінде жасанды интеллект элементтерін қолдану ерекшеліктері сипатталады. Қазақстан үшін ұсыныстар беріліп, ауыл мектептеріндегі инфрақұрылым тапшылығы мен мұғалімдердің цифрлық құзыреттілігін арттыру қажеттілігі көрсетіледі. Сондай-ақ жасанды интеллектіні шектен тыс пайдаланудың тәуекелдері талданып, оны жауапты әрі мақсатты қолданудың маңыздылығы айқындалады. Зерттеу нәтижелері білім беру үдерісіне жасанды интеллектіні енгізу оқушылардың цифрлық құзыреттілігін, уәжін және сыни ойлау қабілеттерін айтарлықтай арттырады.

Кілттік сөздер: жасанды интеллект, цифрлық құзыреттілік, мектеп оқушылары, білім беру жүйесі, педагогикалық инновациялар

Ethical and Legal Challenges of Using Generative Artificial Intelligence in Higher Education in Kazakhstan

[1,*]Timur Alimkulov, [1]Abibullaeva Aiman
Ahmet Yassawi International Kazakh-Turkish UniversityFaculty of Engineering
***onetimtwotim@gmail.com**

Abstract: This paper explores the ethical and legal challenges related to the implementation of generative artificial intelligence (AI) tools (e.g., GPT-based models) in higher education institutions in Kazakhstan. The research focuses on intellectual property and authorship issues concerning AI-generated content, data protection and students' privacy, fairness and bias in AI systems, as well as their impact on academic integrity and students' skills development. The study also evaluates current national regulations and international practices. Based on these findings, we propose recommendations for creating an appropriate regulatory and ethical framework that would enable the safe and efficient integration of generative AI into Kazakhstan's educational system.

Keywords: generative AI, ethics, higher education, Kazakhstan, legal aspects

EEG Sinyal Verilerinden Epilepsi Hastalığının Tespiti için Derin Öğrenme ve Makine Öğrenmesi Tekniklerinin Kullanılması

[1]Mustafa Çullu, [1,*]Yesim Dokuz
[1]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Computer Engineering
[*]ytorun@ohu.edu.tr

Özet: Bu çalışmada, epilepsi hastalığının tespiti EEG sinyal verileri kullanılarak yapay zeka teknikleri ile gerçekleştirilmiştir. Araştırmaya başlanmadan önce benzer çalışmalar incelenmiş, mevcut literatür taraması yapılarak kullanılan yöntemler ve elde edilen sonuçlar değerlendirilmiştir. Ardından projede kullanılan veri seti Bonn Üniversitesi tarafından hazırlanmış, epilepsi alanında yaygın olarak kullanılan EEG sinyal veri seti tercih edilmiştir. Seçilen veri seti üzerinde çeşitli makine öğrenmesi ve derin öğrenme yöntemleri uygulanarak epileptik ve epileptik olmayan sinyallerin sınıflandırılması amaçlanmıştır. Bu kapsamda farklı algoritmaların performansları karşılaştırılmış ve epilepsi tespitinde en etkili yöntemin belirlenmesi hedeflenmiştir. Modellerden elde edilen sonuçlar doğruluk, kesinlik, duyarlılık ve F1-skor gibi performans metrikleri ile değerlendirilmiş; sonuçların iyileştirilmesi amacıyla çoklu eğitim süreçleri gerçekleştirilmiştir. Elde edilen bulgular sistematik olarak raporlanmış ve her yöntemin güçlü ve sınırlı yönleri tartışılmıştır. Bu çalışma, epilepsi tespitinde EEG tabanlı yaklaşımların potansiyelini vurgulamakta, derin öğrenme modellerinin bu alanda kullanımına yönelik karşılaştırmalı bir değerlendirme sunmakta ve yapay zekâ yöntemlerinin sağlık alanında tanı süreçlerine entegre edilebilirliğini ortaya koymayı amaçlamaktadır.

Anahtar Kelimeler: Epilepsi, EEG, Makine Öğrenmesi, Derin Öğrenme

Enhancing higher education transparency through a web application with AI-based moderation

[1,*]Rigon Pira, [2]Gentrit Halimi, [3]Argjend Azizi
[1]Computer Science and Engineering Department, University for Business and Technology, Lagjja Kalabria p.n.
[2]UBT - Higher Education Institution, Faculty of Computer Science and Engineering
[3]UBT - Higher Education Institution, Faculty of Computer Science and Engineering
***rigon.pira@ubt-uni.net**

Abstract: Higher education institutions rely on evaluation platforms to collect student feedback on universities and professors. Transparent and reliable feed-back is critical for improving teaching quality, fostering student trust, and promoting accountability. Existing systems often lack modularity, scalability, and automated mechanisms to prevent inappropriate or toxic comments, reducing credibility and participation. This paper presents a web-based application ad-dressing these challenges using advanced software engineering principles. The system adopts a modular architecture based on Vertical Slice Architecture and the CQRS pattern for maintainability and separation of concerns. Microservices communicate via gRPC, while the front-end interacts with core services through REST APIs. A machine learning model enables real-time prevention of toxic or hateful comments, ensuring respectful communication. The Strategy Pattern dynamically handles rating logic for different entities, such as universities and professors, providing flexibility and extensibility. The application is implemented as a full-stack system, supported by class, activity, and sequence diagrams. Results demonstrate enhanced transparency, automated content moderation, and scalable, flexible architecture. This work offers a practical blueprint for designing educational platforms that responsibly integrate artificial intelligence to improve trust, communication, and feedback quality among users.

Keywords: Higher Education, CQRS, Vertical Slice Architecture, Machine Learning, Toxicity Prevention

Detection of AI-Generated Small-Sized Images Using YOLOv8

[1,*]Ertugrul Gul, [2]Murat Tasyurek
[1]Kayseri University, Software Engineering Department, Kayseri, Turkiye
[2]Kayseri University, Computer Engineering Department, Kayseri, Turkiye
[*]ertugrulgul@kayseri.edu.tr

Abstract: The accelerated progress of generative Artificial Intelligence (AI) has resulted in the creation of highly realistic synthetic images that are becoming harder to distinguish from genuine photographs. This increased realism poses significant challenges for verifying the authenticity of digital media, with serious implications for misinformation, cybersecurity, and legal integrity. To tackle these issues, reliable detection methods are crucial for differentiating real images from AI-generated ones. This study provides evidence that AI-generated synthetic images are detectable using advanced deep learning architectures. We used the CIFAKE dataset, which includes 120,000 images of 32×32 pixels, evenly divided between real and synthetic samples. To ensure a thorough evaluation, we used a validation split not included in the original dataset. Two state-of-the-art models, ResNet and YOLOv8, were trained and tested for binary classification of real versus synthetic images. The experiments showed that YOLOv8 achieved the highest detection accuracy, reaching about 97%. These results show the potential of modern convolutional and detection networks to help verify image authenticity in an era of highly realistic AI-generated images.

Keywords: AI-generated Images, YOLOv8, Deep Learning, Synthetic Images, Image Security

The Relationship Between Academic Procrastination and Time Management Skills in Undergraduate Students

[1,*]Gulshat Muhametjanova
[1]Kyrgyz-Turkish Manas University, Faculty of Science, Department of Appplied Mathematics and Informatics
***gulshat.muhametjanova@manas.edu.kg**

Abstract: This study aims to examine the relationship between academic procrastination and time management skills in undergraduate students. Academic procrastination scale were administered to 202 undergraduate students. Academic procrastination behaviors were analyzed using descriptive statistics, and the relationship between these behaviors and time management skills was assessed using correlation analysis. Furthermore, time management levels (low, medium, high) were determined, and the interaction between these levels and gender, residence (dormitory or home), and demographic variables was examined using independent t-test analysis. The findings indicate that students' academic procrastination tendencies are generally moderate, and time management skills significantly influence these behaviors. A very weak negative correlation was found between time management and academic procrastination, meaning that students with higher time management skills exhibited lower levels of academic procrastination. However, a very weak negative correlation was found between cumulative grade point average (CGPA) and academic procrastination, indicating that students with lower procrastination tendencies had higher GPAs. A significant relationship was also found between time management skills and GPA, with students with higher time management skills having higher GPAs. However, no shared influence was found between time management skills and demographic factors.

Keywords: time management, procrastination, behavior

АРТ-ТЕРАПИЯ: ЛЕЧЕНИЕ ДУШИ ЧЕРЕЗ ТВОРЧЕСТВО

[1, *] Сунакбаева Латофат, [1,] Сейдахметова А.А.
[1] Южно-Казахстанская медицинская академия, г. Шымкент, Казахстан
*** sunakbaevalatofat08@gmail.com**

Аннотация: Аннотация: В статье рассматривается феномен арт-терапии как одного из наиболее перспективных и востребованных направлений современной психотерапии. Особое внимание уделяется её исторической эволюции, начиная с первых практических экспериментов в середине XX века, когда творчество использовалось как средство реабилитации пациентов, и до развития целостных теоретических концепций, сформировавших самостоятельное направление в клинической и педагогической практике. Показаны основные теоретические подходы, в том числе психоаналитический, гуманистический и когнитивно-поведенческий, которые легли в основу формирования арт-терапевтических методов. Отмечается, что арт-терапия выступает не только инструментом коррекции эмоциональных нарушений, но и эффективным способом диагностики внутренних конфликтов и бессознательных переживаний, которые сложно выразить вербально. Через различные художественные формы — рисунок, музыку, танец, драматизацию, литературу — человек получает возможность безопасно выражать подавленные эмоции, снижать уровень психоэмоционального напряжения и гармонизировать внутреннее состояние. В статье также рассматриваются современные виды арт-терапевтических практик: изотерапия, музыкотерапия, танцевально-двигательная терапия, драматерапия, фототерапия и библиотерапия. Подчеркивается их роль в комплексной системе психологической и медицинской помощи, включая коррекцию депрессивных и тревожных расстройств, реабилитацию после травмирующих событий, поддержку детей с особыми образовательными потребностями и повышение адаптационных ресурсов взрослых. Таким образом, арт-терапия представляет собой универсальный и гибкий метод, сочетающий возможности психотерапии и искусства. Она способствует не только восстановлению психоэмоционального равновесия, но и личностному росту, развитию креативного потенциала и самопознанию, что делает её особенно актуальной в условиях возрастающих стрессовых нагрузок современного общества.

Ключевые слова: арт-терапия, творчество, психология, изотерапия, музыкотерапия, танцевально-двигательная терапия, реабилитация, эмоциональное здоровье.

ART THERAPY: HEALING THE SOUL THROUGH CREATIVITY

[1, *] Sunakbaeva Latofat, [1,] A.A. Seidakhmetova
[1] South Kazakstan Medical Academy, Shymkent, Kazakhstan
*** sunakbaevalatofat08@gmail.com**

Abstract: The article examines the phenomenon of art therapy as one of the most promising and in-demand areas of modern psychotherapy. Special attention is given to its historical evolution, starting from the first practical experiments in the mid-20th century, when creativity was used as a means of patient rehabilitation, and up to the development of comprehensive theoretical concepts that formed an independent direction in clinical and pedagogical practice. The main theoretical approaches are highlighted, including psychoanalytic, humanistic, and cognitive-behavioral, which formed the basis for the development of art therapy methods.

It is noted that art therapy serves not only as a tool for correcting emotional disorders but also as an effective means of diagnosing inner conflicts and unconscious experiences that are difficult to express verbally. Through various artistic forms — drawing, music, dance, dramatization, and literature — individuals gain the opportunity to safely express repressed emotions, reduce psycho-emotional stress, and achieve inner harmony.

The article also examines modern types of art therapy practices: art therapy through drawing and painting, music therapy, dance movement therapy, drama therapy, photo therapy, and bibliotherapy. Their role in the comprehensive system of psychological and medical assistance is emphasized, including the correction of depressive and anxiety disorders, rehabilitation after traumatic events, support for children with special educational needs, and strengthening the adaptive resources of adults.

Thus, art therapy represents a universal and flexible method that combines the possibilities of psychotherapy and art. It contributes not only to the restoration of psycho-emotional balance but also to personal growth, the development of creative potential, and self-awareness, which makes it especially relevant in the context of increasing stress loads in modern society.

Keywords: art therapy, creativity, psychology, drawing therapy, music therapy, dance movement therapy, rehabilitation, emotional health.

8 ELECTRICAL ELECTRONICS ENGINEERING

Sıkıştırmalı-anten kullanan bir haberleşme sisteminin farklı kullanıcı alan türleri için incelenmesi

[1,*]Alperen CENGİZ, [1]Mehmet BİLİM, [1]Yasin KABALCI
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Elektrik-Elektronik Mühendisliği Bölümü
[*]alperencengiz@ohu.edu.tr

Özet: Altıncı Nesil (6G) haberleşme teknolojilerinin standartlarının belirlenmesi üzerine çalışmalar devam ederken 2030 yılı itibariyle de faaliyete geçeceği ön görülmektedir. Bu gelişmelerle 6G sistemlerde artan veri hızı ve düşük gecikme süresi gibi gereksinimler geleneksel anten teknolojilerinin 6G teknolojilerindeki ihtiyaç ve gereksinimleri karşılayacak yeterlilikte olmadığı görülmektedir. Böylelikle 6G haberleşme sistemleri için geleneksel anten (konvansiyonel anten) teknolojilerinin temel sınırlarını aşacak yenilikçi anten çözümlerini zorunlu kılmaktadır. Bu anlamda dielektrik dalga kılavuzları üzerinde serbest bir şekilde konumlandırılabilen sıkıştırmalı anten sistemleri (pinching antenna systems) büyük ölçekli yol kayıplarını azaltma ve kullanıcılara yakın güçlü görüş hattı (line of sight) oluşturmasıyla öne çıkmaktadır. Bu çalışmada 28GHz frekansında çalışan sıkıştırmalı anten sistemlerinin performansı kullanıcıların farklı geometrik alanlar ve değişen anten sayıları üzerinden Monte Carlo simülasyonları ile analiz edilmiştir. Geleneksel anten ve sıkıştırmalı antenin farklı düzenli ve düzensiz kullanıcı alan geometrileri üzerinden karşılaştırılmış, ayrıca tek ve çoklu sıkıştırmalı anten sayısının performansa etkisi incelenmiştir.

Anahtar Kelimeler: Altıncı nesil (6G) haberleşme, Sıkıştırmalı anten, Ergodik hız oranı, Esnek anten sistemleri.

Lomax sönümlü kanallar için kusurlu faz hataları analizi

[1,*]Mehmet Bilim
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Elektrik-Elektronik Mühendisliği Bölümü
[*]mbilim@ohu.edu.tr

Özet: Bu çalışmada, Lomax sönümlü kanal modelleri için kusurlu faz hataları analizi gerçekleştirilmiştir. Lomax sönümlenmesi aşırı sönümlü şartları matematiksel olarak başarılı bir şekilde modelleyen ve gerçek sonuçlara yakın bulgular sunabilen bir model olduğu için bu çalışmada tercih edilmiştir. Yapılan analizde literatürde kabul görmüş matematiksel dönüşümler kullanılmış olup, olasılık yoğunluk fonksiyonu temelli bir yaklaşım sunulmuştur. Analiz sonucunda elde edilen bulgularda açıkça görülmektedir ki, analitik ve tam benzetim sonuçları birbirine yakın bir davranış sergilemektedir. Böylelikle sunulan analizin doğruluğu gösterilmektedir.

Anahtar Kelimeler: Faz Hataları, yaklaşık hata ifadesi, Lomax Sönümlü Kanallar

FPAA Platform Realization of Memristor-Based Blackman Window Function Coupled with the FHN Neuron Model

[1]Jean Luck RANDRIANANTENAINA, [1] Obeid ABDALLA [1,*]Ahmet Yasin BARAN, [2]Nimet KORKMAZ, [1]Recai KILIÇ
[1]Erciyes University, Faculty of Engineering, Department of Electrical and Electronics Engineering
[2]Kayseri University, Faculty of Engineering, Department of Electrical and Electronics Engineering
***abaran@erciyes.edu.tr**

Abstract: Memristor-based models are widely studied for their ability to reproduce neuronal and synaptic dynamics in neuromorphic systems. Since physical memristors are not yet commercially available, realizable models and hardware implementations are essential for practical applications. In this work, a Memristive FitzHugh–Nagumo (MFHN) system with a Blackman window function is proposed. Numerical simulations are first performed to investigate the dynamic characteristics of the system, including time-domain responses and the hysteresis curve of the memristor. Following that, the system is successfully implemented on the AN231E04 FPAA platform, which enables rapid prototyping and analog hardware design. CAM block configurations are achieved through the Anadigm Designer interface, and real-time measurements are recorded using a digital oscilloscope. The results demonstrate close agreement between the hardware implementation and the numerical simulations, confirming the feasibility of the proposed MFHN system with Blackman window function for its utilization in real-time neuromorphic applications.

Keywords: Memristor, Blackman window Function, Field Programmable Analog Array (FPAA), FHN Neuron.

Developing Industrial IoT Systems with Low-Power Consumption Sensor and Network Infrastructure

[1,*]Onur İlyas Yavuz, [2]Hakkı Soy
[1]Demsay Elektronik Sanayi ve Ticaret A.Ş., Ar-Ge Merkezi
[2]N. Erbakan Üniversitesi, Mühendislik Fakültesi, Elektrik-Elektronik Mühendisliği Bölümü
[*]o.yavuz@demsay.com

Abstract: Industrial Internet of Things (IIoT) systems play a critical role in ensuring data reliability, energy efficiency, and remote accessibility within modern production processes. However, existing solutions remain considerably limited, particularly in terms of power consumption and data continuity. In this study, a new IoT platform with a flexible architecture — the LPKIT (Low Power Kit) — featuring a low-power consumption and long-range wireless communication infrastructure, has been developed as an alternative to traditional systems used in industrial applications, and its performance analyses have been presented. The LPKIT system consists of two main components: the sensor unit (LPKIT-Sensor) and the gateway unit (LPKIT-Gateway). The sensor unit measures environmental parameters such as temperature, humidity, motion, presence detection, and vibration, and transmits the collected data with low energy consumption via a LoRa connection. The gateway unit, on the other hand, visualizes the sensor data in real time through a graphical user interface and also stores it locally. Experimental results demonstrate that the developed system provides reliable communication performance in terms of both power efficiency and data transmission stability.

Keywords: Industrial IoT, Low Power Consumption, LoRa Communication, Sensor Integration, Data Collection

Investigating the Impact of Realistic Actuator Limitations on AVR Controller Performance for Practical Applications

[1,*]Omer TURKSOY
[1]Iskenderun Technical University, Electrical and Electronics Engineering
[*]omer.turksoy@iste.edu.tr

Abstract: Automatic Voltage Regulators (AVRs) are essential for maintaining stable generator terminal voltage in power systems, and classical Proportional–Integral–Derivative (PID) controllers and their fractional-order extensions (FOPID) remain widely used due to their simplicity and flexibility. Recent studies have employed metaheuristic algorithms to optimize these controllers using various performance indices; however, most works neglect realistic actuator limitations such as control signal and exciter output saturation, which leads to impractical designs. This paper addresses this gap by investigating the impact of realistic actuator limitations on AVR controller performance in the context of practical applications. A Particle Swarm Optimization (PSO) algorithm is applied to tune PID and FOPID parameters using the Zhou–Li–Guo (ZLG) objective function, and the optimized controllers are evaluated through step response, control energy, and standard performance indices in both idealized and saturation-constrained scenarios. Simulation results demonstrate that actuator limitations significantly degrade transient performance and increase control effort, with PID controllers being the most sensitive, while FOPID exhibits superior resilience with smoother dynamics and more efficient control action. These findings highlight the necessity of incorporating actuator nonlinearities in AVR controller design to ensure practically applicable solutions and provide valuable insights for real-world deployment.
Keywords: Automatic Voltage Regulator, Actuator Limitations, PID, FOPID, Particle Swarm Optimization.

Veri Tabanlı Beyin Ağı Modellemesi: Wilson–Cowan Parametrelerinin Çıkarımı ve Beyin Hemisferlerinin Dinamik Karşılaştırılması

[1,*]Filiz Tosunoğlu, [1]Zühra Karaca
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Elektrik-Elektronik Mühendisliği Bölümü
[1,*]filiz.tosunoglu@mail.ohu.edu.tr

Özet: Bu çalışma, insan beyninin sol (LH) ve sağ (RH) hemisferlerine ait 73×73 boyutlu empirik faz senkronizasyon matrislerini kullanarak, Wilson–Cowan (WC) sinir kütle modeli ile fonksiyonel bağlantıların (FC) dinamik olarak modellenmesini amaçlamaktadır. Wilson–Cowan modeli, uyarıcı (E) ve inhibitör (I) nöron popülasyonları arasındaki etkileşimleri diferansiyel denklemlerle açıklayarak beyin ağlarının dinlenim hâli işlevsel organizasyonunu incelemek için güçlü bir çerçeve sunmaktadır. Çalışmada, model parametreleri Diferansiyel Evrim (Differential Evolution, DE) algoritması ile optimize edilmiş ve empirik faz senkronizasyon matrisleri ile WC modelinin ürettiği simülasyon matrisleri arasındaki uyum değerlendirilmiştir.
Sonuçlar, sağ hemisferde model–veri uyumunun sol hemisfere kıyasla anlamlı derecede daha yüksek olduğunu göstermektedir. En güçlü %20 bağlantı için korelasyon değerleri hesaplatılmıştır. Elde edilen bulgular, sağ hemisferin dinamik modelleme ile de doğrulanan daha güçlü fonksiyonel entegrasyona sahip olduğunu ve literatürde rapor edilen hemisferik asimetrilerle uyumlu olduğunu ortaya koymaktadır. Elde edilen sonuçlarla, hemisferik faz senkronizasyonunun dinamik kökenlerinin, nöral kütle modelleri ve evrimsel optimizasyon yöntemleri ile güvenilir biçimde incelenebileceğini göstermektedir. Ayrıca çalışma, hemisferler arası fonksiyonel entegrasyon farklılıklarının yalnızca betimleyici istatistiklerle değil, parametrik dinamik modelleme yaklaşımlarıyla da sistematik olarak ortaya konulabileceğini kanıtlamaktadır.

Anahtar Kelimeler: Wilson–Cowan modeli, diferansiyel evrim algoritması, faz senkronizasyonu, fonksiyonel bağlantı

Channel Estimation in RIS-Assisted MISO-OFDM Systems over TDL Channels Using LMMSE

[1,*]Ural MUTLU, [2]Mehmet BİLİM, [2]Yasin KABALCI
[1]Niğde Ömer Halisdemir University, Bor Vocational School, Department of Electricity and Energy
[2] Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Electrical and Electronic Engineering
[*]umutlu@ohu.edu.tr

Abstract: This study investigates channel estimation in a reconfigurable intelligent surface (RIS)-assisted MISO-OFDM system operating over 3GPP-defined tapped delay line (TDL) channels, motivated by the need to accurately estimate the cascaded Base Station–RIS–User Equipment channel for effective RIS configuration. The system first employs Least Squares (LS) estimation using orthogonal RIS pilot and RIS reflection matrices based on discrete Fourier transform (DFT) designs. To improve estimation accuracy, a Linear Minimum Mean Square Error (LMMSE) estimator is proposed, which refines LS estimates by incorporating second-order channel statistics derived from the TDL power delay profile and by estimating noise variance from adjacent pilot subcarriers. Simulations conducted in 5G sub-6 GHz frequency range show that LMMSE consistently outperforms LS, particularly at short delay spreads due to increased frequency-domain correlation. However, in the mobility scenarios, the Doppler effects reduced the effectiveness of both LS and LMMSE methods, highlighting the time averaging effect of LS estimation.

Keywords: Reconfigurable Intelligent Surface (RIS), MISO-OFDM, Linear Minimum Mean Square Error (LMMSE), Tapped Delay Line (TDL), Channel Estimation

Parameters Estimation Based on Extended Kalman Filter for High Performance Permanent Magnet Synchronous Motors Drives

[1,*]Duygu Gümüşçü, [2]Yunus Emre Altınışık, [3]Rıdvan Demir
[1]Kayseri University, Graduate Education Institute, Department of Electrical and Electronics Engineering
[2]Kayseri University, Vocational School of Information Technologies, Department of Electronics and Automation
[3]Kayseri University, Faculty of Engineering Architecture and Design, Department of Electrical and Electronics Engineering
***224038000003@kayseri.edu.tr**

Abstract: This study presents a high-performance parameter estimation framework for Model Predictive Current Control-based Permanent Magnet Synchronous Motors (PMSMs) drives by integrating an Extended Kalman Filter (EKF) within a MATLAB/Simulink environment. The method simultaneously estimates five critical quantities: stator current components in the stationary reference frame, rotor mechanical speed, load torque, and stator resistance. Accurate estimation of these states and parameters is essential for achieving high-performance sensorless control, fault detection, and real-time performance optimization in drive systems. The EKF is designed based on the nonlinear dynamic model of the PMSM, explicitly accounting for the coupling between electrical and mechanical dynamics. Simulation test scenario includes step-like changes both in load torque and stator resistance to assess robustness. Results demonstrate that rotor speed can be reliably reconstructed despite significant parameter changes, maintaining minimal steady-state error and rapid convergence. The control system effectively tracks both transient and steady-state behaviors of the PMSM without requiring additional mechanical sensors, reducing cost and complexity. The findings confirm that the EKF-based approach provides a high-performance and practical solution for PMSM parameter estimation and control enhancement.

Keywords: Extended Kalman Filter, Permanent Magnet Synchronous Motor, Model Predictive Current Control, Parameter Estimation, Sensorless Control.

Monitoring Fruit Decay and Color Changes Using Image Processing Techniques

[1,2]Batuhan Selamoğlu, [3,*]Muhammad Waris

[1]Istanbul Arel University, Vocational School, Department of Electronics and Automation, Electronics Technology Program
[2] Department of Electrical and Electronics Engineering, Institute of Engineering, Mersin University
[3]Department of Environment Science, Aror University of Art, Architecture, Design and Herritage
***mwaris.faculty@aror.edu.pk**

Abstract: One of the most significant parameters that affect consumer selection, post-harvest storage, and marketability is the quality of the fruit. Traditional methods to check decay and color development are basically manual inspection, which is subjective, time-consuming, and error-prone. Recent advances in image processing and computer vision have provided effective and non-destructive means to assess fruit quality in real time. This work is devoted to the use of image processing techniques for detecting decay development and color change in fruit. The proposed technique involves capturing digital images of fruits under controlled environments and applying preprocessing steps such as noise removal, segmentation, and color space conversion. Most significant features such as texture, shape, and color histograms are extracted to quantify changes with time. Red-Green-Blue (RGB), Hue, Saturation, and Value (HSV), and Commission Internationale de l'Éclairage Lab (CIELAB) space color transformations are very useful for detecting small changes, while thresholding and morphology enable the specification of decayed regions. In addition, classification by machine learning can enhance the accuracy of the discrimination of healthy and defective fruit samples. Results demonstrate that image processing can effectively track decay progression and color shifts, providing a non-destructive, rapid, and accurate tool for quality control in the agricultural and food industries.

Keywords: Fruit quality, Image processing, Decay detection, Color change, Post-harvest monitoring

Analysis of Environmental Pollution Risks and Polluting Factors Using Image Processing Techniques

[1,2]Batuhan Selamoğlu, [3,*]Muhammad Waris
[1]İstanbul Arel University, Vocational School, Department of Electronics and Automation, Electronics Technology Program
[2] Department of Electrical and Electronics Engineering, Institute of Engineering, Mersin University
[3]Department of Environment Science, Aror University of Art, Architecture, Design and Herritage, Sukkur
***mwaris.faculty@aror.edu.pk**

Abstract: Environmental pollution is currently the most critical global issue, and it is a threat to human health, ecosystems, and sustainable development. Traditional monitoring methods, as helpful as they may be, are generally costly, time-consuming, and incomplete with regard to real-time capabilities. The image processing technology is nevertheless an extremely valuable resource for sensing, analyzing, and discriminating various sources of pollution in an efficient and reliable way.
The role of this study is to investigate environmental pollution risks and identify pollution factors using advanced image processing algorithms. Segmentation, feature extraction, and pattern classification techniques are employed to detect air pollution effects (i.e., smoke, haze), water pollution (i.e., color changes, solid wastes), and land degradation (i.e., dumping of wastes, plant stress) from digital images and videos. Machine learning classifiers are also used to boost the correctness of pollutant source identification. The expected outcomes include the development of an affordable, fast, and stable method of real-time monitoring of environmental pollution. The outcomes will contribute to the establishment of early warning systems, effective decision-making regarding environmental management, and implementation of sustainable pollution control policies.

Keywords: Environmental pollution, image processing, pollution risk analysis, pattern recognition, machine learning

Hexagonal QAM implementation for traditional power line communication systems

[1,*]Alperen CENGİZ, [1]Mehmet BİLİM, [1]Yasin KABALCI
[1]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Electrical and Electronics Engineering
***alperencengiz@ohu.edu.tr**

Abstract: This study presents a detailed error probability (P_e) analysis for a single-input single-output power line communication system which uses hexagonal quadrature amplitude modulation. The derivation of the P_e expression is theoretically performed by considering the probability density function (PDF) of the system under consideration. Based on the P_e expression derived from the PDF, various numerical results are presented along with different scenarios. As seen from the presented results, the analytical findings obtained are consistent with the exact computer simulation results.

Keywords: Power line communication, Quadrature amplitude modulation, Error probability.

Meta-Sezgisel Optimizasyon İle Sürekli Mıknatıslı Senkron Motorun Elektriksel ve Mekanik Parametrelerinin Belirlenmesi

[1,*]Recep YILDIZ, [1]İmran Aybüke DOĞAN, [1]Murat BARUT, [2]Emrah ZERDALİ
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Elektrik-Elektronik Mühendisliği Bölümü
[2]Ege Üniversitesi, Mühendislik Fakültesi, Elektrik-Elektronik
[*]ryildiz@ohu.edu.tr

Özet: Sürekli mıknatıslı senkron motorların (SMSM'lerin) yüksek başarımlı kontrollerinin gerçekleştirilmesinde motor parametrelerinin doğru olarak belirlenmesi büyük rol oynamaktadır. Bu nedenle geleneksel yaklaşımlarda motor parametrelerinin belirlenmesine yönelik olarak farklı testlerin gerçekleştirilmesi gerekmektedir. Ancak geleneksel yaklaşımlarda gerçekleştirilen testler, donanım gereksinimi, gerekli test düzeneklerinin oluşturulması ve testlerin gerçekleştirilmesi için ihtiyaç duyulan zaman ve test verilerinden motor parametrelerinin elde edilmesi için gereken hesaplama işlemleri nedenleriyle zahmetlidir. Bu yüzden literatürde SMSM parametrelerinin faklı meta-sezgisel optimizasyon algoritmalarıyla belirlenmesine yönelik çalışmalar gerçekleştirilmiştir. Gerçekleştirilen bu çalışma kapsamında meta sezgisel optimizasyon yöntemlerinden biri olan yıldırım arama algoritması (YAA) ile SMSM'nin stator direnci, stator endüktansı, eylemsizlik, viskoz sürtünme terimi ve sürekli mıknatısın halkalama akısı parametreleri benzetim ortamında belirlenmiştir. SMSM parametrelerinin YAA ile belirlenmesi işleminde maliyet fonksiyonunda gerçek ve belirlenen hız değerleri arasındaki fark olarak tanımlanan hız hatası kullanılmıştır. Belirlenen parametre sınırları için YAA ile on adet optimizasyon gerçekleştirilmiş, elde edilen maliyet ve parametre değerleri kutu grafiklerinde gösterilmiştir. Ayrıca en düşük maliyet değerine sahip parametre değerleri seçilerek parametrelere ilişkin yüzde hata değerleri de sunulmuştur. Elde edilen sonuçlar ve yüzde hata değerleri YAA'nın SMSM parametrelerinin belirlemesindeki başarımını açıkça ortaya koymaktadır.

Anahtar Kelimeler: Sürekli Mıknatıslı Senkron Motor, Yıldırım Arama Algoritması, Parametre Belirleme.

Asenkron Motor Sürücüleri için Bulanık Mantık Kontrolörle Eğim Açısı Değiştirilen Uyarlanabilir Kayma Kipli Gözlemleyici

[1]Halil Burak DEMİR, [1,*]Murat Barut, [1]Recep Yıldız, [2]Emrah Zerdali
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Elektrik-Elektronik Mühendisliği Bölümü
[2]Ege Üniversitesi, Mühendislik Fakültesi, Elektrik-Elektronik Mühendisliği Bölümü
[*]mbarut@ohu.edu.tr

Özet: Bu çalışmada, asenkron motor (ASM) sürücülerinde kullanılan geleneksel kayan kipli gözlemleyici (G-KKG) yapısının çatırtı probleminin etkilerini azaltmak için yeni bir uyarlanabilir kayan kipli gözlemci (U-KKG) yaklaşımı sunulmaktadır. Önerilen U-KKG'de G-KKG yapısında bulunan işaret (sgn) fonksiyonu yerine eğim açısı ASM'nin rotor hızı (ω_m) ve yük momenti (t_L) değişimlerine göre uyarlanan $doyum\,(sat)$ fonksiyonu kullanılmıştır. Eğim açısının ayarlanması için ω_m ve t_L'nin giriş, eğim açısının ise çıkış olarak tanımlandığı bir bulanık mantık kontrolörü tasarlanmıştır. Böylece U-KKG ile G-KKG'de kestirilen stator akımlarının duran eksen takımın bileşenleri, rotor akılarının duran eksen takımı bileşenleri ve ω_m kestirimlerinin iyileştirilmesi amaçlanmaktadır. Önerilen yöntemin başarımı, ω_m ve t_L değişimlerinin içeren kapsayıcı bir senaryo altında hem G-KKG hem de sabit eğim açısına sahip sat fonksiyonu kullanan KKG ile benzetim ortamında karşılaştırılmıştır. Benzetim sonuçları, önerilen U-KKG'de ω_m ve t_L değişimlerine duyarlı şekilde sat fonksiyonun eğim açısını değiştirmesi nedeniyle, çatırtı etkisinin azalttığını ve böylece ω_m tahmininde karşılaştırılan diğer yöntemlere kıyasla daha yüksek başarım elde edildiğini göstermektedir.

Anahtar Kelimeler: Kayan kipli gözlemleyici, Asenkron motor, Doyum fonksiyonu.

İndis modülasyonlu OFDM sisteminin N210 USRP donanımı kullanılarak pratik gerçeklenmesi

[1]Ömer Adıgüzel, [2,*]İbrahim Develi
[1]Tarsus Üniversitesi, Mühendislik Fakültesi, Elektrik-Elektronik Mühendisliği Bölümü
[2]Erciyes Üniversitesi, Mühendislik Fakültesi, Elektrik-Elektronik Mühendisliği Bölümü
[*]develi@erciyes.edu.tr

Özet: Bu çalışmada, gerçek zamanlı deneyler ile indis modülasyonlu dik frekans bölmeli çoğullama (OFDM-IM) sisteminin performansı değerlendirilmiştir. Saha deneyleri için N210 evrensel yazılım radyo çevre birimi (USRP) donanımı kullanılmıştır. USRP'ler ile gerçek zamanlı deneyler yapılırken, hassas zaman ve frekans senkronizasyonunun sağlanması gerekir. Senkronizasyon için verici sinyalin başlangıcına, alıcı tarafta bilinen bir önsöz sinyali eklenmiş ve alıcı tarafta ise korelasyon yoluyla sinyalin başlangıcı belirlenmiştir. OFDM-IM'in pratik performansının değerlendirilmesi için farklı modülasyon derecelerinde hem görüş hattı (LOS) hem de görüş hattı dışı (NLOS) senaryolarında deneyler yapılmıştır. Farklı sinyal-gürültü oranlarında (SNR) takımyıldız diyagramları ile sistemin deneysel performansı sunulmuştur. Elde edilen sonuçlar doğrultusunda gürültünün yükselmesi ile hatanın da arttığı gözlenmiştir. Ayrıca; NLOS senaryosunda, teorik bilgilerden beklendiği üzere algılama doğruluğunun düştüğü görülmüştür.

Anahtar Kelimeler: İndis modülasyonu, OFDM-IM, LOS, NLOS, USRP.

Performance Examination of the FOPI on MPCC-Based PMSM Drive: A Comparative Study

[1]Recep Yildiz, [1,*]Tevfik Yigit
[1]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Electrical and Electronics Engineering
***tevfikyigit@ohu.edu.tr**

Abstract: Permanent Magnet Synchronous Motors (PMSMs) are extensively utilized in high-performance drive systems owing to their efficiency and dependability. However, achieving high-performance control under changing operating conditions remains difficult. To overcome this challenge, one of the most preferred control methods is the Model Predictive Control (MPC) strategy. This paper focuses on the performance evaluation and comparison between integer-order PI (IOPI) and fractional-order PI (FOPI) used in the model predictive current control (MPCC) of the PMSM. To ensure a fair comparison, both control systems including IOPI and FOPI are optimized under identical conditions utilizing the Hybrid Firefly–Particle Swarm Optimization (HFPSO) algorithm. Each optimization is repeated 10 times to guarantee statistical consistency of the results. The optimized values with the minimum cost are chosen for both IOPI and FOPI to perform simulation tests with a comprehensive scenario, including speed and load torque changes. The investigation indicates that the FOPI controller exhibits a more favorable dynamic response and higher overall performance compared to the IOPI controller. These findings highlight the value of fractional-order control in improving the performance of MPCC for advanced motor drive applications.

Keywords: Model Predictive Current Control, Fractional-Order Control, Permanent Magnet Synchronous Motor, Hybrid Firefly-PSO Algorithm.

Method for selecting controlled shunt reactors In high-voltage power grids

[1]HASHIMOV A.M., [2,*]GULİYEV H.B., [3]BABAYEVA A.R.
[1.3]Azerenergy" OJSC, Azerbaijan Scientific-Research and Design-Prospecting Power Engineering Institute
[2]Azerbaijan Technical University
***huseyngulu@mail.ru**

Abstract: : In order to compensate for the reactive power surplus arising from the charging powers of long-length power transmission lines in high-voltage power grids of the power system, a method for selecting controlled shunt reactors using instantaneous values of mode parameters is given. Thus, it has been shown that the selection of such reactors by existing methods leads to their overloading at online control and, as a result, the effective performance of the power grid decreases. Based on the proposed method, the operation of controlled shunt reactors located at selected 330 kV priority nodes of the real power system has been described in the surface form and their operating modes have been studied. As a result of the study, it was determined that the stable maintaining of voltage on the 330 kV buses in the allowable range in accordance with the real-time mode changes of the reactors, as well as the increase in the voltage stability of the power system are achieved.

Keywords: high-voltage power grid, controlled shunt reactor, reactive power surplus, operating modes, stability of the power system due to voltage

Unmanned ground vehicle design for defense operations: From concept to functional prototype

[1,*]Ilkin Aliyev, [1]Imran Yolcuyev, [2]İhsan Ömür Bucak
[1]Azerbaijan Technical University, Faculty of Mechanical Engineering and Robotics, Department of Mechatronics
[2]Iğdır University, Faculty of Engineering, Department of Computer Engineering
***ilkin.aliyev@aztu.edu.az**

Abstract: Today, robotic technologies are rapidly advancing and becoming widespread, especially in the military field. Among these technologies, unmanned ground vehicles have recently gained the most attention and are considered systems of strategic importance. In this work, a model was developed for converting a traditionally human-controlled ground combat vehicle into an unmanned one, with particular focus on designing robotic arm and firing (destruction) systems, which were implemented at the prototype level. The work includes a control board communicating via USB connection, remote image transmission and audio communication systems, as well as a remotely controlled robotic arm. Thanks to the developed user interface, real-time status information from the vehicle can be received in text format and analyzed by the operator. Through these systems, a prototype of an unmanned ground vehicle that operates without human intervention and can perform missions in hazardous environments has been realized. This model, regarded as an important step towards minimizing human casualties in dangerous operations, enables safer and more effective mission execution in field conditions.

Keywords: Robotic systems, Unmanned ground vehicle, Military robot technologies, Robotic arm, Remote control.

9 ENVIRONMENTAL ENGINEERING

Micropollutant pesticides in soil: A database approach

[1] Ahmad Wali Wali Zadah, [2,3,4,*]Neslihan Doğan-Sağlamtimur
[1] Khaja Ghar City, Takhar Province, Mamur Village, 2nd Street No:12 Taluqan, Afghanistan
[*2] Nigde Omer Halisdemir University, Engineering Faculty, Department of Environmental Engineering, Niğde, Türkiye
[3] ALTEKNA Engineering and Technology Services Industry and Trade Limited Company TEKNOPARK No:31 Interior Door:115 Nigde, 51240, Türkiye
[4] Chair, Sustainable Technology Committee Türkiye Federation of Software Developers (TUYAFED)
***neslihandogansaglamtimur@gmail.com**

Abstract: This research examines the role of pesticides as micropollutants in soil pollution, focusing on their persistence, ecological impact, and health risks. Pesticides commonly used in agriculture remain in the soil due to their chemical resistance and affect soil health and biodiversity by creating long-term pollution risks. By combining recent literature, this study provides an overview of how pesticides cause disruptions in soil microbial communities and enzymatic activities essential for nutrient cycling and soil fertility. The findings highlight significant adverse effects that reduce soil health and fertility. Pesticides remaining in soil create direct and indirect health risks such as endocrine disruption, cancer and neurotoxicity through direct exposure and food chain contamination. Innovative restoration techniques such as bioremediation and photocatalytic degradation show promise in reducing soil pollution. However, the practical application and scalability of these methods require further research. This study highlights the need for strengthened regulatory frameworks to control pesticide use and promote sustainable agricultural practices that reduce environmental pollution. Public health initiatives are also needed to monitor pesticide residues in soils and food crops and educate communities. Future research should focus on understanding the cumulative effects of exposure to pesticides, interactions with other soil contaminants, and the development of improved remediation technologies. The findings highlight the importance of a multifaceted approach that includes regulatory measures, sustainable practices and innovative technologies to tackle pesticide pollution in soils.

Keywords: Pesticides, Micropollutants, Soil, Database

Environmental impacts of forest fires and sustainable management strategies

[1]Mohamed Farah Mohamed, [2,3,4,*]Neslihan Doğan-Sağlamtimur
[1]NBC Waddada Sodonka, District Hodan, Mogadishu, Somalia
[2,*]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Environmental Engineering
[3]ALTEKNA Engineering and Technology Services Industry and Trade Limited Company TEKNOPARK No:31 Interior Door: 115 Nigde, 51240, Türkiye
[4]Chair, Sustainable Technology Committee, Türkiye Federation of Software Developers (TUYAFED)
***nds@ohu.edu.tr**

Abstract: Forest fires are increasingly recognized as one of the most critical environmental threats, intensifying under the influence of climate change and human activities. This study examines the multidimensional impacts of forest fires on soil, water, air, and biodiversity, while emphasizing their role in accelerating global climate change through greenhouse gas emissions. Using Türkiye as a case study, recent wildfire events are analyzed to reveal both vulnerabilities and opportunities in national forest management. Findings highlight that wildfires not only degrade ecosystems and disrupt human security but also pose significant economic challenges. Sustainable management strategies including early warning systems, remote sensing technologies, controlled burning, and community-based participation emerge as key solutions. The results of this study underline that a holistic approach, integrating science, technology, governance, and local engagement, is essential for reducing the destructive effects of wildfires and safeguarding ecosystems for future generations.

Keywords: Climate change, Environment, Forest fires, Sustainable management, Türkiye

Türkiye'de üniversite kampüslerinde karbon ayak izi hesaplamaları: Kullanılan metotlar ve azaltım stratejileri

[1,*] Meltem Sarıoglu Cebeci, [2]Fehiman Çiner
[1]Sivas Cumhuriyet Üniversitesi, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü
[2]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü
***sarioglu@cumhuriyet.edu.tr**

Özet: Karbon ayak izi (KAİ), insan faaliyetleri sonucu atmosfere yayılan sera gazlarının toplam miktarının karbondioksit eşdeğeri (CO_2e) cinsinden ölçülmesiyle belirlenir. Üniversiteler, yüksek enerji tüketimi, ulaşım faaliyetleri ve atık üretimi nedeniyle önemli karbon salınımı kaynaklarıdır. Dolayısıyla bu kurumlarda karbon ayak izi hesaplamaları hem çevresel sürdürülebilirlik hem de iklim politikalarına uyum açısından kritik öneme sahiptir. Küresel iklim değişikliğinin etkilerinin giderek belirginleşmesiyle birlikte üniversiteler, sürdürülebilirlik politikaları çerçevesinde karbon ayak izi (KAİ) hesaplamalarına yönelmiştir. Bu çalışma, Türkiye'deki üniversitelerde gerçekleştirilen karbon ayak izi hesaplama uygulamalarını incelemekte; kullanılan metodolojik yaklaşımları ve azaltım stratejilerini tartışmaktadır. Erciyes, Yıldız Teknik, Dokuz Eylül, Ondokuz Mayıs, Bursa Teknik, Iğdır, Ardahan gibi üniversiteler örnek alınarak yapılan analiz, Türkiye yükseköğretim kurumlarının sürdürülebilirlik alanındaki mevcut durumunu ortaya koymaktadır. Türkiye'de üniversiteler karbon ayak izi hesaplamalarında uluslararası standartları kullanmakta ve enerji, ulaşım ile atık yönetimi üzerinde yoğunlaşmaktadır. Ancak çalışmalar genellikle kampüs ölçeğinde kalmakta, ulusal düzeyde bir bütünleşik envanter bulunmamaktadır. Üniversiteler arası ortak ağların kurulması, veri paylaşımının artırılması ve uzun vadeli karbon nötr hedeflerinin belirlenmesi önerilmektedir.

Anahtar Kelimeler: Karbon ayak izi, Karbondioksit eşdeğeri, Uluslararası standartlar, Atık ve su yönetimi, Enerji

Doğadaki ayak izlerimiz ve sürdürülebilir doğal kaynak yönetimi açısından önemi

[1,*]Selma Yaşar Korkanç
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü
***sykorkanc@ohu.edu.tr**

Özet: Doğal kaynaklar canlı yaşamının devamlılığı için gerekli en önemli bileşenlerdir. İnsanoğlu, üretim ve tüketim gereksinimleri için çeşitli doğal kaynaklara ihtiyaç duymaktadır. Ancak doğal kaynaklarımız sınırsız değildir. Doğal kaynaklarımızı korumak ve gelecek nesillere yaşanabilir bir dünya bırakabilmek için doğal kaynaklarımızın ve çevrenin sürdürülebilirliğini sağlamak konusunda çaba sarf etmek önemli bir sorumluluk olarak karşımıza çıkmaktadır. Hızlı nüfus artışı ve sanayileşme, kentleşme vb. insan faaliyetleri doğal kaynaklar üzerinde artan bir baskı oluşturmaktadır. Bu baskının ölçümlenmesinde kullanılan “ayak izi” kavramı gösterge olarak kullanılmakta olup, doğal kaynakların ve çevresel sürdürülebilirliğin değerlendirilmesinde önemli bir araçtır. Günümüzün önemli problemlerinden olan küresel ısınma ve iklim değişikliği etkileriyle mücadele etmek ve uyum sağlamak, bu etkilere karşı doğayı ve toplumları dirençli hale getirmek konusundaki çalışmalarda ayak izi göstergelerinden sıkça yararlanılmaktadır. Ekolojik ayak izi, karbon ayak izi ve su ayak izi, doğal kaynakların kullanım düzeyini ortaya koyarak sürdürülebilir yönetim politikalarının geliştirilmesine katkı sağlamaktadır. Bu çalışmada, ayak izi kavramı, önemli ayak izi çeşitleri ve doğal kaynak yönetimi ile ilişkisi incelenmiş, bireysel ve toplumsal sorumlulukların önemi tartışılmıştır.

Anahtar Kelimeler: Doğal kaynak yönetimi, Sürdürülebilirlik, Karbon ayak izi, Su ayak izi, Ekolojik ayak izi

Sanayide yeşil dönüşüm ve doğa temelli çözümler

[1,*]Fehiman Çiner, [2]Meltem Sarıoğlu Cebeci
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü
[2]Sivas Cumhuriyet Üniversitesi, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü
*** fciner@ohu.edu.tr**

Özet: Çevre, insan yaşamının sürdürülebilirliği açısından vazgeçilmez bir unsurdur. Ancak sanayileşmenin hızlanmasıyla birlikte çevre üzerindeki baskılar da artmış, doğal kaynaklar tükenme noktasına gelmiş ve iklim değişikliği küresel ölçekte ciddi bir tehdit oluşturmaya başlamıştır. Sanayi sektörü, küresel karbon emisyonlarının ve çevresel bozulmanın ana kaynaklarından biridir. Yeşil dönüşüm, sanayide sürdürülebilir üretim süreçlerini teşvik ederek çevresel etkileri azaltmayı ve ekonomik büyümeyi desteklemeyi amaçlamaktadır. Doğa Temelli Çözümler, doğadan ilham alarak, sanayi süreçlerinde doğal ekosistemlerin korunması, restorasyonu ve çevresel sürdürülebilirliği desteklemek için yenilikçi bir yaklaşım sunar. Bu çalışmada, sanayide yeşil dönüşümün önemi, temel prensipleri ve doğa temelli çözümlerin bu süreçteki rolü ele alınacaktır. Ayrıca, mevcut durum analizi, sanayi sektörünün yeşil dönüşümdeki mevcut zorlukları ve fırsatları ortaya konacaktır. Sanayide yeşil dönüşümün uygulanabilirliğini artırmak için politika yapıcılara ve sektör temsilcilerine öneriler sunulacaktır.

Anahtar Kelimeler: Çevre, Doğa temelli çözümler, Sanayide yeşil dönüşüm, Sürdürülebilirlik

Blue economy literacy and marine stewardship

[1,*]Tanzer Satır,[2]Neda Boymirova Tuna
[1]Istanbul Technical University, Maritime Faculty, Tuzla, İstanbul, Türkiye
[2]Ale Mak, No. 19, Naum, Kaolinovo Municipality, Shumen Region, Bulgaria
***tsatir@itu.edu.tr**

Abstract: This study advocates for integrating Marine Science and Sustainable Port Practices into primary, secondary, and vocational curricula to cultivate a new generation of “Blue Citizens” and equip students with essential Green Skills for the maritime sector. The blue economy refers to the sustainable use, preservation, and regeneration of the marine environment, while the related concept of blue growth supports the sustainable development of the maritime sector. This sector includes port activities (freight handling, storage, and port development projects), shipbuilding and maintenance (vessels, machinery, equipment, and floating structures), maritime transport (passenger and freight services), and renewable marine energy (offshore energy production and transmission), providing a broad scope for educational and hands-on learning opportunities.

The study emphasizes providing educational materials, expert guest lectures, and opportunities for students to participate in citizen science projects related to local port environmental monitoring, including water quality assessment, waste analysis, and biodiversity surveys. Through these activities, students gain hands-on experience, develop sustainable decision-making, environmental monitoring, and renewable energy knowledge, and, from primary school onwards, have the opportunity to design and implement entrepreneurship, innovation, and leadership projects, thereby exploring career and professional pathways in the maritime sector.

Keywrods: Blue Economy, Marine, Port, Maritime, Green Skills, Entrepreneurship, Innovation, Leadership, Career Awareness

Türkiye'de belediyelerde atık yönetimi: Karşılaşılan sorunlar ve çözüm önerileri

[1,*] Ece Ümmü Deveci, [1]Özgecan Madenli
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü
***eudeveci@ohu.edu.tr**

Özet: Belediyeler, yerel düzeyde çevresel sürdürülebilirliğin sağlanmasında kritik bir role sahiptir. Türkiye'de atık yönetimi sistemi özellikle Avrupa Birliği uyum süreci, çevre mevzuatındaki güncellemeler ve "Sıfır Atık" yaklaşımı ile son yıllarda önemli gelişmeler göstermiştir. Bununla birlikte, belediyeler finansal, teknik, kurumsal ve toplumsal boyutlarda çeşitli sorunlarla karşılaşmaktadır. Bu çalışmada Türkiye'deki belediye atık yönetimi sorunları kapsamlı biçimde incelenmiş; dünya genelindeki iyi ve kötü uygulama örnekleriyle karşılaştırılmıştır. Literatür taraması ve güncel veriler ışığında, finansal modellerden teknik altyapı yatırımlarına, vatandaş katılımından mevzuat uygulamalarına kadar çok boyutlu çözüm önerileri geliştirilmiştir. Bu bildiri, belediyelerde sürdürülebilir atık yönetimi için bütüncül politikaların ve yenilikçi finansman mekanizmalarının gerekliliğini ortaya koymaktadır.

Anahtar Kelimeler: Belediye, Atık yönetimi, Döngüsel ekonomi, Sıfır atık

Atıksu arıtma tesislerinin plastik kirliliğine katkısı: Biomedyanın rolü ve çevresel etkileri

[1,*]Ceyhun Akarsu, [1]Nüket Sivri
[1] İstanbul Üniversitesi-Cerrahpaşa, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü
***ceyhunakarsu@iuc.edu.tr**

Özet: 1950'lerden bu yana, toplum ticari üretimin başlamasıyla birlikte plastik kullanımına giderek daha fazla yönelmiştir. Plastiğin çok yönlülüğü, dayanıklılığı, hafifliği ve düşük üretim maliyetleri, küresel talebi artırmıştır. Öyle ki günümüzde plastik parçacıklar atıksuların arıtımında bakterilerin plastik yüzey üzerine tutunarak kümeleşmesinde böylece atıksudaki biyokütlenin parçalanmasında dahi rol oynamaktadır. Ancak, son araştırmalar biyomedya olarak adlandırılan bu parçacıkların tesis işletim sürecinde sistemden kaçarak alıcı ortamla buluştuğunu ve değişken miktarlarda toksik elementler içerdiğini göstermiştir. Bu nedenle, bu çalışma mikroplastik kirliliği kaynaklarına yeni bir boyut ekleyerek biyomedyalerin etkisini incelemeyi amaçlamaktadır. Çalışmada aynı zamanda, bu malzemelerin deniz ortamındaki canlılar için oluşturabileceği tehlike malzemenin fiziksel ve kimyasal özellikleri üzerinden değerlendirilmiştir. Bu çalışmanın sonuçları, biyomedyalerin plastik kaynakları olarak değerlendirilmesinin yanı sıra, araştırmacıların tanımlama ve kaynak belirleme süreçlerinde yeni bir perspektif kazanmalarına yardımcı olacaktır. Biyomedyalerin başarılı bir şekilde tanımlanması ve sınıflandırılması durumunda, bu malzemelerin alıcı ortam üzerindeki etkileri daha kapsamlı bir şekilde ele alınabilecektir.

Anahtar Kelimeler: Atıksu arıtma tesisi, Biyomedya, Deniz ekosistemi, Plastik kirliliği, Toksik elementler

Kampüsün görünmeyen kalp atışları: Sigara izmariti kirliliğinin ekotoksikolojik yansıması

[1,*]Yusuf ESMER, [2]V.Zülal SÖNMEZ, [1]Ecem ÖZDER, [1]Gülpınar Türkmen, [1]Nüket SİVRİ
[1]İstanbul Üniversitesi-Cerrahpaşa, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü
[2]Düzce Üniversitesi Düzce Üniversitesi Mühendislik Fakültesi M2 Blok Giriş Kat Konuralp Yerleşkesi
Merkez/Düzce 81620
***ysfesmer@gmail.com**

Özet: Çevresel atıklar içerisinde sigara izmaritleri, yaklaşık %38 gibi yüksek bir oranla öne çıkmaktadır. İzmaritlerin çevrede hızla parçalanacağına dair yaygın yanlış algı, tüketicilerin atıklarını doğrudan çevreye bırakmalarına yol açmaktadır. Oysa asetik asit ile işlem görmüş selülozdan üretilen bu biyoplastikler, içeriklerindeki toksik bileşiklerle birlikte çevrede uzun süre kalabilmekte ve toprak ile su ekosistemleri üzerinde olumsuz etkiler oluşturmaktadır. Bu bağlamda çalışmanın iki temel amacı bulunmaktadır: (i) seçilen kampüs istasyonlarında sigara izmariti yoğunluğunun ve kirlilik indeksi değişimlerinin belirlenmesi, (ii) farklı su ortamlarında (saf su, yağmur suyu ve tuzlu su) hazırlanan izmarit eluantlarının *Daphnia magna*'nın kalp atım hızına etkisinin değerlendirilmesi. Çalışma sonucunda, istasyonlardaki sigara izmariti yoğunluğunun ortalama 7 adet/m² olduğu, izmaritlere maruz bırakılan bireylerde ise ortalama kalp atım hızının 406 atım/dk seviyesine ulaştığı belirlenmiştir. Bu bulgular, sigara izmaritlerinin akut stres etkisi yaratarak *D. magna*'nın fizyolojik yanıtlarını değiştirdiğini göstermekte ve bu atıkların ekosistem sağlığı açısından önemli bir tehdit oluşturduğunu ortaya koymaktadır. Dolayısıyla, sigara izmariti atıklarının çevresel etkilerine yönelik farkındalığın artırılması ve sürdürülebilir yönetim stratejilerinin geliştirilmesi büyük önem taşımaktadır.

Anahtar Kelimeler: Sigara izmariti, *daphnia magna*, toksisite

Advancing a soil credit system policy for Pakistan: Linking soil health with climate and environmental finance

[1,*] Mudassar Hussain, [1]Zulqarnain Haider
[1]Institute of Soil and Environmental Sciences, University of Agriculture, Faisalabad
***inoxentsaim46@gmail.com**

Abstract: Soil health is a cornerstone of environmental stability, sustainable agriculture, and climate resilience, yet it still lacks focused attention within agricultural and environmental policies of Pakistan. Existing initiatives only emphasize sustainable land usage, soil fertility management, and land degradation neutrality. Despite the advancements, current efforts do not provide mechanisms to integrate soil management into broader financial frameworks. The proposed Soil Credit System Policy (SCSP) aims to create a framework that assigns credits for measurable improvements in soil health indicators like controlled erosion, increased organic matter, and reduced salinity. These credits could be traded across domestic and international carbon markets, facilitating farmers, industries, and communities' financial incentives to improve soil quality and environmental outcomes. Integrating soil health with environmental finance, the SCSP would not only boost agricultural productivity and improve climate mitigation but also build ecological stability for long time. This novel approach fills a critical policy gap and provides a progressive pathway for integrating soil conservation with national climate objectives and international sustainability goals.

Keywords: Soil health, Climate finance, Carbon markets, Sustainable agriculture, Environmental policy

The effect of global warming in Konya province, Turkiye

[1,*] Wadah Elsheikh, [2]M. Cüneyt Bağdatlı, [3]Muhammed Kamil Öden
[1]University of Khartoum, Faculty of Animal Production, Department of Meat Production, Khartoum, Sudan
[2]Nigde Ömer Halisdemir University, Faculty of Architecture, Department of City and Regional Planning, Nigde, Turkiye
[3]Selcuk University, Sarayonu Vocational School, Department of Environmental Protection Technologies, Konya, Turkiye
***Wadah988@gmail.com**

Abstract: Climate change refers to long-term shifts in weather patterns, either naturally or due to human activities. It has become a global concern, with Turkiye among the affected countries. Therefore, this study aims to examine the impact of global warming in Konya Province, Turkiye. The findings show that the maximum annual temperature reached 32°C in July and remained high at 31.6°C through August. January records the lowest maximum temperature at 6°C. The minimum temperature ranged from -3.4°C to 17.9°C, while the average temperatures peaked at 25.6°C in July and dropped to 1°C in January. Regarding precipitation, the data reveal that monthly rainfall peaked in December (38 mm) and January (35 mm), indicating wetter winters, and was lowest in July and August at 2 mm, indicating dry summers. The highest humidity recorded was 70%, and the lowest was 28%. During the rainy months, the highest recorded rainfall was 5 mm in December, January, February, March, April, May, and August. The lowest was 1 mm in July, August, and September. On sunny days, July had the longest daylight hours at 12.9 hours, while January had the shortest at 6.4 hours. To address these vulnerabilities, erosion control measures should be implemented, strategies to prevent or mitigate desertification should be developed, and the cultivation of water-efficient crops should be planned in drought-prone areas.

Keywords: Global Warming, Climate Change, Konya province, Turkiye

Advances of marine wastewater outfalls and adaptation of enhancements to systems in developing countries

[1,*] Semih Nemlioglu
[1]Istanbul University-Cerrahpasa, Faculty of Engineering, Department of Environmental Engineering, 34320, Avcilar, Istanbul, Turkiye
***snemli@iuc.edu.tr**

Abstract: Discharging domestic wastewater into the sea from coastal settlements has been a traditional method throughout history. However, discharging wastewater directly onto the shore has caused numerous environmental problems, including aesthetic, and odor problems, resulting in the accumulation of pollution along the seashore. A number of discharge and treatment techniques have been employed throughout history as alternatives to direct discharge, which hinders and sometimes prevents human use of the sea, particularly for swimming, recreation, navigation, and fishing, and strains the tolerance of marine ecosystems. Because the density of domestic wastewater is lower than that of the sea, domestic wastewater discharged into the sea is inevitably retained on the surface. Sea outfall systems, which are pipelines placed along the seabed rather than discharged directly onto the shore, have been developed to extend the trajectory of discharged domestic wastewater moving toward the surface in the marine environment and to dilute the wastewater with seawater. Over time, discharge techniques have evolved, and the dilution capacity of marine outfalls has also been enhanced. Advances of marine outfalls, first applied in developed countries, have become a method used in developing countries to rapidly protect coastal settlements from environmental pollution. Marine outfall technologies can be transferred from developed to developing countries more quickly than wastewater treatment methods. Therefore, Marine outfalls are critical for improving the marine environment in developing countries. Furthermore, existing outfalls can also be improved with advanced discharge techniques. This study discusses the rehabilitation and/or development of marine outfalls in developing countries using advanced techniques.

Keywords: Marine outfalls, Domestic wastewater, Dilution, Marine pollution

Efficiency of bioremediation in cleaning up oil contaminated soil by fraction: comparison of biostimulation and bioaugmentation

[1,*]Totubaeva Nurzat, [1]Rakhat Abdykadrova,[1]Sartova Kulumkan
[1]Kyrgyz-Turkish Manas University, Department of Environmental Engineering, Chyngyz Aytmatov Avenue 56, 720044 Bishkek, Kyrgyz Republic
***nurzat.totubaeva@manas.edu.kg**

Abstract: In transporting and storing oil /petroleum products, one of the urgent environmental problems is finding ways to reduce the oil and petroleum products harmful effects on the environment and offer solutions. One of the most environmentally friendly cleaning methods is the bioremediation method. In this article, using the example of the Kant oil depot, Kyrgyzstan, the cleaning of petroleum product-contaminated soil using the bioremediation method was examined and studied. Within the scope of this work was a comparative analysis of two bioremediation methods, namely bioaugmentation, and biostimulation. Oil-contaminated soil was separated into three fractions by extraction method. After two months of soil cleaning using the above methods, it turned out that the choice of method depends on the fraction of petroleum products and the depth of soil. The biostimulation method is more efficient for resins and aromatic fractions in a depth of 0-30cm 53.8% and 94.5% clean-up percentages, respectively. The best performance in the saturated fraction was with bioaugmentation with a 40.6% clean-up percentage. Parameters such as pH and conductivity were also considered. This work has great practical significance and can be applied to clean up oil-contaminated soils.

Keywords: Bioremediation, Petroleum product, Fractions, Extraction

Environmental solutions: Bioremediation for effective cleaning of petroleum-contaminated soil at kant crude oil refinery

[1,*]Totubaeva Nurzat, [2]Kelgenbaeva Zhazgul,[1]Sartova Kulumkan
[1]Kyrgyz-Turkish Manas University, Department of Environmental Engineering, Chyngyz Aytmatov Avenue 56, 720044 Bishkek, Kyrgyz Republic
[2]I.K.Akhunbaev Kyrgyz State Medical Academy, Department of Biochemistry
***nurzat.totubaeva@manas.edu.kg**

Abstract: In transporting and storing oil /petroleum products, one of the urgent environmental problems is finding ways to reduce the oil and petroleum products harmful effects on the environment and offer solutions. One of the well-known methods for cleaning contaminated soil is the extraction and removal of soil from the contaminated area into sludge storage tanks, however, this does not solve the problem but only transfers from one place to another. One of the most environmentally friendly cleaning methods is the bioremediation method. In this article, using the example of the Kant oil depot, the cleaning of petroleum product-contaminated soil using the bioremediation method was examined and studied. It was found, that cleaning soil contaminated with petroleum products using the bioremediation method is more effective. After two months of soil cleaning using bioremediation, the cleaning efficiency was 24%. As a result of the study, proposals were developed for the restoration of soils located in the area of oil depots and contaminated with petroleum products.

Keywords: Bioremediation, Bio-stimulation, Bioaugmentation, Garden crass

Accumulation of heavy metals in the sediments of the Alamedin River (Kyrgyzstan) and their environmental assessment

[1,*] Batma Kudayarova, [1]Begimay Tashtanova, [1]Nurzat Totubaeva
[1] Kyrgyz-Turkish Manas University, Department of Environmental Engineering
***nurzat.totubaeva@manas.edu.kg**

Abstract: In the context of climate change and increasing anthropogenic impact, there has been a reduction in available sources of drinking water. In this regard, potential water resources located near large population centers are becoming particularly important. Effective and sustainable water resource management is impossible without systematic monitoring of pollution levels and identification of the main sources of anthropogenic and natural contaminants. Bottom sediments are an important indicator of the ecological status of water bodies, as they accumulate a wide range of pollutants, including heavy metals, reflecting both the degree of pollution and its possible origin. The study of sediment quality is of fundamental importance not only for assessing the environmental safety of aquatic ecosystems, but also for protecting human health.

This study investigates the accumulation of heavy metals in the sediments of the Alamedin River, which flows through industrial zones of Bishkek, Kyrgyzstan. Sampling was conducted in 2024 from six stations located upstream, within, and downstream of industrial zones. Sediment and water samples were analyzed for concentrations of heavy metals including Mn, Ni, Co, Ti, Cr, Mo, Zr, Cu, Pb, Ag, Sn, Yb, Y, Sr, and Ba using inductively coupled plasma mass spectrometry (ICP-MS). The results were compared with World Health Organization (WHO) threshold limits and evaluated using contamination factor (CF), pollution degree (Cd), pollution load index (PLI) and geoaccumulation index (Igeo). The results indicate high levels of manganese (Mn), nickel (Ni), and cobalt (Co) in sediments at all stations, especially in industrial areas. Lead (Pb) and chromium (Cr) levels were moderate, while most other metals were classified as non-polluting. The oil refinery and other industrial facilities were identified as the main sources of heavy metal pollution. The study concluded that the Alamedin River is at significant environmental risk due to heavy metal pollution, requiring urgent management measures.

Keywords: Heavy metals, Alamedin River, Sediment pollution, ICP-MS, Ecological risk

Analysıs and research of envıronmental problems of Azerbaıjan

[1,*]Azad Babayev
[1] Azerbaijan Technical University
***azad.babayev@aztu.edu.az**

Abstract: World ecology with its problems of various nature always accompany a person in his historical development. This share of problems falls on any country in the world. Azerbaijan has a very responsible role, where the country is faced with such difficulties due to its geopolitical situation and further economic progress. This article is devoted to the analysis and study of environmental problems of Azerbaijan

Keywords: Ecology, geopolitics, soil pollution, oil cleanup, ecosystem, household waste

Heavy metals' toxicity on plants in the liberated regions of Azerbaijan

[1] Eldar Garayev, [1]Cavid Shamilov, [1]Sara Pashayeva, [1,*]Kamala Badalova, [1]Bahiyya Mirzayeva
[1] Department of Pharmaceutical toxicology and chemistry, Azerbaijan Medical University
***kamala.badalova@mail.ru**

Abstract: Currently, environmental pollution is a serious concern worldwide. The study and restoration of the ecological state of the liberated territories remains one of the most important problems of the modern era. As a result of many years of military operations and human activity, soil, water resources and vegetation in these regions have been seriously polluted. In particular, the accumulation of heavy metals in the soil and plants leads to a disruption of the ecological balance and a decrease in agricultural productivity. In order to eliminate this pollution and restore the ecosystem, it is important to implement large-scale scientific research and ecological monitoring programs. Heavy metals are characterized by two main features—toxic effects on living organisms in relatively low concentrations and bioaccumulative abilities. Being rich in heavy metal soils, plants and bottom sediments become toxic over time, presenting a serious danger to all living things. Analysis of the amount of heavy metals in plants in liberated areas is of great importance for the correct orientation of ecological restoration measures. In order to protect the environment and human health, the concentration of these elements should be regularly monitored and analyzed. When heavy metals enter ecosystems, they disrupt their balance, cause toxic effects on living organisms, and reduce the quality of agricultural products. The main sources of these substances entering the soil and water are industrial waste, improperly managed household waste, fertilizers used in agriculture, and polluted water bodies. To prevent this pollution, continuous environmental monitoring should be carried out, and the condition of water bodies and soil layers should be constantly monitored. The accumulation of heavy metals - lead, cadmium, mercury, arsenic and nickel - in plants poses a great threat to the ecosystem and human health. The COP29 international climate conference held in November 2024 paid special attention to the issue of restoring the ecological state of the liberated territories. Within the framework of the conference, topics such as climate change, restoration of ecosystems and sustainable land use were widely discussed. The importance of international cooperation and financial support for environmental protection and strengthening ecosystems was emphasized. In this context, international organizations and experts should actively participate in accelerating ecological rehabilitation work in the liberated territories, restoring contaminated lands and water sources, and forming sustainable ecosystems. The measures implemented within the framework of Azerbaijan's ecological restoration strategy and international cooperation will contribute to the restoration of the ecological balance of the region and achieving long-term ecological sustainability. In addition, the ecological balance can be restored in the liberated territories through the application of new technologies and the expansion of ecological projects. Also, the implementation of education and awareness programs can contribute to raising environmental awareness.

Keywords: Azerbaijan, heavy metals, toxicity, liberated regions, pollution

Potential use of steel slag as an alternative abrasive media: A sustainable approach for surface preparation

[1,*] Fatih Hayati Çakır
[1]Eskişehir Osmangazi University, Eskişehir Vocational School, Eskişehir, Turkey
***fcakir@ogu.edu.tr**

Abstract: Traditional abrasives such as garnet are widely used in industrial applications including surface preparation, cutting, and cleaning. However, the extraction and processing of such abrasives come with significant economic and environmental costs. This paper explores the potential use of steel slag, an industrial by-product, as an alternative abrasive medium. The discussion includes the current state of the abrasive industry, the required physical and chemical properties of abrasives, and an overview of steel slag characteristics. The study evaluates processing techniques such as crushing, screening, and conditioning to convert steel slag into usable abrasive particles. Environmental and economic benefits are examined, along with challenges and recommendations for future research and industrial adoption. This paper aims to highlight the viability of valorizing steel slag, contributing to circular economy goals and reducing the ecological footprint of surface treatment processes.

Keywords: Steel slag, Abrasive media, Garnet alternative, Industrial by-products, Sustainability

Tersine lojistik ve e-atıkların yönetimi için bibliyometrik analiz

[1,2] Bahar Özyörük, [2,3,4,*]Emine İkikat Tümer
[1]Kırgızistan-Türkiye Manas Üniversitesi, Mühendislik Fakültesi, Endüstri Mühendisliği Bölümü
[2]Gazi Üniversitesi, Mühendislik Fakültesi, Endüstri Mühendisliği Bölümü
[3]Kırgızistan-Türkiye Manas Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İktisat Bölümü
[4]Kahramanmaraş Sütçü İmam Üniversitesi, Tarımsal Yayım Araştırma ve Uygulama Merkez Müdürlüğü
***bahar@gazi.edu.tr**

Özet: Dünyada ekonomi alanında yaşanan gelişim ve değişimler beraberine ürünlerin çeşitlenmesi, kişiselleşmesine sebep olmuştur. Bu ise doğal kaynakların azalması çevre, iklim ve endüstri gibi birçok konuyu ele almayı zorunlu kılmıştır. Birçok ülke bu sebeple ürün ve malzeme geri dönüşümüne önem vermektedir. Ömrünü tamamlamış ürünlerin geri kazanımı ülkelerin ulusal mevzuatları ile desteklenen bir konu olmanın ötesinde, global düzeyde ekolojik anlamda da gerekli bir konu olarak kabul edilmektedir. Diğer yandan işlenmemiş ham maddelerin kullanımını ve maliyetini azaltan bir yapı olan “e-atık” lar ekonomik olarak da ilgi çekmektedir. Literatürde tedarik zinciri yönetimi ve atıkların ger dönüşünü de ele alan tersine lojistik faaliyetler popüler olmuştur. Bu çalışma bu konuyu önemle alarak, 1991-2025 yılları WOS veri tabanında yer alan 267 makaleyi bibliyometrix analiz yöntemiyle incelemektedir. WOS veri tabanlarında ‘‘E-WASTE‘‘ ve ‘‘REVERSE LOGISTICS‘‘ anahtar kelimeleri kullanılarak tarama yapılmıştır. WOS veri tabanından alınan tüm verilerle Bibliyometrix programıyla çeşitli analizler gerçekleştirilmiştir. Analizler sonucunda sınırları belirtilen yıllara ilişkin makale sayısı, yıllık ortalama alıntı sayısı, bu konu hakkında en çok yayın basan dergiler ile öne çıkan yazarlar, yazarların atıf alma oranları araştırmacıların ülkeleri ve iş birliği durumları, en çok alıntılama alan makaleler, ortak atıf ve iş birliği ağları alt başlıklarında incelenmiştir. Bu çalışmaların artan eğilimi konuya verilen önemi göstermiştir.

Anahtar Kelimeler: Atık yönetimi, E-atık, Tersine lojistik

Endüstriyel atıksuların arıtımında elektrokoagülasyon yöntemi: Geçmişten günümüze ilerlemeler ve karşılaşılan sorunlar

[1,*] Ceyhun Akarsu
[1] İstanbul Üniversitesi-Cerrahpaşa, Mühendislik Fakültesi, Çevre Mühendisliği Bölümü
***ceyhunakarsu@iuc.edu.tr**

Özet: Kirletici giderimini arttırmak ve maliyetleri düşürmek amacıyla alternatif arıtma teknolojileri üzerine yürütülen çalışmalarda elektrokoagülasyon prosesi, işletim kolaylığı ve farklı kirletici gruplarını tek bir aşamada uzaklaştırabilme kapasitesi nedeniyle ön plana çıkmaktadır. Özellikle ağır metaller, boyar maddeler, fosfat, askıda katı maddeler ve bazı organik kirleticilerin gideriminde yüksek verimlilik göstermesi, bu yöntemi günümüzde yeniden dikkat çeken bir teknoloji haline gelmiştir. Ayrıca endüstriyel atıksuların arıtılmasında ön arıtım adımı olarak kullanılması, pilot ölçekli uygulamalarda daha kaliteli süzüntü suyu elde edilmesi ve ileri arıtma teknolojilerinin üzerindeki yükü azaltılması yönünde umut verici sonuçlar ortaya koymuştur. Prosesin temelinde, uygun anot malzemesinden elektroliz yoluyla metal iyonlarının açığa çıkması ve bu iyonların suda koagülant etkisi göstererek kirleticilerin çöktürülmesi yer almaktadır. Bununla birlikte, enerji tüketimi, elektrotların pasivasyonu, yüksek çamur üretimi ve ölçek büyütme zorlukları yöntemin yaygınlaşmasında sınırlayıcı unsurlar olarak öne çıkmaktadır. Ancak son yıllarda farklı elektrot tasarımları, hibrit arıtım teknolojileri ve proses optimizasyonu üzerine yapılan araştırmalar, bu sınırlılıkların aşılması konusunda önemli ilerlemeler sağlamıştır. Dolayısıyla bu bildiride elektrokoagülasyon prosesinin geçmişten günümüze geçirdiği değişim, uygulama alanları, sağladığı kazanımlar ve karşılaşılan problemler bütüncül bir bakış açısıyla ele alınmaktadır. Ayrıca, gelecekteki araştırma eğilimleri tartışılmakta; özellikle teknolojinin laboratuvar ölçekle sınırlı kalmayıp ticarileştirmesine yönelik dikkat çekilmektedir.

Anahtar Kelimeler: Elektrokoagülasyon, Atıksu arıtımı, Çevre mühendisliği, Proses optimizasyonu

Enhanced strontium removal and hydrogen generation via electrodialysis integrated with ion-exchange resins

[1,*] Asala Saleh, [1]Burak Yuzer, [1]Yusuf Bicer
[1]Division of Sustainable Development, College of Science and Engineering, Hamad Bin Khalifa University, Doha, Qatar
***askh89622@hbku.edu.qa**

Abstract: The selective recovery of strontium (Sr2+) from wastewater streams is critical for reducing environmental risk and recovering valuable resources. In this study, an electrodialysis (ED) cell (PCCell, Germany) equipped with five anion-exchange membranes and six selective monovalent-cation-exchange membranes (five cell pairs) was employed to treat a 500 mL synthetic wastewater solution containing 8700 mg/L Sr2+. The diluate compartment was packed with monovalent cation-exchange resins and standard anion-exchange resins, and resin regeneration was performed between runs using 10 % NaCl solution. Five treatment cycles (40–50 min each) were conducted. Conductivity of the diluate decreased from 17 mS/cm to 1.5 mS/cm during operation. Sr2+ concentration dropped to 55 mg/L in the first cycle but increased to 500 mg/L by the fifth cycle, indicating gradual resin exhaustion and partial Sr2+ leakage. After regeneration of the resins, 90% of the Sr2+ ions have been recovered. Simultaneously, hydrogen gas evolution occurred at the cathode electrode, producing 193–221 mL per run. The total energy consumption averaged 5.87 kWh per m^3 of treated solution, with a net energy requirement of 4.58 kWh per m^3 after accounting for energy recovery from hydrogen production. These findings demonstrate that the integration of ion-exchange resins into an ED stack enhances Sr2+ removal efficiency and enables concurrent hydrogen generation, similar to electrodeionization (EDI) systems. However, the observed rebound in Sr2+ concentration highlights the importance of optimizing resin capacity and regeneration conditions for sustained performance. This study provides a proof-of-concept for coupling Sr recovery with hydrogen production, contributing to circular resource use and more sustainable water treatment technologies.

Keywords: Strontium recovery, Electrodialysis (ED), Cation-exchange resin, Hydrogen generation, Sustainable wastewater treatment

Ammonium ion recovery and electricity generation from domestic wastewater using integrated pre-treatment and reverse electrodialysis

[1,*] Asifa Anwar, [1]Burak Yuzer, [1]Yusuf Bicer
[1]Division of Sustainable Development, College of Science and Engineering, Hamad Bin Khalifa University, Doha, Qatar
***asan39545@hbku.edu.qa**

Abstract: This study investigates the recovery of ammonium ions from domestic wastewater using a combined pre-treatment and reverse electrodialysis (RED) approach. Effluent from an aerobic sludge digester at a municipal wastewater treatment plant in Doha, Qatar, was subjected to sequential treatment steps to enhance RED performance. Initial suspended solids removal was achieved by coagulation–flocculation with alum, reaching 99% removal efficiency. Subsequent advanced oxidation step using the Fenton process achieved up to 65% total organic carbon (TOC) removal. Following these treatments, the pre-treated wastewater was concentrated using an electrodialysis cell. The resulting concentrate served as the feed for a modified electrodialysis unit operated in reverse electrodialysis mode to recover ammonium ions and simultaneously generate electricity. The system achieved a maximum open-circuit potential of 1.6 V and produced a current of 66 mA under operational conditions. This work demonstrates that integrated pre-treatment and RED can simultaneously recover valuable nitrogen species and produce electrical energy from real wastewater streams. The findings highlight the potential of RED as a sustainable technology for nutrient recovery and energy production in municipal wastewater treatment plants, particularly when combined with targeted pre-treatment strategies to control fouling and organic load.

Keywords: Ammonium recovery, Reverse electrodialysis, Pretreatment processes, Wastewater, Nutrient recovery

Hybrid pretreatment and modeling for fouling control in decentralized membrane systems: A pilot from rural Azerbaijan

[1,*]Natiq Pasha, [2]Orkhan Mikayil
[1]Azerbaijan Technical University, Baku, Azerbaijan
[2]Aqualink LLC, Baku, Azerbaijan
***pashanatiq@aztu.edu.az**

Abstract: Climate change and infrastructural gaps in rural areas have heightened the need for sustainable and cost-effective wastewater treatment solutions. This study presents a decentralized membrane-based pilot system implemented in Tekle village of the Gobustan district, Azerbaijan, designed to address these challenges under semi-arid conditions. The system integrates a hybrid pretreatment module and a calibrated first-order fouling kinetics model to enhance pollutant removal efficiency and optimize cleaning intervals. Field results demonstrated consistent removal of BOD₅, TSS, NH_4-N, and total phosphorus, aligning with national discharge standards. Modeling confirmed that membrane fouling was primarily driven by organic loading and biomass accumulation, and that optimizing cleaning schedules significantly improved flux recovery. The embedded model allowed predictive maintenance without SCADA infrastructure, making it suitable for low-resource settings. The system offers a modular and scalable solution aligned with SDG targets 6.3 and 6.5, while also contributing to SDG 9 and 13. Its operational feasibility, combined with an economic assessment framework, demonstrates high potential for replication in similar contexts.

Keywords: Decentralized membrane treatment; Hybrid pretreatment configuration; Membrane fouling control; Fouling kinetics modeling; Cleaning cycle optimization; Semi-arid rural regions; Sustainable Development Goals (SDGs)

10 FOOD ENGINEERING

Kırmızı mercimek protein izolatının fonksiyonel özelliklerinin belirlenmesi ve temel bileşen analiziyle incelenmesi

[1,*]Mehmet Yetişen, [1]Cem Baltacıoğlu
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Gıda Mühendisliği Bölümü
[*]mehmetyetisen@ohu.edu.tr

Özet: Bu çalışmada, kırmızı mercimek ununda izoelektrik çöktürme yöntemi kullanılarak protein izolatı elde edilmiş ve izolat ile ham unun fizikokimyasal özellikleri karşılaştırılmıştır. Protein izolasyon süreci sonucunda, kuru madde bazında %12,8 ±1,15 verim elde edilmiştir. İzolatın protein içeriği %68,25 ±0,57 olarak ölçülmüş ve bu değer, ham unun protein içeriği olan %25,81 ±0,08'e göre önemli bir artışı ortaya koymuştur. Renk analizleri sonucunda, L* değerindeki düşüş, ürünün daha koyu bir renge sahip olduğunu gösterirken; a* ve b* değerlerindeki artış, daha kırmızı ve sarımsı bir görünüm kazandığını göstermiştir. Nem oranı ve su aktivitesinde gözlenen düşüş ise izolatın mikrobiyal dayanıklılık açısından daha uygun olduğunu göstermiştir. Temel bileşen analizi (PCA) ile yapılan istatistiksel değerlendirme, protein içeriği ve renk parametrelerinin örneklerin ayrışmasında belirleyici olduğunu ortaya koymuştur. Elde edilen bulgular, kırmızı mercimek protein izolatının fonksiyonel gıda bileşeni olarak kullanılabileceğini ve izoelektrik çöktürme yönteminin etkinliğini desteklemektedir.

Anahtar Kelimeler: Kırmızı Mercimek, Protein İzolatı, İzoelektrik Çöktürme, Temel Bileşen Analizi.

UV-C-assisted cold brewing: a novel approach to enhance white tea's nutritional quality

[1]Busra Zeynep Guler, [1]Selen Bilgic, [2,*]Sibel Uzuner
[1]Bolu Abant Izzet Baysal University, Faculty of Engineering, Department of Food Engineering
[2]Izmir Institute of Technology, Faculty of Engineering, Department of Food Engineering
***sibeluzuner@iyte.edu.tr**

Absract: While hot infusion methods are commonly used for tea extraction, they often require longer processing times and can degrade sensitive nutritional compounds. In contrast, cold infusion techniques have gained attention for better preserving delicate bioactive components. However, limited research exists on their application in white tea. This study investigates the potential of ultraviolet-C (UV-C) light as a non-thermal alternative to traditional heat treatments for enhancing the nutritional quality of cold-brewed white tea.

The cold brewing process utilized a drip tower system, where 10–30 g of tea leaves were infused with 1 L of ice water at room temperature (20–25 °C) over an 8-hour period. UV treatment was conducted using an annular quartz glass tube fitted with 12 evenly spaced UV-C lamps emitting at 254 nm. The impact of UV-C exposure on key functional properties—total phenolic content (TPC), total antioxidant activity (TAA), turbidity, yellow color tone, color density, and color parameters (*L*, a*, b**) was assessed.

A Box–Behnken design was used to optimize the influence of three variables: number of UV-C lamps (2–8), solid-to-liquid ratio (SLR; 1–3%), and number of treatment cycles (4–8). The highest TPC (354.9 mg/L) was observed at 2% SLR, 2 lamps, and 2 cycles, while the highest TAA (73.84%) occurred at 3% SLR, 5 lamps, and 8 cycles. Optimal conditions (2.2% SLR, 8 lamps, 8 cycles) yielded 61.8 mg/L TPC and 42.4% TAA. Overall, UV-assisted cold brewing presents a promising method for enhancing the functional properties of white tea.

Keywords: Cold-brew, White tea, UV-C, Extraction.

Farklı ekstraksiyon yöntemleri ve çözgenlerin nar meyvesinin (*Punica granatum*) kabuğundan fenolik madde ekstraksiyonuna etkisinin incelenmesi

[1,*]Cem Baltacıoğlu, [1]Mehmet Yetişen, [1]Ufuk Turan Akgüçlüer, [1]Gökhan Can Gökalp, [1]Merve Ertuğrul
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Gıda Mühendisliği Bölümü
[*]cembaltacioglu@ohu.edu.tr

Özet: Bu çalışma, nar meyvesinin artık oluşturan kabuklarında bulunan toplam fenolik bileşiklerin ve antioksidan aktivitelerinin belirlenmesi amacıyla ekstraksiyon yöntemlerinin ve solventlerin karşılaştırılması amacıyla yapılmıştır. Çalışmada kullanılan nar meyvelerinin kabukları ayrılıp, kurutularak toz haline getirilmiştir. Toz halindeki materyalin ekstraksiyonlarında metoda uygun olarak seçilen solventlerden saf su, %80 metanol + %1 HCl, %80 metanol ve saf su + %1 HCl kullanılmıştır. Klasik metot, ultrases dalgası, mikrodalga ve su banyosu ekstraksiyon yöntemleri kullanılmıştır. Su banyosunda elde edilen verimin karşılaştırılması amacıyla 20°C ve 80°C sıcaklıkta ekstraksiyon yapılmıştır. Bitkilerin toplam fenolik madde miktarı Folin-Ciocalteu metoduna göre ölçülmüştür. Antioksidan aktivite; DPPH yöntemine göre belirlenmiştir. Uygulanan ekstraksiyon metodu ve kullanılan çözeltilere göre elde edilen sonuçlarda farklılıklar gözlemlenmiştir. Elde edilen veriler sonucunda en yüksek toplam fenolik madde miktarı 128,25 mgGAE/g'dır ve %80metanol+%1HCl çözeltisi ile 80°C'lik su banyosu ekstraksiyonundan elde edilmiştir. En düşük toplam fenolik madde miktarı ise klasik ekstraksiyon metodu ve saf su çözeltisinden alınmış olup 32,01 mgGAE/g'dır. Yapılan analiz ve elde edilen veriler sonucunda en yüksek antioksidan aktivite % inhibisyon değeri 86,53 ve %80metanol+%1HCl çözeltisi ile 80°C'lik su banyosundan elde edilmiştir. En düşük antioksidan aktivite değeri ise 21,52 mg/g'dır ve saf su çözeltisi kullanarak ultrases dalgaları ekstraksiyonundan elde edilmiştir. Uygulanan farklı ekstraksiyon metotları ve kullanılan çözgenler arasından en yüksek toplam fenolik madde ve antioksidan aktivite değeri aynı metot ve çözgenden (80°C su banyosu ve %80metanol+%1HCl) elde edildiği belirlenmiştir.

Anahtar Kelimeler: Antioksidan, Ekstraksiyon, Fenolik, Nar kabuğu.

Çoklu değişken analizi kullanarak farklı ekstraksiyon yöntemlerinin zencefil tozunun fizikokimyasal özelliklerine etkisinin belirlenmesi

[1]Halil İbrahim Şimşek, [1]Flandra Skeja, [1]Gözde Doğanay, [1]Ayşenur İnce, [1,*]Cem Baltacıoğlu, [1]Hasan Uslu, [1]Hasan Tangüler
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Gıda Mühendisliği Bölümü
[*]cembaltacioglu@ohu.edu.tr

Özet: Bu çalışmada zencefil (Zingiber officinale) ekstraktlarının kalite özelliklerine ekstraksiyon tekniğinin etkisi karşılaştırmalı olarak incelenmiştir. Klasik çözücü ekstraksiyonu (kontrol), ultrason destekli ekstraksiyon (UAE; 40, 50, 60 °C) ve süperkritik CO_2 ekstraksiyonu (SFE) uygulanmış; °Briks, L*, a*, b*, Chroma ile toplam fenolik madde (TPC), DPPH ve TEAC belirlenmiştir. Ekstraksiyon yöntemlerinin etkisini ortaya koymak için çoklu değişken analizi olarak temel bileşen analizi (PCA) ve hiyerarşik kümeleme analizi (HCA) kullanılmıştır. Sonuçlar yönteme bağlı belirgin farklılıklar ortaya koymuştur. SFE, °Briks ve biyoaktif özellik bakımından (TPC, DPPH, TEAC) en yüksek sonuçları vermiştir. UAE ekstraktları °Briks bakımından birbirine yakın seviyelerde görülmüş ve kontrole göre artış tespit edilmiştir. Renk parametleri açısından SFE daha koyu ve yeşilimsi bir profil oluştururken b* ve Chroma bu yöntemde en yüksek bulunmuştur. UAE-60 °C parlaklığı (L*) en iyi korumuş; UAE-50 °C antioksidan aktiviteyi, UAE-60 °C ise TPC'yi kendi grubu içinde en fazla yükseltmiştir. Kontrol ise biyoaktivite ve renk parametrelerinde düşük seviler göstermiştir. Sonuç olarak, zencefil ekstraktlarının fizikokimyasal özelliklerinin yönteme ve sıcaklığa duyarlı olduğu belirlenmiştir.

Anahtar Kelimeler: Çoklu değişken analizi, Süperkritik karbondioksit ektraksiyonu, Ultrason destekli ekstraksiyon, Yeşil ekstraksiyon, Zencefil.

Farklı ekstraksiyon yöntemlerinin alıç (*Crataegus monogyna*) meyvesi ekstraktlarının fizikokimyasal özelliklerine etkisinin çoklu değişken analizleri ile incelenmesi

[1]Halil İbrahim Şimşek, [1]Gözde Doğanay, [1]Flandra Skeja, [1]Dilek Yaprak Uslu, [1]Cem Baltacıoğlu, [1*]Hande Baltacıoğlu
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Gıda Mühendisliği Bölümü
[*]handebaltacioglu@ohu.edu.tr

Özet: Bu çalışmada, farklı ekstraksiyon yöntemlerinin (ultrason destekli ekstraksiyon, UAE; mikrodalga destekli ekstraksiyon, MAE; süperkritik CO_2 ekstraksiyonu, SFE) alıç ekstraktlarının fizikokimyasal özellikleri üzerindeki etkileri araştırılmıştır. Elde edilen ekstraktlarda, briks, renk (L*, a*, b* ve Chroma), toplam fenolik madde (TP) ve antioksidan aktivite (DPPH, TEAC) parametreleri belirlenmiştir. Ek olarak, alıç ekstraktlarının özellikleri temel bileşen analizi (PCA) ve kümeleme analizi (HCA) gibi çoklu değişken analiz yöntemleriyle kapsamlı şekilde değerlendirilmiştir. Bulgulara göre, UAE'nin düşük sıcaklıklar (40 ve 50 °C) koşullarında en yüksek TP ve antioksidan aktivite değerlerine ulaşıldığı belirlenmiştir. MAE uygulamalarında, güç seviyesindeki artışla birlikte bu değerlerde düşüşler belirlenmiştir. Renk profillerine bakıldığında, SFE yöntemi en yüksek L*, b* ve Chroma değerlerini vererek en parlak ve en doygun renge sahip ekstraktı üretmiştir. Buna karşın, UAE uygulamaları en koyu ekstraktları üretmiştir. Çoklu değişken analizleri (PCA ve HCA), yöntemler arasında farklılıkları belirlemede başarıyla kullanılmıştır. Uygulanan ekstraksiyon metodolojisinin, alıç ekstraktının fizikokimyasal özelliklerini belirlemede kritik bir rolü olduğu belirlenmiştir.

Anahtar Kelimeler: Alıç (*Crataegus monogyna*), Çoklu değişken analizi, Mikrodalga destekli ekstraksiyon, Ultrason destekli ekstraksiyon, Süperkritik CO_2.

The Importance of plant seeds in gluten-free food production

[1]Flandra Skeja, [1]Cem Baltacıoğlu, [1]Hande Baltacıoğlu, [2]Cengiz Çesko, [2,*]Hyrije Koraqi
[1]Niğde Ömer Halisdemir University, Engineering Faculty, Food Engineering Department
[2]UBT College – Higher Education Institution, Food Science and Biotechnology Department
[*]hyrie.koraqi@ubt-uni.net

Abstract: Especially in recent years, consumers have increasingly focused on healthy living standards and balanced eating habits. With the rise of health-related threats, the diversity of plants that can be used for nutritional purposes is also gradually decreasing. Several recent studies have shown that the nutritional quality of cereal-based gluten-free products needs to be improved. Plant seeds have been consumed by ancient civilizations for centuries. Although they are not included in the cereal group, they draw attention due to their similar characteristics and uses. The most commonly known among them are quinoa, amaranth, and buckwheat. In addition to being gluten-free, these plants are rich in high-quality proteins and peptides, as well as nutritional and bioactive compounds, such as flavonoids, phenolic acids, fatty acids, vitamins, and minerals. Furthermore, interest in these seeds is increasing due to their anticarcinogenic, antioxidant, anti-inflammatory, hypocholesterolemic, antidiabetic, and antihypertensive properties. This review addresses the health benefits of plant seeds, which have great potential as a source of gluten-free food, especially for celiac patients.

Keywords: Gluten-free diet, Amaranth, Buckwheat, Quinoa

Diyabetik Türk lokumu geliştirilmesine yönelik literatür analizi

[1,*]Zeynep Cesur Aksaraylı, [2]Erdoğan Küçüköner
[1]Süleyman Demirel Üniversitesi, Mühendislik ve Doğa Bilimleri Fakültesi, Gıda Mühendisliği Bölümü
[2]Süleyman Demirel Üniversitesi, Mühendislik ve Doğa Bilimleri Fakültesi, Gıda Mühendisliği Bölümü
[*]zeynep_csr@hotmail.com

Özet: “Türk” adıyla özdeşleşen ve geleneksel bir lezzet olan lokumun Anadolu topraklarındaki geçmişinin “rahat-ul hulkum” adıyla 15. yüzyıla dayandığı bilinmektedir. Tarihi yüzyıllara dayanan lokum, günümüzde “Turkish Delight” adıyla dünya çapında bilinirliğe sahiptir. Türk lokumu, köklü bir geçmişe ve kültürel bir kimliğe sahip olan geleneksel tatlılarımız arasında özel bir üründür.

Diyabetin ülkemizde ve dünya çapında prevalansının artması, etiket okur-yazarlığının yaygınlaşması, sağlıklı beslenmeye artan ilgi neticesinde diyabetik gıdalar üzerine yapılan çalışmalar hem akademik hem de endüstriyel alanda önem kazanmaktadır. Bu çalışmanın amacı, diyabetik lokum üretimine yönelik mevcut akademik literatürü inceleyerek, tercih edilen alternatif tatlandırıcıları, üretim sırasında oluşan zorlukları, meydana gelen tekstür ve duyusal sorunları ortaya koymaktır. Yapılan detaylı literatür taramasında, Türk lokumunun diyabetik formülasyonları ile ilgili akademik çalışmaların sınırlı düzeyde olduğu görülmüştür. İncelenen araştırmalarda, sakkaroz yerine düşük glisemik indekse sahip tatlandırıcılar, şeker alkolleri ve doğal meyve özlerinin kullanıldığı belirlenmiştir. Fakat bu formülasyonlar sınırlı sayıdadır ve bunların üretim sürecine entegrasyonundaki güçlükler, meydana gelen tekstürel sorunlar literatürde kapsamlı olarak ele alınmamıştır. Sonuç olarak, diyabetik lokum üzerine yapılan sınırlı çalışmalar, bu alanda yenilikçi ve uygulanabilir yaklaşımlara ihtiyaç olduğunu göstermektedir. Ürünün geleneksel karakterini koruyarak sağlıklı beslenme alışkanlıklarına uygun biçimde yeniden formülasyonu, fonksiyonel gıda geliştirme sürecine katkı sağlayabilir ve lokumun daha geniş bir tüketici kitlesine ulaşmasına yardımcı olabilir.

Anahtar Kelimeler: Türk lokumu, Diyabetik ürün, Fonksiyonel gıda, Literatür taraması, Gıda mühendisliği.

Comparative characterization of sesame milk powders produced by spray drying and lyophilization after ultrasound-assisted extraction

[1]Lina Miçooğulları, [1,*]Gülcan Özkan, [1]Ebru Aydın
[1]Süleyman Demirel University, Faculty of Engineering and Natural Sciences, Department of Food Engineering
[2]Kırgızistan-Türkiye Manas Üniversitesi, Mühendislik Fakültesi, Elektrik-Elektronik Mühendisliği Bölümü
***gulcanozkan@sdu.edu.tr**

Abstract: In this study, sesame milk with approximately 12% dry matter was produced using ultrasound-assisted extraction (UAE) and converted into powder by two different drying methods: spray drying (SD) and freeze-drying (lyophilization, FD). The resulting sesame milk powders were compared in terms of physicochemical composition, rheological and techno-functional properties, as well as structural characteristics (FTIR, SEM, XRD). The powder obtained by SD showed higher protein content (10.97%), lower hygroscopicity (0.075%), and better flowability (Carr index 37.29%, Hausner ratio 1.60). In contrast, FD powders exhibited higher energy value (555 kcal/100 g), lower moisture content (1.90%), and superior solubility (87.03%). SEM analysis revealed that SD powders had spherical and porous particles, supporting easy solubility and rehydration, while FD powders displayed fragile, layered, and amorphous structures that limited solubility performance. FTIR and XRD analyses indicated that FD better preserved chemical structures and crystalline residues, whereas SD resulted in a more amorphous structure. Overall, while both methods presented distinct advantages, spray drying was found to be more suitable for industrial applicability. Furthermore, the advantages of UAE in terms of low energy consumption and additive-free production highlight its potential for developing sustainable and eco-friendly plant-based milk powders. This approach aligns with the Sustainable Development Goals (SDG 2, 3, 9, 12, and 13) by promoting responsible production, nutritional security, and climate-conscious innovation.

Keywords: Sesame milk powder, Spray drying, Lyophilization, Ultrasound-assisted extraction, SDGs, Functional food

Mor patatesten aquafaba ile zenginleştirilmiş vegan bar üretimi

[1,*]Cansel Murat, [1]Katibe Sinem Coruk, [2]Hande Baltacıoğlu
[1]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Food Engineering
***sinemcoruk@ohu.edu.tr**

Özet: Çalışmada yumurta tozu yerine nohut suyundan elde edilen aquafabanın farklı oranlarda (%5, %10, %15) kullanılarak, haşlanmış mor patates, yulaf, çeşitli baharatların ilavesi ile yapılarak vegan barlar üretilmiştir. Elde edilen vegan barların kontrol (yumurta tozu ile yapılan) örneği ve aquafaba eklenerek yapılan vegan barların hem biyoaktif hem de fizikokimyasal özellikleri incelenmiştir. Analiz sonuçlarına göre özellikle %15'lik aquafaba ilavesi protein bakımından kontrol örneğine göre istatiksel bir fark bulunmamaktadır. Ayrıca mor et renkli patates ilavesi yapılan barların biyoaktif olarak zenginleştirilmesine katkı sağlamıştır. Tekstür açısından %5'lik aquafaba ilave oranı kontrol örneğinden istatiksel olarak farklılık sağlarken ($p \leq 0,05$), diğer ilave oranları farksız bulunmuştur. Duyusal açıdan ise aquafaba ilavesi olumsuz bir durum oluşturmaz iken, en yüksek (%15) aquafaba ilavesi yapılan bar, duyusal açıdan en yüksek skor elde etmiştir. Bütün bu sonuçlar eşliğinde bu çalışmanın literatüre, hayvansal protein kaynağı yerine bitkisel protein ikamesi ve mor patates ile zenginleştirilmiş vegan barların sağlık yönünden birçok olumlu etkisi olan fenolik bileşiklerce zengin ve yapısında bulunan antosiyaninler sayesinde tüketicinin ürüne karşı sempatisini uyandırması açısından da katkı sağlayacağı düşünülmektedir.

Anahtar Kelimeler: Aquafaba, Biyoaktif bileşen, Mor et renkli patates, Vegan bar.

Influence of Early Harvest on Quality Parameters and Aroma Compounds of Gemlik, Edremit, Uslu, and Tekir Olive Oils

[1,*]Serife Cevik, [2]Abidin Tatlı, [3]Gulcan Ozkan
[1]Isparta University of Applied Sciences, Gelendost Vocational School, Dept. of Food Proces
[2]Chairman of the Board of Directors of the Olive Oil Academy
[3]Suleyman Demirel University, Faculty of Engineering and Natural Sciences, Department of Food Engineering
***serifecevik@isparta.edu.tr**

Abstract: In this study, some physicochemical properties, pigment compositions, and volatile profiles of extra virgin olive oils obtained from Gemlik, Uslu, Tekir, and Edremit olive varieties using the cold-pressing method under early harvest conditions (<27 °C) were evaluated. All oil samples met the extra virgin olive oil classification criteria determined by the International Olive Council (IOC); free fatty acidity peroxide values, UV absorption coefficients were found to be below the limit values. Pigment values revealed that Edremit and Tekir varieties had higher chlorophyll and pheophytin a contents than Gemlik and Uslu, thus offering a more pronounced green color and fresh sensory properties. Aroma profile was determined by the head space solid phase micro-extraction (HS-SPME) method and gas chromatography-mass spectrometry (GC-MS). In these oil samples, hexanal (9.92–21.62%) and trans-2-hexenal (15.40–36.31%) were found to be the major volatile compounds, and determined that these compounds significantly contributed to the green, fresh, and fruity sensory character of the oils. Volatile components were classified as desired and undesired aroma compounds and evaluated using Principal Component Analysis (PCA) and Hierarchical Cluster Analysis (HCA). PCA explained 92.8% of the total variance, demonstrating that the varieties were differentiated in terms of desired and undesirable volatiles, andGemlik and Uslu varieties in the same group, and Edremit and Tekir varieties in a different group.

Keywords: Olive oil, quality parameters, volatile compounds, PCA and HCA

Şalgam üretiminde fermantasyon sırasında bazı fizikokimyasal özelliklerdeki değişim: şalgam turpunun etkisi

[1,*]Hasan Tangüler, [1]Dilay Asena Aytekin
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Gıda Mühendisliği Bölümü
[*]htanguler@ohu.edu.tr

Özet: Şalgam turpu (*Brassica rapa*), şalgam suyuna hem adını veren hem de üretiminde aroma ve lezzet vermesi açısından kullanılan, dolayısı ile şalgam suyunun kalitesini artırdığı ifade edilen köklü bir sebzedir. Bu çalışma, ülkemize özgü bir geleneksel fermente ürün olan şalgam suyunun doğrudan üretim yöntemiyle üretiminde, farklı oranlarda ilave edilen şalgam turpunun fermantasyon süreci boyunca bazı fizikokimyasal özellikler üzerindeki etkilerini araştırmak amacıyla gerçekleştirilmiştir. Denemelerde şalgam turpu %0,0 (kontrol), %1,0, %2,5, %5,0 ve %7,5 oranlarında ilave edilerek beş farklı grup oluşturulmuş, kontrollü koşullarda fermantasyona bırakılmıştır. Fermantasyon süresi boyunca pH, toplam asitlik, renk yoğunluğu, renk tonu ve renk bileşimi gibi temel kalite parametrelerine bakılmıştır. Elde edilen bulgular, tüm örneklerde fermantasyon ilerledikçe pH değerinin azaldığını, buna karşılık toplam asitlik değerinde belirgin bir artış gerçekleştiğini göstermiştir. pH değerleri 6,1 – 5,88 aralığından başlayarak fermantasyon sonunda 3,53 – 3,64 aralığına düşerken, toplam asitlik değerleri 0,09 g/L'den başlayarak 6,21 – 6,62 g/L'ye yükselmiştir. Renk analizleri sonucunda, özellikle kırmızı rengin fermantasyon sürecinde baskın hale geldiği ve şalgam turpu ilavesinin renk yoğunluğu üzerinde olumlu katkılar sağladığı tespit edilmiştir. Renk tonu ve bileşimi açısından ise farklı turp oranlarına rağmen örnekler arasında büyük farklılıklar gözlenmemiştir. Şalgam turpu ilavesinin, doğrudan üretim yöntemiyle hazırlanan şalgam sularında fermantasyon sürecini olumlu yönde etkilediği; pH, asitlik ve renk gibi parametrelerde değişime neden olduğu belirlenmiştir. Elde edilen bulgular, geleneksel yöntemle yapılan üretimlere ilişkin önceki çalışmalarla büyük ölçüde uyumludur.

Anahtar Kelimeler: *Brassica rapa*, Doğrudan yöntem, Şalgam fermantasyonu, Şalgam turpu.

Changes in some physicochemical properties during fermentation in shalgam production: the effect of turnip radish

[1,*]Hasan Tangüler, [1]Dilay Asena Aytekin
[1]Niğde Ömer Halisdemir University, Faculty of Engineering, Food Engineering Department
[*]htanguler@ohu.edu.tr

Abstract: Turnip radish (*Brassica rapa*) is a root vegetable that gives its name to shalgam juice and is used in its production to impart aroma and flavor, thus improving its quality. This study was conducted to investigate the effects of turnip radish added at different rates on certain physicochemical properties during the fermentation process of shalgam juice, a traditional fermented product unique to our country, using the direct production method. In the experiments, turnip radish was added at 0.0% (control), 1.0%, 2.5%, 5.0%, and 7.5% to form five different groups and allowed to

ferment under controlled conditions. Throughout the fermentation period, key quality parameters such as pH, total acidity, color intensity, color tone, and color composition were examined. The findings showed that pH decreased as fermentation progressed in all samples, while total acidity significantly increased. pH values ranged from 6.1 to 5.88 and decreased to 3.53 to 3.64 at the end of fermentation, while total acidity values increased from 0.09 g/L to 6.21 to 6.62 g/L. Color analyses revealed that red color, in particular, became dominant during the fermentation process, and the addition of turnip radish contributed positively to color intensity. Despite the different radish ratios, no significant differences were observed among the samples in terms of color tone and composition. It was determined that the addition of turnip radish positively affected the fermentation process in shalgam juices prepared using the direct production method, causing changes in parameters such as pH, acidity, and color. The findings are largely consistent with previous studies on traditional production methods.

Keywords: *Brassica rapa,* Direct method, Shalgam fermentation, Turnip radish.

Extraction of bioactive compounds from sweet cherry (*Prunus avium l.*) stem

[1]Adnan Yılmaz, [1,*]Erkan Karacabey
[1]Süleyman Demirel University, Engineering and Natural Sciences Faculty, Food Engineering Department
[*]erkankaracabey@sdu.edu.tr

Abstract: The last term focus of researchers has led on the plant-derived bioactives due to their potential health beneficial effects. In this study, the extraction of bioactives compounds from cherry stems and its functional potential were investigated. As an extraction technique, pressurized liquid extraction method was handled, which is one of the innovative extraction techniques. To achieve the best extraction performance with high functional potential, an optimization study was conducted by the experimental design which was formed by response surface methodology. Temperature (°C) and flow rate (mL/min) were the processing conditions. Total phenolic content and DPPH radical scavenging capacity of the extracts were used as dependent variables. According to the performance parameters of R2 and adjusted-R2, the models corresponding to the total phenolic content of the extract and free radical scavenging activity (DPPH, % inhibition) were found to be significant ($p<0.05$). Pressurized liquid extraction was optimized by using these models. The optimum conditions of the pressurized liquid extraction system were determined as 105°C and 0.5 mL/min. The total phenolic content and % inhibition values of the extracts obtained under these conditions were 25.48 mg GAE/g dry sample and 86.82%, respectively. Conventional solid/liquid extraction method was used to compare the method performance. The results obtained here were 3.81 mg GAE/g dry sample and 40.90 %inhibition. Compared to the conventional method, pressurized liquid extraction was found to be a promising technique for the extracting bioactive compounds from cherry stems**.**

Keywords: Pressurized liquid extraction, Optimization, Response surface methodology, plant-based bioactive source

Carnauba wax oleogel as a shortening substitute: impact on the quality of beluga lentils crackers

[1,*]Hilal Arslan Bayrakcı
[1]Selcuk University, Karapınar Aydoganlar Vocational School, Department of Food Processing
***hbayrakci@selcuk.edu.tr**

Abstract: Oleogels are oil-gel mixtures that can be used similarly to solid fats and are considered harmless; in recent years, their use as an alternative to traditional solid fats like margarine and butter in foods has been increasing, and they attract attention with their potential to preserve nutritional value. This study investigated the impact of replacing shortening with sunflower oil-based carnauba wax oleogel at different levels on the quality of Beluga lentils crackers. The physical, textural, and sensory properties of crackers were determined. Crackers were produced by substituting the shortening with oleogel at 0, 25, 50, 75, and 100% (referred to as control, OG-25, OG-50, OG-75, and OG-100). Color measurements (L*, a*, b*, and ΔE), diameter, thickness, spread ratio, and hardness were evaluated, as well as sensory parameters including taste, odor, appearance, texture, and overall acceptability. Analysis showed that increasing the oleogel substitution level led to a decrease in L* and an increase in a* and b* values. Notable color changes (ΔE) occurred in OG-75 and OG-100 samples, which were detectable by the human eye. OG-50 crackers exhibited the largest diameter and spread ratio among all groups. Greater oleogel replacement resulted in softer cracker texture. Sensory tests revealed no significant ($p>0.05$) difference in taste and aroma, but appearance and texture scores improved, especially at higher substitution levels. In conclusion, up to 50% oleogel replacement preserves most original properties, and higher ratios enhance appearance and texture, supporting the use of oleogels as a healthier alternative fat in crackers.

Keywords: Oleogel, Crackers, Fat replacement, Healthy food, Beluga lentil

Development of gluten-free chip-type snack formulation with lemon peel waste

[1,*]Nezahat Olcay, [1]Kadriye Alev Akmeşe
[1]Selcuk University, Beyşehir Ali Akkanat Tourism Faculty, Department of Gastronomy and Culinary Arts
***nezahat.olcay@selcuk.edu.tr**

Abstract: Lemon peel, a byproduct of the lemon juice production industry, constitutes approximately half of the whole fruit. Therefore, a significant amount of waste is generated in lemon juice production. With its high nutritional value and dietary fiber content, lemon peel has the potential to be used as an alternative raw material in food products. The use of lemon peel waste in food products is also important for sustainability. In this study, an innovative gluten-free chip-type snack was developed for consumers with gluten intolerance by substituting lemon peel powder at different ratios (0, 2.5, 5, 7.5, and 10%). The color, physical, textural, and sensory properties of the end products were examined. As the lemon peel powder substitution ratio increased, the L* values decreased and the b* values increased. No significant effect of lemon peel powder substitution on the a* color value or hue angle was found. Samples with substitution ratios of 7.5% and 10% were found to have the highest saturation index values. The substitution of lemon peel powder resulted in significant reductions in diameter and spread ratios of the samples. No significant difference was found between the hardness values of the samples. Sensory properties of samples with 2.5% and 5% substitution ratios were found acceptable. Future studies are recommended to investigate the nutritional and functional properties of the end products. This study is expected to pave the way for future studies on the use of lemon peel powder in the enrichment of various gluten-free food formulations.

Key Words: Lemon peel, chip-type snack, gluten-free snack, enrichment, sustainability

The importance of storage and cold chain in the food industry: current technological tools

[1] Usman Mir Khan, [2,*]Mesut Selamoglu
[1]National Institute of Food Science and Technology, University of Agriculture
[2]Logistics Program, Department of Management and Organization, Bahce Vocational School, Osmaniye Korkut Ata University Bahce
[*]mesutselamoglu@osmaniye.edu.tr

Abstract: Like the “safety food works” lists, storage and cold chain management is one of the essential components of the food industry. It aids in maintaining the safety, integrity, and freshness of food items. Its proper functioning aids in the prevention of spoilage, retention of nutrients, and extension of shelf life of fruits, vegetables, dairy products, and meat. Cold chain logistics is the supply chain that maintains a uniform low temperature and is imperative in the prevention of bacteria and other pathogens that cause foodborne diseases. The quality of storage and cold chain logistics has benefitted from the cutting-edge technology. The Internet of Things (IoT) technology can be utilized to devices that collect data on temperature and humidity, assisting in their maintenance and enabling quick action when there are anomalies. Inventory management and space optimization are enhanced through AS/RS systems. In addition, new smart packaging techniques are being developed, which gives better insights into the products, benefiting both the retailers and the shoppers. One impactful innovation is the deployment of blockchain technology to increase transparency and traceability. With blockchain, each stage of the cold chain is verified and every event is recorded on a ledger that cannot be changed, that is available to view at any time. The likelihood of misrepresentation is diminished and food safety is improved. In addition to the benefits of reducing waste, using these technologies enhances the sustainability of the food supply chain, improving its efficiency and resilience. As the food sector grows on an international scale, the aforementioned capabilities are indispensable for upholding the rules of food safety and quality

Keywords: Cold Chain Logistics, IoT in Food Storage, Smart Packaging

Artificial intelligence in egg processing using aloe vera as coating material for quality control

[1]*Yusuf ISHAQ, [1]Sibel CANOĞULLARI DOĞAN
[1]Niğde Ömer Halisdemir University, Faculty of Agricultural Science and Technology, Department of Animal Production and Technologies
***ishaqyusuf965@gmail.com**

Abstract: The main aim of the review was to analyses the egg processing using Aloe Vera as coating material for quality control. Egg is one of the main protein sources needed for human consumption. Several challenges are faced in egg processing which can be internal and external. The external issue involves damage on eggshell which could lead to health and economic losses. Poultry farmers therefore need to adopt the use of effective coating materials to improve egg processing and quality control, and also employ the artificial intelligence through machine learning algorithms. Aloe Vera is an important coating material due to it antimicrobial and antioxidant properties. They also contain polysaccharides and certain compounds which promote effective eggs quality. Artificial intelligence with the use of Aloe Vera could help farmers save cost, reduce labor, and increase profitability. Other application of artificial intelligence was identified apart from egg quality control during processing which includes disease diagnostics, egg automation, cleaning tasks, and environmental control. The review concludes that artificial intelligence as a modern application in poultry production can help improve the quality of eggs combined with Aloe Vera as the main coating material. The study recommends that poultry farmers should adopt the use of Aloe Vera as coating material to process eggs and same time adopt machine learning algorithms which could help monitor and identify certain defects which could lead to egg damages.

Keywords: Aloe vera, Artificial intelligence, Egg processing, Quality control.

Food safety consciousness and purchasing behavior of consumers for milk and dairy products in urban area of Niğde province

[1]Maral Nazari, [2,*]Betül Bahadır
[1]Department of Animal Production and Technologies, Faculty of Agricultural Sciences and Technologies, Niğde Ömer Halisdemir University
[2]Isparta University of Applied Sciences, The Faculty of Agriculture, Department of Agricultural Economics, Isparta, Türkiye
***betulgurer@isparta.edu.tr**

Abstract: This study examined consumers' food safety consciousness and purchasing behavior for milk and dairy products. The data was gathered through the application of a questionnaire developed for food safety in milk and dairy products and purchasing preferences to consumers via face-to-face questionnaire method with 272 consumers residing in the urban area of Nigde province. As a result of this investigation, the milk and dairy products purchased by the majority of consumers were reported, such as cow milk, cow milk products and butter. It was determined that consumers buy an average of 13.5 liters of milk, 3 kg of cheese, about 10.5 kg of yogurt, and 1.5 kg of butter per month. It was found that 82% of consumers know the concept of food safety, and they stated that they were familiar with the Ministry of Agriculture and Forestry and the Ministry of Health as the food safety supervisory organizations. In the study, it was concluded that consumers consider the good for the product's naturalness and quality to be purchased as the most important criterion when purchasing milk and dairy products.

Keywords: Food safety, Milk and dairy products, Purchasing behavior

Mersin ilinde süt ve süt ürünleri israfı

[1,2*]Bahar Özyörük, [2,3,4]Emine İkikat Tümer
[1] Kırgızistan-Türkiye Manas Üniversitesi, Mühendislik Fakültesi, Endüstri Mühendisliği Bölümü,
[2] Gazi Üniversitesi, Mühendislik Fakültesi, Endüstri Mühendisliği Bölümü
[3] Kırgızistan-Türkiye Manas Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İktisat Bölümü
[4] Kahramanmaraş Sütçü İmam Üniversitesi, Tarımsal Yayım Araştırma ve Uygulama Merkez Müdürlüğü
***bahar@gazi.edu.tr**

Özet: İnsanoğlunun yaşamını sürdürebilmesi için temel gereksinimlerinden biri gıdadır. Gıdalar, bireylerin protein, karbonhidrat, vitamin, mineral ve yağ ihtiyacını karşılar. İnsanın yaşamsal faaliyetlerini sürdürebilmesi ve sağlıklı bir yaşam sürebilmesi için gerekli olan gıdaların bir kısmı tüketiciye ulaştıktan sonra israf edilmektedir. Dünya genelinde 673 milyon insan açlıkla mücadele ederken küresel olarak üretilen gıdaların 1/3'ü çöpe atılmaktadır. Süt ve süt ürünleri tüketimi ürün yelpazesi, beslenme alışkanlıkları sosyo-kültürel şartlara bağlı olarak ülkeden ülkeye hatta bölgeden bölgeye değişiklik göstermektedir. Gelişmiş ülkelerde süt ve süt ürünleri tüketimi, buna bağlı olarak israfı da gelişmekte olan ülkelerden daha fazladır. Süt ve süt ürünleri, yüksek getiri potansiyeli ve hassas tedarik zinciri süreçleri nedeniyle küresel gıda israfında önemli bir paya sahiptir. Özellikle raf ömrünün kısa, tedarik zincirinin hassas olması bu israfı tetikleyen bir faktördür. Bu çalışmada Mersin ilinde tüketicilerin süt ve süt ürünleri tüketim ve israf miktarlarının belirlenmesi amaçlanmıştır. Çalışma kapsamında 93 tüketiciye yüz yüze anket uygulanmış ve çalışmanın verileri elde edilmiştir. Elde edilen verilere göre tüketiciler haftada 152,43 ml süt, 24,83 gr peynir, 164,84 ml yoğurt ve 13,82 gr tereyağı israf etmektedirler. Süt ve süt ürünleri israfının azaltılması hem ekonomik hem de çevresel sürdürülebilirlik açısından kritik öneme sahiptir bu nedenle israfın azaltmak için hanehalkında süt ve süt ürünlerinin doğru saklama koşulları, son kullanma tarihi ve tüketim süresi konusunda farkındalık artırıcı kampanyalar düzenlenmelidir.

Anahtar kelimeler: Süt, Süt ürünleri, İsraf, Gıda israfı

Biyosensörlerin gıda alanında kullanımı

[1,*]Ayşe Bal, [2]Erdoğan Küçüköner
[1]Süleyman Demirel Üniversitesi Fen Bilimleri Enstitüsü, Gıda Mühendisliği Anabilim Dalı Isparta Türkiye
[2]Süleyman Demirel Üniversitesi, Mühendislik ve Doğa Bilimleri Fakültesi, Gıda Mühendisliği Bölümü Isparta Türkiye
[*]aysevimbal@icloud.com

Özet: Biyosensörler, gıda güvenliği ve kalite kontrolünde geleneksel yöntemlere kıyasla daha hızlı, hassas, taşınabilir ve maliyet etkin çözümler sunan yenilikçi teknolojiler olarak öne çıkmaktadır. Biyolojik tanıma elemanları ve transdüser bileşenleri sayesinde patojen mikroorganizmalar, toksinler, alerjenler, pestisit kalıntıları ve gıda bileşenleri kısa sürede ve yüksek özgüllükle tespit edilebilmektedir. Günümüzde glikoz, laktat ve etanol analizinden Salmonella ve Listeria gibi mikroorganizmaların tespitine kadar çok çeşitli ticari biyosensör uygulamaları mevcuttur. Nanoteknoloji ve CRISPR/Cas tabanlı sistemlerin entegrasyonu, biyosensörlerin duyarlılığını ve güvenilirliğini artırarak yeni kullanım alanlarının önünü açmıştır. Ayrıca nanosensörler ve nanozim tabanlı yaklaşımlar, düşük tespit limitleri ve yüksek stabilite sağlamaktadır. Gıda ambalajlamada biyosensör tabanlı akıllı etiketler, ürünlerin raf ömrünün izlenmesi ve gıda israfının önlenmesine katkı sunmaktadır. Bununla birlikte, gıda matrislerinde doğrudan tespit, numune hazırlama, uzun dönem stabilite ve maliyet konularında aşılması gereken zorluklar devam etmektedir. Gelecekte biyosensörlerin tarımdan tüketime uzanan tüm değer zincirinde daha yaygın olarak kullanılması, gıda güvenliğini artıracak ve tüketicilere daha sağlıklı ürünlere erişim imkânı sağlayacaktır. Bu bağlamda, biyosensör teknolojilerinin geliştirilmesi, gıda endüstrisinin sürdürülebilirliği ve toplum sağlığı açısından büyük bir potansiyel barındırmaktadır

Anahtar Kelimeler: Biyoreseptör, Biyosensör, Nanoteknoloji, Gıda Güvenliği, Gıda Kalitesi.

PM_{10}-Based evaluation of urban air quality: the case of Merzifon, Amasya

[1*]Can Zeytünlü, [2]NaimSezgin
[1]Istanbul University-Cerrahpasa, Institute of Graduate Studies, Avcilar, Istanbul, Turkiye
[2]Istanbul University-Cerrahpasa, Engineering Faculty, Environmental Engineering Department, 34320, Avcilar, Istanbul, Turkiye
*** can.zeytunlu@ogr.iuc.edu.tr**

Abstract: Urban air pollution is recognized as one of the most critical environmental issues worldwide due to its adverse impacts on human health, ecosystems, and economic activities. The World Health Organization (WHO) identifies air pollution as one of the leading environmental risk factors, responsible for millions of premature deaths each year. Particulate matter (PM), in particular, is of great importance to public health because of its small size, which allows it to penetrate the respiratory tract, and its toxic composition. PM_{10} (particles with an aerodynamic diameter smaller than 10 μm) is commonly used as a parameter in air quality assessments, as it can reach the upper regions of the respiratory system.

This study aims to examine the temporal variations of PM_{10} concentrations in Merzifon, a district of Amasya Province, in order to assess the air quality status in the region and identify potential sources of pollution. For this purpose, PM_{10} measurement data recorded between January 1, 2022, and December 31, 2024, were obtained from the national air quality monitoring network operated by the Ministry of Environment, Urbanization, and Climate Change of Türkiye. The data were analyzed on hourly, daily, and seasonal scales, and the results were evaluated comparatively with respect to both the Air Quality Index (AQI) and national and international air quality standards. Through these analyses, the current air quality levels in Merzifon are presented together with their seasonal and daily fluctuations, providing insights into periods of elevated pollution loads. The findings offer valuable input for the development of local air quality management strategies and for informing policy measures at the national level.

Keywords: Urban air pollution, PM10 distributions, Environmental effects

Antioxidant activity, technological and sensory characteristics of gluten-free buckwheat cookies enhanced with defatted grape seed powder

[1,*]Elif Yaver
[1]Konya Technical University, Vocational School of Technical Sciences, Department of Food Processing, Konya, Türkiye
[*]elifyaver@hotmail.com

Abstract: Celiac patients must consume gluten-free foods for life. However, most available gluten-free foods are poor in essential nutrients. Many of the food wastes are valuable ingredients because of their rich protein, dietary fiber, vitamins, and/or mineral content. Defatted grape seed powder is a waste of the cold-press oil extraction process, which has strong antioxidant activity and high amounts of proteins, fibers, and minerals. In this study, the influence of the addition of defatted grape seed powder at 0, 2.5, 5.0, 7.5, and 10% levels on the antioxidant activity and physical and sensory features of gluten-free buckwheat cookies was investigated. The results of the antioxidant activity of the gluten-free cookies demonstrated that phenolic contents and antioxidant activities of the cookies drastically increased as the addition level of grape seed powder increased. The moisture amount of gluten-free buckwheat cookies ranged between 6.27% and 6.68%. Cookies enriched with 10% grape seed powder have a similar moisture content to the control (0% grape seed powder). The inclusion of defatted grape seed powder did not notably change the diameter and thickness values of cookies. While the addition of grape seed powder up to 7.5% elicited similar spread ratios to the control sample, the spread ratio value of cookies made with 10% grape seed powder (9.23) was higher than the control (8.11). In terms of sensory assessment, high seed powder addition levels showed higher color scores in gluten-free buckwheat cookies. Moreover, the incorporation of defatted grape seed powder did not indicate a negative influence on the overall acceptability of gluten-free cookies. Therefore, the data of the study revealed that defatted grape seed powder is a good alternative to enhance the antioxidant activity of gluten-free cookies with acceptable technological features.

Keywords: Food wastes, Grape seed powder, Gluten-free, Cookies**.**

Carob flour changed the physical, textural and sensory qualities of chips

[1,*]Zuhal Alkay, [2]Yunus Emre Tunçil, [3]Enes Dertli
[1]Necmettin Erbakan University, Faculty of Engineering, Department of Food Engineering
[2]Necmettin Erbakan University, Faculty of Engineering, Department of Food Engineering
[3]Istanbul Technical University, Faculty of Chemical and Metallurgical Engineering, Department of Food Engineering
***zuhalalkay21@hotmail.com.tr**

Abstract: Carob flour is a fiber-rich byproduct obtained from the extraction of carob gum. In this study, different concentrations of carob flour (5%, 10%, and 15%) were used in the production of chips, a snack product. The effect of this substitution on the psychochemical properties (color, diameter, thickness, spread ratio), textural profile, and acceptability of the final products was investigated. The addition of carob flour was observed to change the color values (darker) of the chip products. However, despite decreasing the diameter values, it did not cause any changes in the thickness or spread ratios. Indeed, although the addition of carob flour reduced the hardness of the chips, it did not lead to a significant difference in brittleness. The acceptability of the chips decreased compared to the control sample with the addition of carob flour. This was attributed to the bitter taste of the products. Consequently, a maximum of 5% carob flour can be considered acceptable, and this level can be considered to have positive effects on bakery products.

Keywords: Carob flour, Chips, Psychochemical properties, Sensory evaluation, Textural profile.

Nutritional and anti-nutritional profiling of parsley (*Petroselinum crispum*)

[1]Arbnore Bytyçi, [2]Hyrije Koraqi, [3]Hande Baltacıoğlu, [1,4*]Anka Trajkovska Petkoska
[1]Faculty of Technology and Technical Sciences, University St. Kliment Ohridski - Bitola, Dimitar Vlahov, Veles 1400, Republic of North Macedonia
[2]Faculty of Food Science and Biotechnology, UBT-Higher Education Institution, St. Rexhep Krasniqi No. 56, 10000 Pristina, Kosovo
[3]Niğde Ömer Halisdemir University, Engineering Faculty, Food Engineering Department
[4]Department of Materials Science and Engineering, Korea University, Seoul, South Korea
***anka.trajkovska@uklo.edu.mk**

Abstract: Parsley (*Petroselinum crispum*) is a widely used culinary and medicinal herb valued for its rich phytochemical composition. This study assessed its vitamin C, β-carotene, chlorophyll pigments, and major anti-nutritional factors. Results showed high contents of vitamin C (135.4 ± 3.41 mg/100 g) and β-carotene (22.25 ± 0.75 mg/100 g), confirming strong antioxidant potential. Chlorophyll a (14.04 ± 0.80 mg/100 g) and chlorophyll b (4.32 ± 0.35 mg/100 g) were also abundant, indicating detoxifying and health-promoting properties. Anti-nutritional factors were comparatively low: tannins (10.34 ± 0.55 mg/100 g), phytate (19.11 ± 0.55 mg/100 g), cyanogenic glycosides (0.78 ± 0.02 mg/kg), and oxalate (265 ± 2.55 mg/100 g), suggesting safe consumption levels. Overall, *Petroselinum crispum* exhibits a favorable nutritional profile, rich in antioxidants with minimal anti-nutritional constraints. These findings support its inclusion in daily diets and its potential use in functional foods and nutraceuticals aimed at mitigating oxidative stress-related disorders.

Keywords: Anti-nutrients, Parsley, Phytochemicals, Vitamin C.

11 GEOLOGICAL, GEOTECHNICAL AND MINING ENGINEERING

Varyans bileşen kestiriminin iki boyutlu deformasyon analizi üzerindeki etkisi

[1,*]Cahit Tağı ÇELİK, [1]Kutalmış GÜMÜŞ
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Harita Mühendisliği Bölümü
[*]ctcelik@ohu.edu.tr

Özet: Deformasyon analizi, jeodezinin önemli konularından biridir. Jeodezik ağlar kullanılarak deformasyonların belirlenmesi çeşitli yöntemlerle gerçekleştirilmektedir. Bu yöntemlerden biri de şekil değiştirmezlik yöntemidir. Bu çalışmada, iki boyutlu bir jeodezik ağın farklı iki zamanda yapılan ölçüleri için şekil değiştirmezlik yöntemine dayalı deformasyon analizi gerçekleştirilmiş; varyans bileşen kestiriminin yapılmadığı ve yapıldığı iki farklı durum ele alınarak karşılaştırma yapılmıştır. Veriler simülasyon yoluyla üretilmiştir. Çalışmada kullanılan ağ, beş referans noktası (R1, R2, R3, R4, R5) ve dört obje noktası (b1, b2, b3, b4) içermektedir. Birinci epok için kabul edilen koordinatlardan doğrultu ve mesafeler hesaplanmış, beyaz gürültü eklenerek gözlemler oluşturulmuştur. İkinci epokta ise b1 ve b4 noktaları sırasıyla 367g ve 355g yönlerinde 4 mm ve 3 mm ötelenmiş, ardından doğrultular hesaplanarak beyaz gürültü ile simülasyon verileri elde edilmiştir. Her iki epok için yapılan dengeleme sonucunda birinci epokta m_{01} = 1.1589, ikinci epokta ise m_{02} = 1.0664 bulunmuştur. Elde edilen sonuçlar, varyans bileşen kestiriminin dikkate alındığı ve alınmadığı durumlar için şekil değiştirmezlik yaklaşımı ile değerlendirilmiştir. İlk durumda yapılan analizde yalnızca b1 noktasında 370.06g yönünde 3.549 mm' lik anlamlı hareket tespit edilmiştir. İkinci durumda ise b1 noktasında 370.31g yönünde 3.916 mm ve b4 noktasında 353.18g yönünde 3.725 mm' lik anlamlı hareket belirlenmiştir. Sonuçlar, başlangıçta öngörülen değerlerle elde edilen sonuçların uyumlu olduğunu göstermektedir.

Anahtar Kelimeler: Deformasyon Analizi, Varyans Bileşen Kestirimi, Jeodezik Ağ Dengelemesi

Orta toroslar oksitli (nonsulpfide) Kurşun-Çinko yataklarının duraylı izotop jeokimyası: Jenetik bir yaklaşım

[1,*]Abdurrahman Lermi
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi Jeoloji Mühendisliği Bölümü
[*]alermi@ohu.edu.tr

Özet: Bu çalışmanın amacı, Zamantı Maden Provensi (Orta Toroslar) içerisinde yer alan Pb-Zn yataklarının alterasyon mineralojisi, jeokimyası, ve oksitlenmeyi oluşturan koşullar, oluşan yeni mineral birliktelikleri ve buna neden olan olayların anlaşılmasıdır. Bu yataklardan Delikkaya, kireçtaşı ve bitümlü killi kireçtaşından oluşan Alagöl formasyonu içinde yer alır ve K55D uzanımlı ve KD dalımlıdır. Tekneli madeni ise Siyah Aladağ Napı içerisinde mizzialı kireçtaşlarına yerleşmiştir. Yataklar tamamen fay kontrollüdürler ve cevher her iki yatakta da düzensiz mercekler, kırıklar ve karstik boşluklarda ve yan kayaçlara ornatma şeklinde yerleşmiştir. Yapılan cevher mikroskopisi ve XRD çalışmalarında primer cevher mineralleri galen, sfalerit ve pirit; oksitli cevher minerali olarak ise en az beş farklı kristal yapısı ve renginde simitzonit, hidrozinkit, seruzit, hemimorfit, anglezit, plumbojarosit ve silis mineralleri en yaygın olan cevher ve gang mineralleri olarak tespit edilmiştir. Mineral birlikteliklerine, Minerallerin C ve O duraylı izotope verilerine bakıldığında bu yatakların oksitlenme ve yeniden çökelme şartları oldukça düşük sıcaklık, başlangıçta asidik ancak daha sonra alkalin pH ve yüksek oksitlenme potansiyeli (Eh) koşullarında, nemli bir ortamda gerçekleştiği söylenebilir. Ana bileşen karbon kaynağı çoğunlukla yan kayaçlar ve az oranda ise atmosferik CO_2 olabileceği anlaşılmaktadır. Mineral parajenezine ve izotop verilerine göre ikincil zenginleşme Paleosen- Geç Pleistosen zaman aralığında ayrışma ve yeniden çökelme, düşük sıcaklıkta, alkali ve yüksek oksidan koşullarda gerçekleşmiş olmalıdır. Au ve Ag ise bazı yataklarda zenginleşme gösterirler. Oksitlenme Profilleri, tabandan tavana doğru birincil sülfür, ikincil sülfür, sülfat, karbonat ve çok az da fosfat mineralleri ile temsil edilirler. Bölgede olgun ve tam oksitlenme profilinin bulunması oldukça zordur.

Anahtar Kelimeler: Alterasyon mineralojisi, izotop jeokimyası, oksitli Zn-Pb yatakları, nonsulfid, Orta Toroslar

Dere sedimanlarında jeokimyasal risk değerlendirmesi ve kirlilik kaynaklarını belirlemede Pb izotoplarının kullanılması: Örnek bir çalışma

[1,*]Abdurrahman Lermi, [2]Emmanuel Daanoba Sunkari
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi Jeoloji Mühendisliği Bölümü
[2]Sir Padampat Singhania University, Faculty of Integrated and Advanced Technology, Department of Mining Engineering
[*]alermi@ohu.edu.tr

Özet: Bu çalışmada, Türkiye'nin önemli madencilik bölgelerinden biri olan Niğde-Ulukışla Havzası'ndaki Orta Toroslar'ın güney kesiminde yer alan derelerden alınan 53 sediman örneğinde seçilmiş elementlerin (Al, Fe, Mn, Mo, As, Cd, Cu, Cr, Ni, Co, Pb, Sb ve Zn) konsantrasyonları ve Pb izotop oranları ICP-MS ve MC-ICP-MS kullanılarak belirlenmiştir. Dere sedimanlarında olası ağır metal kirliliğini ve buna bağlı ekolojik riskleri değerlendirmek amacıyla çeşitli kirlilik ve risk indeksleri kullanılmıştır. Sedimanlarda As, Cd, Cu, Cr, Ni, Co, Pb, Sb ve Zn içeriklerinin, özellikle eski ve aktif madenler ile cüruf yığınlarının yakınındaki derelerde yüksek olduğunu göstermektedir. Kirlilik indekslerine göre sedimanlar As, Cd, Sb, Zn ve Pb açısından yüksek derecede; Cu, Ni, Cr ve Co açısından ise orta derecede kirlenmiştir. Potansiyel ekolojik risk analizleri, sedimanların As, Cd, Sb ve Pb bakımından çok yüksek risk düzeyine işaret etmektedir. Ayrıca, Ni, Cr, As, Pb, Zn ve Cd ise çoğu örnekte kabul edilebilir sınırları aşarak sediman faunası üzerinde olumsuz etkilere yol açabilecek düzeylere ulaşmıştır. Çok değişkenli istatistiksel değerlendirmeler, ağır metal birikiminin madencilik faaliyetleri ve tarımsal kimyasal kullanımı gibi antropojenik etkilerin yanı sıra, anakaya ayrışması ve baz metalce zengin mineralizasyonların süperjen alterasyonu gibi jeojenik süreçlerle ilişkili olduğunu ortaya koymaktadır. Pb izotop analizleri ise sedimanlardaki toplam Pb'nin ($^{206}Pb/^{207}Pb$ = 1.09–1.29) büyük ölçüde ultrapotasyumlu kayaların ayrışması ($^{206}Pb/^{207}Pb \approx 1.20$) ve Pb-Zn-Au yataklarındaki kurşun minerallerinden ($^{206}Pb/^{207}Pb \approx 1.21$) kaynaklandığını; ayrıca maden cürufu yığınlarının ($^{206}Pb/^{207}Pb$ = 1.10) sınırlı düzeyde de olsa antropojenik kirliliğe katkıda bulunduğunu göstermektedir.

Anahtar Kelimeler: çevre kirliliği, Dere sedimanı, Pb izotopları, risk değerlendirme, Ulukışla

Integrating Hydrogeological Risk Assessment into Mine Planning to Assess Groundwater Quality and Health Impacts in Ghana

[1],*Rahinatu Abdul-Rahman, [1,2] Emmanuel Daanoba Sunkari
[1]Sir Padampat Singhania University, Faculty of Integrated and Advanced Technology, Department of Mining Engineering
[2]University of Johannesburg, Faculty of Science, Department of Chemical Sciences
***abdulrahmanrahina947@gmail.com**

Abstract: The mining sector in Ghana, including both legal and illegal (galamsey) activities, presents considerable risks to groundwater quality, necessitating the systematic integration of Hydrogeological Risk Assessment (HRA) into mine planning frameworks. This review explores current research on the utilization of HRA to evaluate groundwater contamination and its associated public health consequences throughout the mining lifecycle. The findings indicate that the hydrogeological conditions at the site, particularly within the mineral-rich Birimian Supergroup and Tarkwaian Group, significantly influence the mobility of pollutants. Critical factors facilitating the migration of metallic contaminants (Pb, Cd, As, Hg) and cyanide compounds through acid rock drainage and subsurface flow channels include alterations in pH, oxidation-reduction potential, and seasonal hydrological variations. Localized aquifer contamination near illegal mining sites poses a threat despite broader compliance with the World Health Organization's standards. Quantitative risk studies reveal that arsenic-associated carcinogenic hazards exceed tolerable thresholds in many areas, including significant non-carcinogenic exposure (Hazard Quotient > 1) to other potentially hazardous elements. The research proposes a tripartite framework for the implementation of HRA: (i) sophisticated geospatial methodologies for assessing aquifer risk prior to mining; (ii) sensor networks that perpetually monitor water quality; and (iii) adaptive mitigation solutions tailored to Ghana's diverse geological contexts. This study proposes enhancing the regulations by incorporating mining-specific water quality criteria and facilitating compliance verification. The study also offers an evidence-based link between hydrogeological research and sustainable mineral development, offering practical strategies to safeguard water resources in Ghana and other tropical mining regions.

Keywords: hydrogeological risk assessment; mine planning; groundwater pollution; metal mining; public health

Sezgisel Optimizasyon Algoritmaları ile Otopark Tasarımında Kapasite Artırımı

[1]Ahmet Emin Karkınlı, [1,*]Mustafa Hüsrevoğlu
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Harita Mühendisliği Bölümü
***mhusrevoglu@ohu.edu.tr**

Özet: Otopark tasarımlarında araç genişlikleri, manevra alanları ve çizgilerin eğim açıları gibi unsurlar, toplam kapasiteyi doğrudan etkileyen kritik faktörler arasında yer almaktadır. Geleneksel uygulamalarda çoğunlukla standart tasarımlar tercih edilmekte, ancak bu durum mevcut alanın en verimli şekilde kullanılmasını her zaman garanti etmemektedir. Özellikle yoğun kent bölgelerinde sınırlı alanın etkin biçimde değerlendirilmesi, mühendislik ve şehircilik açısından güncelliğini koruyan bir sorun olarak karşımıza çıkmaktadır. Bu çalışma, sezgisel optimizasyon yaklaşımlarının otopark kapasitesini artırmadaki potansiyelini ele almaktadır. Çeşitli sezgisel algoritmalar farklı senaryolarda uygulanmış ve elde edilen çözümler, araçların park düzeninde kapladıkları alan ve manevra kolaylığı gibi ölçütler üzerinden karşılaştırılmıştır. Böylece farklı algoritmaların sunduğu yaklaşımlar değerlendirilmiş; hız, çeşitlilik ve çözüm kalitesi açısından ortaya çıkan farklılıklar tartışılmıştır. Araştırma, yalnızca kapasiteyi artırmayı değil, aynı zamanda kullanıcı deneyimini ve kentsel işlevselliği iyileştirmeyi de hedefleyen yenilikçi bir bakış açısı ortaya koymaktadır. Çalışma, otopark planlamasında mühendislik ve şehircilik disiplinleri için uygulanabilir, karşılaştırmalı bir değerlendirme sunarak alana katkıda bulunmaktadır.

Anahtar Kelimeler: Kapasite, Otopark tasarımı, Sezgisel Optimizasyon Algoritmaları, Yapay zeka.

Yapay zekâ ile veri odaklı taşınmaz değerleme: Kentsel dönüşüm perspektifi

[1,*]Mustafa Hüsrevoğlu, [1]Aslı Bozdağ
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Harita Mühendisliği Bölümü
[*]mhusrevoglu@ohu.edu.tr

Özet: Kentsel dönüşüm uygulamalarında taşınmazın mevcut özelliklerine karşılık dönüşüm sonrası kazanacağı özelliklerine yönelik bir değer verilmesi gerekmektedir. Bu değerin belirlenmesinde pek çok etken yer almaktadır. Bu etkenler; arazi özellikleri ve bunun göreceli ifadeleri, mevzuat ve teknik hesaplamalar olarak ifade edilebilir. Arazi özellikleri coğrafi boyutu dâhilinde niceliksel olması ile daha kesin sonuçlara sahipken, göreceli ifadeler; insan algısının, duygularının, sosyal-kültürel yapısının ve ekonomik statüsünün bir sonucu olarak taşınmazlara yansımaktadır. Mevzuat etkeni arazi üzerindeki hukuksal zeminin ve siyasal değişimin etkisi ile değere yansımaktadır. Teknik hesaplamalar ise taşınmaz üzerindeki değerin eşit veya daha iyi olasılıkla eş değer dağılımına yönelik matematiksel modelleme çabalarını ifade etmektedir. Bu etkenler taşınmaza ait tüm özelliklerin yansıtılamaması, mevzuatın bütüncül olmaması, kullanılan hesaplama tekniklerin eş değer bir sonuç üretememesi yönüyle sıklıkla eleştirilmektedir. Son yıllarda gelişen bilgi teknolojileri ile taşınmazlara ilişkin veri altyapısının aynı dijital platformlarda toplanması, saklanması ve mekânsal olarak analiz edilmesi gerçekleştirilebilmektedir. Bununla birlikte büyük veri alt yapısının oluşturulması ile bir mahalle, bir bölge veya bir kent için değerleme sağlanabilmektedir. Özellikle yapay zekâ tekniklerinin gelişmesiyle beraber büyük veri alt yapısı ile nesnel, tarafsız ve gerçekçi hesaplamalar yapılabilmektedir. Bu çalışmada, kentsel dönüşüm uygulamalarında taşınmaz değerleme sürecinde olması gereken veri alt yapısı ortaya konularak, yapay zekâ tekniklerinin kullanımına yönelik hesaplama teknikleri ifade edilecektir. Kentsel dönüşümde maliyetli, uzun zaman ve emek gerektiren değerleme süreci yerine veri ve yapay zekâ odaklı planlamanın önemi ve dönüşümde yer alan tüm aktörler adına somut faydaları ortaya konulacaktır.

Anahtar Kelimeler: Kentsel Dönüşüm, Makine Öğrenmesi, Taşınmaz Değerleme, Yapay Zekâ, Yönetişim.

Effect of operating parameters on sulfur removal from Low-Grade coal by ultrasonic treatment

[1,*]Ö.Y.TORAMAN
[1] Nigde Ömer Halisdemir University, Faculty of Engineering, Mining Engineering Department
[*]otoraman@ohu.edu.tr

Abstract: This paper presents an attempt of using a laboratory type, high power ultrasonic generator to clean a low rank-medium sulfur coal sample in the presence of sodium hydroxide (NaOH) solutions. The tests were conducted at various ultrasonic treatment times, NaOH concentration, and solid ratio of slurry. Temperatures of the slurry atmosphere during ultrasonic treatment were recorded at different NaOH concentrations and treatment times. The study showed satisfactory removal of sulfur (~37%) from the coal samples in optimal conditions 20~40 g L^{-1} slurry concentration, 0.5 mol L^{-1} NaOH concentration and 10 min. treatment time.

Keywords: Coal, Sulfur removal, Alkali media, Ultrasonic treatment

Tarihi yapılarda biyolojik bozunma etkileri: Niğde yöresinden örnekler

[1,2]*Mustafa Korkanç, [3]Ahmet Savran
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Jeoloji Mühendisliği Bölümü 51240, Niğde/ Türkiye
[2]Niğde Ömer Halisdemir Üniversitesi Afet Eğitim ve Yönetimi Uygulama ve Araştırma Merkezi 51240, Niğde/ Türkiye
[3]Niğde Ömer Halisdemir Üniversitesi Fen Edebiyat Fakültesi Biyoloji Bölümü (Emekli Öğretim Üyesi)
***mkorkanc@ohu.edu.tr**

Özet: Kaya yüzeylerinde, atmosfer ve kaya arasındaki etkileşim süreçlerine bağlı olarak zamanla değişiklikler meydana gelmektedir. Tarihi yapılar üzerinde kalıcı olumsuz etkiye sahip doğal koşullardan biri de biyolojik faktörlerdir. Bu faktörlerin etkileri sürekli ve çok yavaş olduğundan alınması gereken önlemler de çoğunlukla ihmal edilmektedir. Birincil biyolojik etki, yapı üzerinde yetişen ve yapıya zarar veren bitkilerdir. Çalışma alanı olarak seçilen, geçmişten günümüze kadar birçok medeniyete ev sahipliği yapmış olan Orta Anadolu'da yer alan Niğde bölgesinde önemli tarihi yapılar bulunmaktadır. Bu çalışmada, tarihi yapılar üzerinde meydana gelen ve bu yapılara zarar veren biyolojik etkileri belirlemek amacıyla farklı taşlardan inşa edilmiş 3 tarihi yapı belirlenmiştir. Öncelikle, bu yapılarda kullanılan taşların taş cinsleri tanımlanmış, daha sonra yüzey pürüzlülüğü ile ilgili çalışmalar yapılmıştır. Taş türlerinin, yapı üzerindeki konumlarının ve taşın yüzey pürüzlülüğünün bitki gelişimi üzerinde büyük etkisi olduğu bulunmuştur. Terk edilmiş kiliseler yüksek dayanımlı taşlardan inşa edilmiş olmasına karşın, yüzey pürüzlülüğü yüksek, yatay veya düşük eğimli kısımlarda kullanılan taşlarda ve arasındaki boşluklarda yetişen otsu ve odunsu bitkilerin çatı kaplamasına önemli zararlar verdiği görülmüştür.

Anahtar Kelimeler: Biyolojik bozunma, Niğde, Tarihi yapı, Yüzey pürüzlülüğü

AWEI ve Otsu eşiğine dayalı tam otomatik Kara–Su ayrımı ile kıyı çizgisi türetimi: Karataş Gölü'nün (Burdur) 1985–2025 zamansal analizi

[1,*]Münevver Gizem Gümüş, [1]Kutalmış Gümüş
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Harita Mühendisliği Bölümü
[*]gizemkisaaga@ohu.edu.tr

Özet: Bu çalışma, Google Earth Engine (GEE) bulut tabanlı hesaplama ortamında Landsat Koleksiyon-2 (Seviye-2) uydu verileri kullanılarak geliştirilen tam otomatik bir kara–su ayrım yöntemini sunmaktadır. Yöntem, Otomatik Su Çıkarım İndeksi (AWEI) ile Otsu eşikleme yaklaşımını birleştirmekte; süreç, bulut ve doygunluk maskelerinin uygulanması, radyometrik düzeltmeler, mevsimsel medyan kompozitlerin oluşturulması, AWEI hesaplaması, Canny tabanlı Otsu eşikleme ve bağlı bileşen analizi adımlarıyla ilerlemektedir. Bu işlem hattının sonunda kıyı çizgileri otomatik olarak vektörleştirilerek SHP formatında dışa aktarılmıştır. Uygulama alanı olarak Burdur ili sınırlarında yer alan Karataş Gölü seçilmiş; 1985–2025 dönemi için göl yüzey alanı değişimleri analiz edilmiştir. Bulgular, AWEI tabanlı yaklaşımın özellikle gölge ve düşük yansıtımlı alanlarda, NDWI ve MNDWI gibi klasik indislerin neden olduğu hatalı sınıflamaları büyük ölçüde azalttığını ortaya koymuştur. Ayrıca, elde edilen sonuçlar bölgedeki belgelenmiş kuraklık eğilimleri ile uyumlu bulunmuş ve yöntemin kuraklık göstergelerinin uzun dönemli izlenmesi için güvenilir bir çerçeve sunduğu gösterilmiştir.

Anahtar Kelimeler: AWEI, Google Earth Engine, Kıyı çizgisi, Karataş Gölü, Otsu eşikleme

Predictive Modelling of Geometallurgical Variables at Tarkwa Mine, Southwestern Ghana

[1,*]Joseph Adusei, [1]Emmanuel Daanoba Esunkari, [3]Emmanuel Addo Jr, [1]Anthony Ewusi
[1]University of Mines and Technology GH
[2]TEX FZCO AE
***kojoadusei@gmail.com**

Abstract: In seeking to improve efficiency in the mine to mill process, mining companies are incorporating ore processing variables during ore planning and scheduling stages to improve decision making. Therefore, the accurate modelling of these ore processing variables has become more critical. This case study presents a D-vine copula modelling process applied to predict recovery (Rec) from three geometallurgical variables, that is Bond Work index test (BWi), resistance to abrasion and breakage index (A*b) and semi-autogenous grinding (SAG) power index test (Spi), using a dataset consisting of 775 diamond drill core samples of the four geometallurgical variables from Tarkwa Mine in Ghana. The distributions of the four variables were used to create a geometallurgical model to predict values of Rec based on SPI, BWi, and A*b using a 10-D version of copula-based quantile functions, which can be integrated in the mine planning and scheduling process. The module produced an average predicted recovery of 89.26% compared to an observed average recovery of 88.64%. A mean absolute error of 4.41 was obtained indicating an acceptable module performance considering the observed recovery values, which suggests that the model's predictions closely align with the observed values. This modelling framework enables the creation of a geometallurgical block model that not only improves the prediction of metallurgical variables but also significantly improves the integration of geological and metallurgical information, thereby optimizing processing outputs, project revenue and cash flows for mining companies.

Keywords: Geometallurgy, D-vine copula, predictive modelling, mining, correlation, prediction.

Oligo/miyosen yaşlı kurtulmuştepe formasyonu'nun (aktoprak havzası, niğde, orta anadolu, türkiye) gölsel sedimanların jeolojik, mineralojik, jeokimyasal özellikleri

[1,*]Ali GüreL, [1]Ali Tümüklü
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Jeoloji Mühendisliği Bölümü
***agurel@ohu.edu.tr**

Özet: Oligo/Miyosen yaşlı Kurtulmuştepe Formasyonu, Aktoprak Havzası'ndaki akarsu ve sığ göl ortamı sedimanlarını temsil eder. Bu birim, ince tabakalı beyaz marn, beyaz kireçtaşı masifleriyle ardalanmalı olarak ve kırmızı renkli çamurtaşıyla birlikte bulunur üst kesime doğru kumtaşı ve çörtlü kireçtaşı tabakalarına geçer ve Ulukışla/Niğde'nin güneyinde Zeyvegediği anhidritinin üzerine gelir. Daha güneyde, Aktoprak ve Yeniyıldız köyleri arasındaki alanda, bu formasyon Geç Kretase yaşlı ofiyolitik temel kayaçların üzerine yerleşmiştir ve marn, kireçtaşı, kumtaşı ve çamurtaşı ardalanmasından oluşur. Bu birimler polarize ışık mikroskobu, X-ışını difraktometrisi, taramalı elektron mikroskobu ve enerji dağılımlı analiz (SEM-EDX) ile kimyasal analiz (ICP-MS) yöntemleri kullanılarak incelenmiştir.
Smektit havzanın güney kesiminde baskın kil minerali iken, Kurtulmuştepe Formasyonu'nun çamurtaşı çökeltilerinde kuzeye doğru paligorsgite miktarı nispeten artmaktadır. Marn birimleri mikritik dokular sergiler; kuruma çatlakları ve gözeneklerde mikrosparitik kalsit kristalleriyle birikte paigorgit baskındır, ayrıca vadose çimentoları ve organik madde (gastropodlar, ostrakodlar, bitki sporları, algler ve çift kabuklu parçalardan zengin bir topluluk) içerir.
Marn örnekleri yüksek CaO ve kızdırma kaybı (LOI) değerleriyle karakterizedir; çamurtaşı örnekleri ise başlıca SiO_2, Al_2O_3+Fe_2O_3+MgO, LOI ve nispeten yüksek CaO içerir, bu da feldispat, kuvars ve kalsit ile ilişkili smektit ve paligosgit varlığını ortaya koyar. Çamurtaşlarında baryum (Ba) ve rubidyum (Rb) değerleri marnlara göre nispeten yüksek ve sabittir. K_2O ile Rb+Ba arasında gözlenen pozitif korelasyon, feldispat gibi K içeren minerallerin varlığını yansıtmaktadır. Saha verileri, mineralojik ve jeokimyasal analizler temel alındığında, paligorsgit otijenik olarak ya kalsitle birlikte ortak çökelme ile kalsifikasyon sırasında ya da detritik smektitin dönüşümüyle veya süpersaturasyon koşullarında doğrudan çökelme ile oluştuğu düşünülmektedir.

Anahtar Kelimeler: Aktoprak Havzası, İllit ve Klorit, Oligo/Miyosen, Paligoskit, Smektit,

Geological, mineralogical, and geochemical properties of lacustrine sediments of the Oligo/Miocene Kurtulmuştepe formation (Aktoprak basin, Nigde, Central Anatolia, Turkiye)

[1,*] Ali GüreL, [1]Ali Tümüklü
1Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Geological Engineering 51240, Niğde/Turkey
***agurel@ohu.edu.tr**

Abstract: The Oligo/Miocene-aged Kurtulmuştepe Formation represents fluvial and shallow lacustrine deposits within the Aktoprak Basin. This unit consists of thinly bedded white marls intercalated with massive white limestones and red mudstones, passing upward into sandstone and cherty limestone layers. It overlies the Zeyvegediği

anhydrite south of Ulukışla/Niğde. Further south, between the villages of Aktoprak and Yeniyıldız, the formation rests unconformably on Late Cretaceous ophiolitic basement rocks and comprises alternations of marl, limestone, sandstone, and mudstone.
These lithologies were examined using polarized light microscopy, X-ray diffraction (XRD), scanning electron microscopy coupled with energy-dispersive X-ray analysis (SEM-EDX), and inductively coupled plasma mass spectrometry (ICP-MS).
Smectite is the dominant clay mineral in the southern part of the basin, whereas the amount of palygorskite gradually increases northward within the mudstone sediments of the Kurtulmuştepe Formation. Marl units exhibit micritic textures; desiccation cracks and pores are filled with microsparitic calcite crystals, where palygorskite is also abundant. In addition, vadose cements and organic remains (gastropods, ostracods, plant spores, algae, and bivalve fragments) are commonly observed.
Marl samples are characterized by high CaO and loss on ignition (LOI) values, whereas mudstone samples contain high SiO_2, Al_2O_3 + Fe_2O_3 + MgO, LOI, and relatively high CaO contents, revealing the coexistence of feldspar, quartz, and calcite associated with smectite and palygorskite. Barium (Ba) and rubidium (Rb) contents in mudstones are relatively high and uniform compared to marls. The positive correlation observed between K_2O and Rb + Ba indicates the presence of K-bearing minerals such as feldspar.

Keywords: Aktoprak Basin, Illite and Chlorite, Oligo/Miocene, Palygorskite, Smectite,

GNSS tabanlı RTK uygulamalarında teknik ve çevresel parametrelerin karşılaştırmalı analizi

[1,*]Kutalmış Gümüş, [1]Cahit Tağı Çelik, [1]Münevver Gizem Gümüş
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Harita Mühendisliği Bölümü
[*]kgumus@ohu.edu.tr

Özet: Bu çalışma, GNSS tabanlı RTK uygulamalarında ölçüm doğruluğunu etkileyen veri formatları, cihaz ayarları, uydu kombinasyonları ve çevresel faktörleri kapsamlı biçimde değerlendirmeyi amaçlamaktadır. İlk olarak, RTK uygulamalarında kullanılan RTCM ve CMR/CMR+ veri formatları; ölçüm kolaylığı, hız ve birlikte çalışabilirlik açısından karşılaştırılmıştır. Daha sonra Network RTK uygulamalarında cihaz ayarlarının teknik rolü incelenmiş ve multipath azaltma, Co-OP Tracking, L2C sinyal desteği ile kapalı alan performansı gibi parametrelerin doğruluk ve güvenilirlik üzerindeki etkileri değerlendirilmiştir. Çalışmada ayrıca yalnızca GPS ile GPS+GLONASS kombinasyonlarının kullanımı ele alınmış ve farklı sistem kombinasyonlarının konum doğruluğuna katkıları ortaya konmuştur. Türkiye'deki Niğde Ömer Halisdemir Üniversitesi Merkez Yerleşkesi'nde yürütülen saha çalışmaları kapsamında yapraksız, tomurcuklu ve yapraklı dönemlerde yapılan gözlemler aracılığıyla bitki örtüsü yoğunluğu, gökyüzü görüş açıklığı ve su yüzeyleri gibi çevresel faktörlerin konumsal doğruluk üzerindeki etkileri analiz edilmiştir. Elde edilen bulgulara göre, bitki örtüsü, gökyüzü görüş kısıtlılığı ve su yüzeyleri RTK doğruluğunu olumsuz etkilemektedir. Özellikle yapraklı dönemlerde ve ağaç altı koşullarında hatalar artmakta, ancak jalon yüksekliğinin artırılması bu olumsuz etkiyi önemli ölçüde azaltmaktadır. GPS tek başına belirli bir doğruluk sağlasa da GPS+GLONASS entegrasyonu, zorlu koşullarda daha kararlı ve güvenilir sonuçlar sunmaktadır. Veri formatları açısından CMR+ açık alanlarda düşük hata değerleri sağlarken, RTCM kapalı ve yarı kapalı alanlarda daha dengeli ve güvenilir performans göstermektedir. Bununla birlikte, multipath azaltma, Co-OP Tracking, L2C sinyali ve kapalı alan modu gibi cihaz optimizasyonları ölçüm doğruluğunu artırarak hata oranlarını düşürmektedir. Sonuç olarak elde edilen veriler, GNSS tabanlı RTK uygulamalarında hem teknik ayarların hem de çevresel koşulların ölçüm kalitesinde belirleyici olduğunu ortaya koymaktadır.

Anahtar Kelimeler: CMR+, DOĞRULUK, GNSS, RTK, RTCM

A landslide susceptibility modeling study for Niğde province using the frequency ratio method based on the google earth engine

[1,*]Münevver Gizem Gümüş, [2]Ceren Yağcı, [1]Kutalmış Gümüş
[1]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Surveying Engineering
[2]Osmaniye Korkut Ata University, Faculty of Engineering, Department of Surveying Engineering
[*]gizemkisaaga@ohu.edu.tr

Abstract: This study was conducted using the Frequency Ratio (FR) method and the Google Earth Engine (GEE) platform to determine the spatial distribution of landslide susceptibility in Niğde Province. Parameters such as slope, aspect, land cover, and precipitation were obtained from global remote sensing datasets (SRTM, CORINE 2018, CHIRPS), processed in the GEE environment, normalized, and reclassified using FR coefficients. The results obtained were combined with equal weighting to create a Landslide Susceptibility Index (LSI). The model outputs identified areas with high susceptibility, particularly in the districts of Bor, Çamardı, and Ulukışla, demonstrating the potential for rapid, low-cost, and repeatable analysis using GEE in environments with limited field data. Twelve percent of the study area is classified as very high susceptibility, 18% as high susceptibility, and 26% as medium susceptibility. The accuracy of the model was compared with the MTA landslide inventory, and the AUC value was calculated as 0.854 ($p = 0.000$) based on the ROC curve. This finding demonstrates the model's strong classification performance and statistical significance. In conclusion, the study contributes to determining landslide risk in areas with data constraints and to developing decision support mechanisms.

Keywords: Frequency Ratio, GEE, Landslide Susceptibility, ROC Analysis, Remote Sensing

Metal Tozlarından Alüminyum Oksit (Al2O3) ve Çinko Oksit (ZnO) Boyut Dağılım Özellikleri

[1,*]Metin Uçurum
[1]Bayburt üniversitesi
***mucurum@bayburt.edu.tr**

Özet: Sanayide kullanılan hammaddelerin fiziksel, kimyasal, biyolojik ve fiziko-kimyasal özelliklerinin bilinmesi, üretim proseslerinde kullanılabilmeleri için teknik bir zorunluluktur. Endüstride üretimin ana girdilerinden olan hammaddeler incelendiğinde çoğunun fiziksel yapısının toz formatında olduğu görülmektedir. Toz, bütünün mekanik (kırma, öğütme), kimyasal, elektroliz ve atomizasyon gibi farklı teknik ve teknolojiler ile daha küçük parçalara (partiküllere) ayrılarak üretilen malzemelerdir. Bunların en önemli özellikleri arasında boyutu, şekli ve yoğunluğu gelmektedir. Toz malzemelerin özelliklerinden boyut ve boyut dağılım özellikleri için ayrı bir parantez açılması gerekmektedir. Toz partiküllerin boyut değerlerinin ortaya konulmasında çoğunlukla ortalama tane boyutu (average particle size) olarak bilinen d50 değeri kullanılmaktadır. Bununla birlikte en iri (maksimum) tane boyutu için d80, d90, d100, en küçük (minimum) boyutu belirtmek için ise d10, d20, d30 tercih edilebilmektedir. Toz malzemelerin kullanıldığı proseslerde boyuta bağlı sorunların oluşmaması için bakılması gereken bir özellik de eş boyutluluk (üniform) özelliğidir. Toz malzemelerin bu özelliklerinin belirlenmesi için bilim insanları tarafından ortaya konulmuş bir çok ampirik yaklaşım söz konusudur. Alümina oksit (Al2O3) farklı boyutlarda ve saflıklarda üretilen önemli bir hammaddedir. Çinko oksit (ZnO) ise diğer bir inorganik metal bileşik olup bu metal tozları kauçuk, plastik, frit, cam, refrakter ve aşındırıcı sanayinde başta olmak üzere bir çok sanayi dalında kullanılmaktadır. Yapılan bu çalışmada; sanayide geniş kullanım alanına sahip Al2O3 ve ZnO metal tozlarının boyut dağılım özellikleri irdelenmiştir.

Anahtar Kelimeler: Toz malzeme, boyut ve boyut dağılım özellikleri, Al2O3, ZnO

Integrating geochemical, geostatistical and machine learning techniques in delineating exploration vectors for critical mineral deposits: Advances, applications, and future directions

[1],*Joseph Ndago Amoldago, [1,2] Emmanuel Daanoba Sunkari
[1]Sir Padampat Singhania University, Faculty of Integrated and Advanced Technology, Department of Mining Engineering
[2]University of Johannesburg, Faculty of Science, Department of Chemical Sciences
***amoldagojosph122@gmail.com**

Abstract: The global transition toward decarbonization and advanced technologies has intensified demand for critical minerals such as lithium, cobalt, graphite, and rare earth elements (REEs), often found in geologically complex and concealed terrains where conventional exploration methods are limited. This study presents a systematic review of peer-reviewed publications (2010–2025), conducted under PRISMA 2020 guidelines, to evaluate the integration of geochemical, geostatistical, and machine learning (ML) techniques in critical mineral exploration. It proposes a methodological framework that combines compositional data analysis, probabilistic simulation, and interpretable ML models to improve prospectivity mapping and reduce uncertainty. The framework is demonstrated across diverse geological settings, including sediment-hosted cobalt systems, carbonatite-hosted REEs, and lithium–cesium–tantalum (LCT) pegmatites, where it aids in resolving mineralogical complexity and detecting obscured alteration halos. Key findings reveal that geochemical data often require log-ratio transformations to address compositional closure before multivariate analysis can identify meaningful element associations. Anomaly detection is improved using advanced data cleaning and mapping techniques. Spatial patterns and uncertainties in mineral distribution are analyzed with specialized mapping tools. On-site data collection is enhanced through portable instruments, digital mapping, satellite imagery, and ML-based classification. Case studies from Africa, Asia, Europe, South America, and Australia demonstrate how this integrated framework improves target vectoring, reduces speculative drilling, and enhances resource estimation. The review also discusses limitations such as data sparsity, scale mismatches, and interpretability challenges. It recommends integrating environmentally friendly, multi-scale geochemical, geostatistical, and ML techniques in exploration workflows to accelerate sustainable discovery and strengthen resilient supply chains for critical minerals. This multidisciplinary roadmap bridges methodological innovation with geological insight for next-generation exploration.

Keywords: critical minerals; integrated exploration techniques; PRISMA framework; sustainable resource discovery; mineral exploration

Plastik geri dönüşümünde kalsit mineralinin rolü ve sürdürülebilir döngüsel ekonomiye katkısı üzerine bir araştırma

[1]Esra Eren, [2,*]Serkan Çayırlı
[1]Niğde Ömer Halisdemir Üniversitesi, Fen Bilimleri Enstitüsü, Maden Mühendisliği Anabilim Dalı
[2]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Maden Mühendisliği Bölümü
[*]scayirli@ohu.edu.tr

Özet: Bu çalışma, Türkiye'deki plastik geri dönüşüm sektörünün mevcut durumunu detaylı bir şekilde analiz ederek, kalsit mineralinin (CaCO3) plastik üretimi ve geri dönüşüm süreçlerindeki kritik rolünü vurgulamaktadır. Araştırmada, küresel bir sorun haline gelen plastik atıkların çevresel etkilerinin önlenmesi ve döngüsel ekonomiye geçiş sürecinde kalsit mineral katkısının teknolojik ve çevresel boyutları incelenmiştir. Özellikle geri dönüştürülmüş plastiklerin kalitesini artırmada kalsit mineralinin takviye edici rolü ele alınmış, Türkiye'nin zengin mineral rezerv avantajları ve sektörel entegrasyon potansiyeli bütünsel bir perspektifle değerlendirilmiştir.

Araştırmalar, kalsit ilavesinin geri dönüştürülmüş polimerlerin mekanik özelliklerini (örneğin, \çekme modülü) ve termal kararlılıklarını önemli ölçüde iyileştirdiğini, aynı zamanda işlenebilirliği artırarak ve maliyetleri düşürerek ekonomik verimliliği yükselttiğini göstermektedir. Ancak, makalede belirtilen Türkiye'nin kalsit rezerv ve üretim verilerinin mevcut kaynaklarla uyuşmadığı tespit edilmiştir; bu durum, ülkenin kaynak potansiyeli ile fiili üretim performansı arasındaki fırsat boşluğunu ortaya koymaktadır. Kalsitin stratejik kullanımı, plastik atık sorununa sürdürülebilir bir çözüm sunarken, Türkiye'nin döngüsel ekonomi hedeflerine ulaşmasını hızlandırabilir ve küresel rekabet gücünü artırabilir.

Anahtar Kelimeler: Döngüsel ekonomi, Kalsit minerali, Mineral katkı maddeleri, Plastik geri dönüşüm, Sürdürülebilir üretim.

Impacts of illegal mining on soil quality in Ghana: Geochemical alterations, ecological consequences, and sustainable Remediation strategies

[1],*Enoch Frimpong, [1,2] Emmanuel Daanoba Sunkari, [1]Rahinatu Abdul-Rahman
[1]Sir Padampat Singhania University, Faculty of Integrated and Advanced Technology, Department of Mining Engineering
[2]University of Johannesburg, Faculty of Science, Department of Chemical Sciences
***enopong3038@gmail.com**

Abstract: Artisanal and small-scale mining (ASM), particularly illicit activities referred to as galamsey in Ghana, has inflicted significant environmental harm in several ways. This review examines the impacts on soil quality, focusing on the principal ASM-endemic areas in Ghana. It also explores the occurrence of biodiversity loss, accelerated soil erosion, and the fragmentation of critical ecological networks, and examines sustainable methods to remediate the geochemical degradation caused by mining on soils. The key findings indicate that geochemical deterioration is severe, characterized by elevated concentrations of potentially toxic elements such as mercury (Hg), lead (Pb), arsenic (As), and cadmium (Cd), frequently exceeding the thresholds established by the World Health Organization and Ghana's Environmental Protection Agency. The soil is increasingly becoming acidic and depleting organic matter, adversely affecting current agricultural output and jeopardizing long-term food security and ecosystem resilience. Three sustainable soil remediation methods are found to be efficient: (1) phytoremediation employing indigenous hyperaccumulator species for metal extraction, (2) biochar amendments to sequester contaminants and improve soil quality, and (3) community-driven land restoration projects that amalgamate traditional ecological knowledge with contemporary conservation strategies. The study emphasizes the necessity of combining thorough geochemical risk assessments with comprehensive community involvement as a fundamental basis for effective remediation. This holistic strategy guarantees that restoration efforts are scientifically sound and socially sustainable, promoting environmental recovery and ensuring long-term stability.

Keywords: community-led restoration, ecological degradation, geochemical risk assessment illegal mining, phytoremediation.

Kapadokya bölgesindeki yeraltı soğuk hava deposu kazılarında risk değerlendirmesi ve kazı performansı iyileştirme önerileri

[1,*]Ramazan Çomaklı
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Maden Mühendisliği Bölümü
[*]rcomakli@ohu.edu.tr

Özet: Kapadokya Bölgesi, benzersiz jeolojik yapısı ve tarihsel önemiyle dikkat çekerken, bölgedeki yeraltı yapıları da bölgenin kültürel mirasının önemli bir parçasıdır. Bölgede farklı amaçlar için kazılmış yeraltı yapıları bulunmakla birlikte günümüzde özellikle soğuk hava deposu olarak yapılan büyük ölçekli kazılar öne çıkmaktadır. Soğuk hava deposu kazılarında karşılaşılan başlıca zorluklar arasında, yapıların yapısal zayıflıkları, çevresel faktörler (su, nem, hava koşulları) ve jeolojik özellikler yer almaktadır. Bu parametreler kazı sürecindeki güvenliği ve yapısal bütünlüğü tehdit edip mekanize kazıcı performansını olumsuz etkileyebilmektedir. Bu çalışma, Kapadokya'daki soğuk hava depolarının kazı süreçlerinde karşılaşılan riskleri ve bu risklerin en aza indirilmesine ve kazı performansının iyileştirilmesine yönelik önerileri içermektedir. Ayrıca, daha verimli bir kazı için formasyon ve kazıcı özelliklerine bağlı olarak nelere dikkat edilmesi gerektiği detaylı olarak ele alınmıştır. Elde edilen sonuçlar, bölgede daha güvenli ve verimli soğuk hava deposu kazıları için bilimsel ve mühendislik yaklaşımlarının entegrasyonunun ne denli önemli olduğunu ortaya koymaktadır.
Anahtar Kelimeler: Kapadokya bölgesi, Kazı performansı, Soğuk hava depoları, Risk değerlendirmesi.

Risk assessment and excavation performance improvement suggestions for underground cold storage excavations in the Cappadocia region

[1,*]Ramazan Çomaklı
[1]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Mining Engineering
***rcomakli@ohu.edu.tr**

Abstract: The Cappadocia Region is notable for its unique geological structure and historical significance, while its underground structures are also a significant part of the region's cultural heritage. While underground structures have been excavated for various purposes, large-scale excavations for cold storage are particularly prominent today. Among the primary challenges encountered in cold storage excavations are structural weaknesses of the structures, environmental factors (water, humidity, weather conditions), and geological features. These parameters can threaten the safety and structural integrity of the excavation process and negatively impact mechanized excavator performance. This study examines the risks associated with excavating cold storage facilities in Cappadocia and proposes methods to mitigate these risks and enhance excavation performance. Furthermore, it provides a detailed overview of the factors that should be considered for more efficient excavation, depending on the formation and excavator characteristics. The results demonstrate the importance of integrating scientific and engineering approaches for safer and more efficient cold storage excavations in the region.

Keywords: Cappadocia region, cold storages, Excavation performance, Risk assessment.

NaCl ortamında asetik asit ile flotasyon tesis atıklarından metal kazanımında katı oranı ve liç sıcaklığın etkisi

[1,*]Emine YOĞURTCUOĞLU
[1]Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Maden Mühendisliği Bölümü
[*]eyogurtcuoglu@ohu.edu.tr

Özet: Bu çalışmada oksitli flotasyon atıklarının değerlendirilerek metal kazanımı incelenmiştir. Çalışmada organik bir asit olan asetik asit NaCl ortamında kullanılmış, katı oranı parametresinin ve liç sıcaklığının metal kazanımları üzerindeki etkileri araştırılmıştır. Numune yoğun olarak oksit içerikli olup, kurşun-çinko atıklarını barındırmaktadır. Liç deneyleri sabit 0,5 M asetik asit ve 200 g/L NaCl konsantrasyonları ile farklı katı oranlarında (%5–40) ve farklı sıcaklıklarda (25-95℃) yürütülmüştür. Sonuçlar, en yüksek kazanımların %5–10 katı oranında elde edildiğini göstermiştir. Katı oranı arttıkça kazanımlar belirgin şekilde azalmıştır. Liç sıcaklığında ise durum lineer bir artış şeklinde gerçekleşmiştir. Bu sonuçlar, çevre dostu organik asitlerle oksitli flotasyon atıklarının değerlendirilmesinde katı oranının kritik bir parametre olduğunu ortaya koymaktadır.

Anahtar Kelimeler: Asetik asit, Flotasyon atıkları, Katı oranı, Liç sıcaklığı, NaCl

Hydrogeologıcal research for groundwater in the environment of Konjuh - Municıpality of liplan

[1,*]Blertë Retkoceri, [2]Argjend Hajra
[1]Goce Delčev University of Štip, Faculty of Natural and Technical Sciences, Štip, Republic of North Macedonia
[2]Ss. Cyril and Methodius University in Skopje, Faculty of Civil Engineering, Skopje, Republic of North Macedonia
***blertaretkoceri@hotmail.com**

Abstract: This study presents the results of hydrogeological research carried out in the Konjuh area within the Municipality of Lipjan, Kosovo, aimed at assessing groundwater resources for potable water supply. The research involved structural-exploratory drilling and the construction of two wells (P-1 and P-2), followed by comprehensive hydrodynamic testing to evaluate the lithological composition, aquifer characteristics, and sustainable groundwater extraction potential. Both wells were drilled using the rotary method with bentonite mud circulation, and sediment samples were systematically collected at one-meter intervals for detailed lithological analysis. Hydrogeological parameters, including static water levels and discharge capacities, were determined through step- drawdown tests. The results indicate optimal discharge rates ranging from 6.0 to 7.0 liters per second, with recommended maximum drawdowns of 22.0 to 25.0 meters, ensuring sustainable aquifer exploitation. The findings highlight favorable conditions for the development of a potable water supply system and underscore the importance of regular groundwater level monitoring to maintain long-term hydrogeological balance. This study provides valuable data and practical recommendations for local water resource management and future hydrogeological investigations in similar sedimentary basin environments.

Keywords: Groundwater, hydrogeological research, aquifer system, step drawdown test, sustainable water management

12 MATHEMATICS

On a generalized Gibson–Pickering model: Soliton solutions, conservation laws, and modulation instability in plasma physics

[1]Arzu Akbulut, [2]Ulviye Demirbilek, [3]Ali Danladi, [4]Funda Turk, [5,*]Ercan Çelik, [6]Hasan Bulut
[1]Bursa Uludağ University, Faculty of Arts and Science, Department of Mathematics
[2]Mersin University, Faculty of Science, Department of Mathematics
[3]Federal University, Department of Mathematics
[4]Bartın University, Faculty of Science, Department of Mathematics
[5]Kyrgyz-Turkish Manas University, Department of Applied Mathematics and Informatics, Djal
[6]Fırat University, Department of Mathematics
[*]ercan.celik@manas.edu.kg

Abstract: In this study, a fifth-order nonlinear partial differential equation (PDE) is analytically explored using two powerful solution techniques: Enhanced Modified Extended Tanh-Expansion Method (EMETEM) and Genaralized Riccati Equation Mapping Method (GREMM). These methods yield a rich set of exact solutions, including solitary and periodic wave profiles, which are crucial for understanding nonlinear wave propagation in various physical contexts. To investigate the dynamical properties of the system, a modulation instability (MI) analysis is performed, revealing that under certain parameter regimes, the system maintains spectral stability, indicating that small perturbations do not grow exponentially over time. Furthermore, conservation laws are established via the application of the new conservation theorem. The physical behavior and spatial evolution of the obtained solutions are illustrated through two-dimensional (2D), three-dimensional (3D), and contour visualizations. Overall, this research presents a comprehensive analytical framework that combines solution construction, stability assessment, and conservation analysis, contributing to the theoretical and applied understanding of nonlinear wave dynamics in mathematical physics.

Keywords: Enhanced modified extended tanh method, Genaralized Riccati equation mapping method, Soliton, Conservation law, Modulation instability.

Comprehensive Analysis of solutions, stability, and bifurcation in a generalized extended (2 + 1)-D Kadomtsev–Petviashvili equation

[1]Ulviye Demirbilek, [2]Arzu Akbulut, [3,*]Ercan Çelik
[1] Mersin University, Faculty of Science, Department of Mathematics
[2] Bursa Uludağ University, Faculty of Arts and Science, Department of Mathematics
[3] Kyrgyz-Turkish Manas University, Department of Applied Mathematics and Informatics, Djal
[*]ercan.celik@manas.edu.kg

Abstract: In this study, we derive new solutions for the equation of (2 + 1) dimensional using three methods: the modified extended tanh function method, the (m + 1/G′) expansion method and the modified Kudryashov method. These methods are commonly employed to describe the behavior of optical solitons in nonlinear media. By applying these techniques, we obtain exact analytical solutions that span a wide range of optical soliton solutions. To derive various types of soliton solutions, including rational, hyperbolic, and trigonometric functions, we utilize the balancing principle to investigate the dynamic behavior of the solitons. In addition, to improve the clarity of our findings, we present 3-D, 2-D, and contour graphs. Furthermore, we analyze the governing model with and without the perturbation term, conducting a detailed investigation within the framework of bifurcation and chaos theory.

Keywords: The modified extended tanh-function method, The (m+1/G′)-expansion method, The modified Kudryashov method, Sensitivity analysis, Bifurcation analysis.

Meme kanserinde matematiksel modelleme ve optimal kontrol stratejileri

[1,*]Mehmet Yavuz, [2]Fatma Özlem Öz
[1]Necmettin Erbakan, University, Faculty of Science, Department of Mathematics and Computer Sciences
[2]Kyrgyz-Turkish Manas University, Department of Applied Mathematics and Informatics
***mehmet.yavuz@manas.edu.kg**

Özet: Matematiksel modelleme yaklaşımları özellikle son yıllarda giderek önem kazanmıştır. Matematiksel modelleme birçok farklı alanda karar vericilere rehberlik etmeye devam etmektedir. Bu alanların en önemlileri arasında özellikle kanser ve türevleri, ekolojik sorunlar, bulaşıcı hastalıkların yönetimi ve av-avcı ilişkileri vb. biyolojik süreçlerin modellenmesinde etkili sonuçlar vermektedir. Bu bağlamda, bu çalışmanın odaklandığı kanser türü olan meme kanseri dünya çapında önemli bir sağlık sorunudur ve özellikle kadınlarda en ölümcül hastalıklar listesinde hala ilk sıralarda yer almaktadır. Bu nedenle kanserle mücadelede etkili stratejiler geliştirmek büyük önem taşımaktadır. Diğer yandan optimal kontrol stratejilerinin geliştirilmesi kanser tedavisinde önemli bir rol oynamaktadır. Bu stratejiler meme kanserinde tanıyı kolaylaştırmak ve hastaların tedaviye en iyi yanıtı vermesini sağlamak için tedavi protokollerini optimize etmeyi amaçlamaktadır. Bu çalışmada, hastalığın tanı ve tedavi süreçlerini içeren meme kanserinin kompartımanlı bir modeli geliştirilmiş ve modelin biyolojik önemini ortaya koymak için pozitiflik, sınırlılık, denge noktaları ve denge noktalarının kararlılığı gibi birçok matematiksel analiz gerçekleştirilmiştir. Ayrıca, model için temel üreme sayısı hesaplanmış ve model parametrelerinin bu sayıya ne kadar duyarlı olduğunu belirlemek için duyarlılık analizi yapılmıştır. Modeli temsil eden diferansiyel denklem sisteminde, tanı ve tedaviyi içeren kontroller, optimal kontrol teorisi dikkate alınarak sisteme uyarlanmıştır. Böylece klasik meme kanseri problemi, optimal bir kontrol problemine dönüştürülmüş ve kontroller hesaplanarak etkili stratejiler belirlenmeye çalışılmıştır. Bu bağlamda üç farklı strateji geliştirilmiş, sayısal simülasyonlar gerçekleştirilmiş ve meme kanseri üzerinde hangi stratejilerin daha etkili olduğu incelenmiştir. Sonuç olarak, üç kontrolün birlikte kullanıldığı stratejinin en etkili sonucu verdiği görülmüştür. Bu durum hem erken tanı hem de tedavinin birlikte kullanılmasının meme kanseri sağkalım oranlarını artırdığı şeklinde yorumlanabilir.

Anahtar Kelimeler: Meme Kanseri, Matematiksel Modelleme, Duyarlılık Analizi, Optimal Kontrol, Erken Tanı.

Mathematical Modelling and Optimal Control Strategies in Breast Cancer

[1,*]Mehmet Yavuz, [2]Fatma Özlem Öz
[1]Necmettin Erbakan, University, Faculty of Science, Department of Mathematics and Computer Sciences
[2]Kyrgyz-Turkish Manas University, Department of Applied Mathematics and Informatics
***mehmet.yavuz@manas.edu.kg**

Abstract: Mathematical modeling approaches have become increasingly important, especially in recent years. Mathematical modeling continues to guide decision-makers in many different fields. Among the most important of these fields, especially cancer and its derivatives, ecological problems, management of infectious diseases and predator-prey etc. give effective results in modeling biological processes. In this context, breast cancer, which is the type of cancer that this study focuses on, is a major health problem worldwide and is still on the list of the most deadly diseases, especially in women. Therefore, it is of great importance to developing effective strategies in the fight against cancer. On the other hand, developing optimal control strategies plays an important role in cancer treatment. These strategies aim to optimize treatment protocols in breast cancer to facilitate diagnosis and ensure the best response of patients to treatment. In this study, a compartmental model of breast cancer, including the diagnosis and treatment processes of the disease, is developed and many mathematical analyses, including positivity, boundedness, equilibrium points and stability of equilibrium points, are performed to demonstrate the biological significance of the model. In addition, the basic reproduction number for the model is calculated and sensitivity analysis is performed to determine how sensitive the model parameters are on this number. In the differential equation system representing the model, controls including diagnosis and treatment are adapted to the system by considering the optimal control theory. Thus, the classical breast cancer problem is transformed into an optimal control problem and effective strategies are tried to be determined by calculating the controls. In this context, three different strategies are developed, numerical simulations are performed and which strategies are more effective on breast cancer are examined. As a result, it is seen that the strategy in which the three controls are used together gives the most effective result. This can be interpreted as the use of both early diagnosis and treatment together increases the survival rates of breast cancer.

Keywords: Breast Cancer, Mathematical Modeling, Sensitivity Analysis, Optimal Control, Early Diagnosis.

Acknowledgement: This study was supported by The Scientific and Technological Research Council of Türkiye (TÜBİTAK).

Analytical solutions of the conformable Klein-Gordon equation

[1,]Nevriye Takımsu, [1,*]Güldem Yıldız
[1]Niğde Ömer Halisdemir University, Faculty of Sciences, Department of Mathematics
[*]guldem.yildiz@ohu.edu.tr

Abstract: The principal objective of this study is to derive analytical solutions for the nonlinear partial differential conformable Klein-Gordon equation, which has recently garnered interest across numerous physical domains. In this study, analytical solutions of the conformable Klein-Gordon equation are obtained using the Sardar-subequation method. Fourteen different solutions of the hyperbolic and trigonometric types, consistent with those documented in the literatüre, have been derived. In addition, 2D, 3D, and contour graphs have been produced to depict the dynamic behavior of particular derived solutions.

Keywords: Klein-Gordon Equation, Sardar-Subequation Method

Numerical solution of a parabolic problem with a non-smooth regular function

[2]Asan Omuraliev, [1,*]Peyil Esengul kyzy
[1]Kyrgyz State Technical University named after. I. Razzakova
[2]Kyrgyz-Turkish Manas University
[*]peyil.esengul@manas.edu.kg

Abstract: This problem pertains to a nonsmooth regular function asymptotically solving a solution. It is studied using the boundary layer method, where a boundary layer-type asymptotics is constructed, and the solution asymptotics include several boundary layer functions as components. This paper proposes a numerical method for solving such a problem.

Keywords: Numerical solution, asymptotic solution, parabolic problem, nonsmooth regular function.

Inverse problem of determining the kernel and the right-hand side for a class of integro-differential equations

[1,*]Kalyskan Matanova
[1]Kyrgyz-Turkish Manas University
[*]kalys.matanova@manas.edu.kg

Abstract: In many physical processes, especially those involving memory effects and weak dispersion, integro-differential equations of pseudoparabolic type become a powerful modeling tool. These equations are essential for describing systems where the evolution depends not only on current but also on accumulated past states. Extending these models naturally leads to inverse problems, which play a crucial role in numerous fields of science and engineering such as seismology, mineral exploration, biology, medical imaging, and computed tomography.
This work is devoted to the investigation of an inverse problem concerning the determination of an unknown kernel and the right-hand side of a fourth-order integro-differential pseudoparabolic equation with given initial and mixed homogeneous boundary conditions, as well as additional overdetermination conditions. By employing the method of integral equations and the Green's function, the inverse problem is reduced to a system of Volterra operator equations of the second kind. Using the contraction mapping principle, we establish sufficient conditions for the existence and uniqueness of a solution to the considered inverse problem.

Keywords: Inverse problem, integro-differential pseudoparabolic equation, Volterra operator equation, Green function, resolvent

On the influence of fredholm integral operator on convergence of approximations in the optimal control problem of oscillatory processes

[1,*]Elmira Abdyldaeva
[1]Kyrgyz-Turkish Manas University
[*]efa_69@mail.ru

Abstract: Problems of optimal control for processes described by integro-differential equations remain insufficiently studied, and the development of constructive methods for their solution represents a relevant challenge in the theory of optimal control of distributed parameter systems. In this area, the author has previously conducted studies on the solvability of nonlinear optimization problems of oscillatory processes described by the integro-differential equation with Fredholm integral operator. Sufficient conditions for the unique solvability of the nonlinear optimization problem were established, and an algorithm for constructing the complete solution was proposed.

The present article addresses the problem of constructing approximate solutions and analyzing their convergence. The focus is on studying the influence of the integral operator on the convergence rate of approximations. It is shown that the presence of the integral operator necessitates the construction of three types of approximations of the optimal process: approximation via the resolvent of the kernel of the integral operator, approximation by optimal controls, and finite-dimensional approximation. Accordingly, three types of approximations of the minimum value of the functional are also introduced. Sufficient conditions are provided for the convergence of approximations of the distributed and boundary vector optimal controls, the three types of optimal process approximations, and the corresponding approximations of the minimum value of the functional. Conditions for the contractiveness of the corresponding operator equation are established, and the convergence of the approximations of the optimal control, the optimal process, and the minimal value of the functional is proved.

Keywords: Approximations of complete solution, nonlinear optimization, convergence of approximations, vector distributed optimal control, Optimal processes, minimal value of functional

Stasyoner fazlı singüler parabolik problemin sayısal çözümü

[1,*]Ella Abylaeva, [2]Asan Omuraliev
[1] Kırgızistan-Türkiye Manas Üniversitesi, Fen Fakültesi, Uygulamali Matematik ve Enformatik Bölümü
[2]Kırgız Teknik Üniversitesi, Fen Fakültesi, Uygulamalı Matematik ve Enformatik Bölümü
***ella.abylaeva@manas.edu.kg**

Özet: Bu çalışma, fazın türevinin tek bir noktada sıfır olduğu, hızlı salınımlı serbest terimli singüler bir parabolik problemin sayısal çözümü için regularize edilmiş asimptotik bir yaklaşım geliştirmektedir. Fazın birinci türevinin sıfıra eşit olması, çözüm yapısında geçiş katmanlarını yaratmaktadır. Çözümün asimptotik açılımının; parabolik, iç, hızlı salınımlı ve köşe sınır tabakalı fonksiyonlarından oluştuğu gösterilmektedir. Köşe sınır katman fonksiyonları iki bileşenle temsil edilmektedir: ilki, parabolik sınır katman ile hızlı salınımlı sınır katman birleşimi, ikincisi ise parabolik ve iç sınır katman fonksiyonlarının birleşimidir.

Anahtar Kelimeler: Singüler Problemler, Asimptotik, Regülarize Edilen.

Numerical solution of a singularly perturbed parabolic problem with stationary phase

[1,*]Ella Abylaeva, [2]Asan Omuraliev
[1] Kyrgyz-Turkish Manas University, Faculty of Science, Department of Applied Mathematics and Informatics
[2] Kyrgyz Technical University, Faculty of Science, Department of Applied Mathematics and Informatics
***ella.abylaeva@manas.edu.kg**

Abstract: This work develops a regularized asymptotic approach for the numerical solution of a singularly perturbed parabolic problem with a rapidly oscillating free term, where the derivative of the phase vanishes at a single point. The vanishing of the first derivative of the phase induces transitional layers in the solution structure. It is shown that the asymptotic expansion of the solution consists of parabolic, inner, rapidly oscillating, and corner boundary layer functions. The corner boundary layer functions are represented by two components: the first combines the parabolic boundary layer with a rapidly oscillating boundary layer, while the second combines the parabolic and inner boundary layer functions.

Keywords: Singularly Perturbed Problems, Asymptotics, Regularization.

On upper bounds of $|H_{2,1}(f)|$ and $|H_{2,2}(f)|$ hankel determinants for some subclasses of univalent functions related with sine functions

[1,*]Muhammet KAMALİ
[1]Kyrgyz-Türkish Manas University, Department of Mathematics, Faculty of Sciences, Chyngz Aitmatov Avenue
***muhammet.kamali@manas.edu.kg**

Abstract: Let f be analytic in the open unit disk $\Omega = \{z \in C : |z| < 1\}$ and normalized so that $f(z) = z + a_2 z^2 + a_3 z^3 + \ldots$. Let $\beta \geq 0,\ p, q \in \mathbb{N}^* = \mathbb{N} \cup \{0\}$. We define the class of $S^*_{(\beta,p,q)}$ in the following way

$$S^*_{(\beta,p,q)} = \left\{ f \in S : \frac{D^{p+q}_{\beta} f(z)}{D^{p}_{\beta} f(z)} \prec 1 + \sin(z) \right\}$$

In this present article, our aim is to investigate the estimate of $|H_{3,1}(f)|$ for the subclass $S^*_{(\beta,p,q)}$ of analytic functions related with sine function.

Keywords: Analytic Functions, Coefficient Estimates, Subordination, Hankel Determinant, Sine Function.

AMS Classification 2010: 30C45, 30C50

13 MECHANICAL ENGINEERING

Development of commercial utensil washer machine design for green transformation

[1*]Zafer Kahraman, [1]Murat Hacı, [1]Soner Gürcü, [2,3]Hakan Serhad Soyhan
[1]Öztiryakiler Madeni Eşya San. Ve Tic. A.S, R&D Center
[2]Sakarya University, Mechanical Engineering Department
[3]Team-San Co., Sakarya University Technopark Company
[*]zkahraman@oztiryakiler.com.tr

Abstract: Commercial utensil washer machines, unlike commercial dishwashers, are widely used for washing a variety of large-sized kitchen products (pots/pans, tray, utensils, etc.). This study aimed to develop the designs of an innovative commercial utensil washer machine prototype that conserves natural resources, contributes to climate change and sustainability goals, and aligns environmental goals for low-carbon production, particularly in line with the Carbon Border Adjustment Mechanism (CBAM) for green transformation. The development of the uniquely designed commercial utensil washer machine prototype in accordance with international standards (EN 60335-1, EN 60335-2-58, etc.) has achieved benefits such as reducing water consumption by at least 20 liters per water change compared to an existing product of the same capacity, while also achieving at least 20% energy efficiency. The development of innovative product designs has also contributed to the Carbon Border Adjustment Mechanism efforts. Through studies based on R&D systematics, original designs for an innovative product were developed within the framework of industry-university collaboration.

Keywords: Utensil washer machine, Green transformation, Design

Numerical analysis and simulation of hydrogen production via high-temperature solid oxide electrolysis cells

[1,2]Mansur Mustafaoğlu, [1,2*]Muhammet Kaan Yeşilyurt, [3]Hülya Öztürk Doğan, [4]Hadi Ghasemi ZAVARAGH
[1]Atatürk University, Faculty of Engineering, Department of Mechanical Engineering
[2]Atatürk University, Institute of Science and Engineering, Department of Nanoscience Engineering
[3]Atatürk University, Technical Sciences Vocational School, Department of Chemistry
[4]Technical and Vocational University
[*]kaan.yesilyurt@atauni.edu.tr

Abstract: This study examines the potential of solid oxide electrolysis cells (SOECs) as a hydrogen production technology that operates at high temperatures and stands out in terms of energy conversion efficiency. Numerical modeling and multiphysics approaches provide a detailed analysis of the electrochemical, thermal, and mechanical processes occurring in SOEC systems. By determining the effects of parameters such as temperature distribution, current density, and gas flow paths on SOEC performance, the study highlights critical data for both increasing system efficiency and improving durability. Furthermore, an in-depth review of thermodynamic optimization, mechanical stress analysis, and renewable energy integration is addressed. The article stresses numerical simulations as not merely tools for analysis but also as catalysts of innovation. Artificial intelligence and machine learning based modeling methods significantly improve performance prediction, fault detection, and long-term durability analysis of SOEC systems. Open-source and commercial software significantly facilitate virtual prototyping and parameter optimization processes. The integration of computing power, AI algorithms, and cyber-physical systems accelerate the commercialization of SOEC technology and thereby play a key role in the transition to a carbon-neutral hydrogen economy.

Keywords: Solid Oxide Electrolysis Cell (SOEC), High Temperature Electrolysis (HTE), CFD, Hydrogen Production, Numerical Simulation

Finite element simulation and optimization of cutting forces in turning inconel 718 using the Johnson–Cook model and Taguchi design

[1,*]Fitim ZEQIRI, [2]Mahmut ALKAN, [2]Serkan TOROS
[1]University "Isa Boletini" Mitrovica, Faculty of Mechanical and Computer Engineering
[2]Nigde Halisdemir University, Faculty of Engineering, Mechanical Engineering Department
[*]fitim.zeqiri@umib.net

Absract: This study investigates the influence of cutting parameters on cutting forces during the turning of Inconel 718 using the finite element method (FEM). Numerical simulations were carried out with Deform 3D (V6.1) and validated against established theoretical models. The Johnson–Cook constitutive model was applied to describe the material behavior under high strain rates and elevated temperatures, while process optimization was performed using the Taguchi design of experiments (DOE) in Minitab 17.

The results demonstrate that cutting speed, feed rate, and depth of cut significantly affect cutting forces in all three directions (Fx, Fy, Fz). Specifically, increasing cutting speed reduces cutting forces, whereas higher feed rates and depths of cut increase them. Furthermore, tool geometry—particularly tool nose radius—was found to influence tangential and radial forces while reducing axial forces.

The proposed numerical model shows strong agreement with published experimental data, confirming the accuracy of FEM in predicting cutting forces during the machining of Inconel 718. These findings provide valuable insights for optimizing turning parameters, improving tool life, and ensuring machining efficiency in the processing of difficult-to-cut superalloys.

Keywords: Inconel 718, Finite element modelling, cutting force, Taguchi Design**.**

Experimental tensile test of TWIP steel

[1],*Labinot Topilla, [2]Onur Çavuşğlu, [3]Serkan Toros [1]Flamur Salihu, [1]Gjelosh Vataj
[1]Unıversıty of Applied Science in Ferizaj, Faculty of Engineering and Informatics, Department of Industrial Engineering with informatics
[2]Gazi University, Faculty of Technology, Department of Manufacturing Engineering
[3]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Mechanical Engineering
***labinot.topilla@ushaf.net**

Abstract: This abstract presents the experimental testing of the metal TWIP which in recent years finds continuous application in the automotive industry, which has faced ever-increasing demands to improve vehicle safety, reduce fuel consumption and reduce pollutant gas emissions. The experimental analyses were carried out in the laboratory of the Faculty of Engineering at the University of Nigde in Turkey. All material tests were carried out at room temperature. The test device was of the type of Shimadzu Autograph 100 kN tensile force equipped with video extenometer. The samples selected were in the ASTM E8 standard and designated as Standard (s), (20a), (4a) and (a). In total, there were 36 samples which were drawn at 3 different tensile velocity such as: 25 mm/min, 125 mm/min and 500 mm/min, for each sample drawn at each speed there were 3 samples. The thickness of all samples was 1.4 mm, also the average Gauge Length of all samples was 50 mm, while the average width of the samples differs: the average width of the standard samples was 12.5 mm, for the samples (20a) the average width was 6.08 mm, for the samples (4a) the average width was 6.21 mm and for the samples (a) the average width was 6.21 mm, The aim was to analyze the behavior of the TWIP metal at three pulling speeds, from where it was observed that with increasing speed, the stress on the samples increases and the ductility decreases.

Keywords: Experimental, Samples, Tensile velocity.

Experimental investigation of the aerodynamic characteristics of S809, S812, S822, and NACA 63(3)618 airfoils at low Reynolds numbers for small wind turbine applications

[1]Riad Morina, [2,]*Yahya Erkan Akansu
[1]University for Business and Technology (UBT), Mechatronics and Energy Engineering
[2]Niğde Ömer Halisdemir University, Faculty of Engineering, Department of Mechanical Engineering
***akansu@ohu.edu.tr**

Absract: This work presents an experimental investigation of the aerodynamic performance of four airfoil profiles: S809, S812, S822, and NACA 63(3)618, intended for small horizontal-axis wind turbine applications. Tests were carried out in a closed-circuit wind tunnel using airfoil sections with a chord length of 150 mm and a span of 450 mm. The angle of attack varied from −20° to +20° in 1° increments at two Reynolds numbers, Re = 5×10^4 and 1×10^5. Lift and drag forces were measured and used to obtain the corresponding coefficients, lift and drag coefficients (C_L, C_D), thereby characterizing aerodynamic behavior in the laminar–transitional regime.
The results showed that the S822 airfoil exhibited the best overall aerodynamic efficiency, with a higher lift-to-drag ratio (C_L/C_D) and delayed stall behavior compared to the other tested profiles. These findings indicate that S822 is the most suitable candidate for further blade design and optimization for small-scale wind turbines operating at low wind speeds and low Reynolds numbers.
The resulting dataset provides valuable empirical data to support the design and optimization of small wind-turbine blades under low-Reynolds-number flow conditions.

Keywords: Low-Reynolds number aerodynamics, Wind-tunnel testing, Airfoil performance, Small wind turbine blades, Lift-to-drag ratio.

Effect of plasma nitriding on the impact wear resistance of AISI 8620 steel

[1,*]Harun Mindivan, [1]Elif Öztürk
[1]Bilecik Şeyh Edebali University, Faculty of Engineering, Department of Mechanical Engineering
***harun.mindivan@bilecik.edu.tr**

Abstract: The present study investigated the effect of plasma nitriding on the impact wear resistance of AISI 8620 steel. Nitriding was performed at 500 °C for 12 h in a 20% N_2–80% H_2 atmosphere. Microstructural characterization and microhardness measurements revealed the formation of a ~4 μm thick compound layer and an effective case depth of ~260 μm, with surface hardness increasing from 220 $HV_{0.05}$ (untreated) to 572 $HV_{0.05}$ (nitrided). Impact wear tests using a reciprocating hammer-type rig (5 Hz, 8000 impacts) demonstrated that plasma nitriding enhanced wear resistance, reducing the wear rate by 63% under a contact pressure of 2.89 GPa.

Keywords: AISI 8620, Impact wear, Plasma nitriding.

Impact-sliding wear behavior of shot-peened AISI 4340 steel

[1,*]Harun Mindivan, [1]Züleyha Taşkan
[1]Bilecik Şeyh Edebali University, Faculty of Engineering, Department of Mechanical Engineering
***harun.mindivan@bilecik.edu.tr**

Abstract: This study investigates the impact-sliding wear behavior of shot-peened AISI 4340 steels under severe loading conditions. Steels were shot-peened at intensities of 16, 20, and 24 A, and their structural and mechanical properties were analyzed using optical microscopy and microhardness testing. An inclined impact-sliding test, designed to simulate high dynamic loads, was conducted under Hertzian contact pressures of 1.59 and 2.88 GPa. Results revealed that increasing shot-peening intensity enhanced both surface hardness and impact-sliding wear resistance.

Keywords: AISI 4340, Impact-sliding wear, Shot peening, Surface properties.

Farklı yakıt formülasyonlarına eklenen karbon nanotüp katkısının motor performansı ve emisyonları üzerindeki etkisinin incelenmesi

[1]Mehmet TARAK, [2,*] Mehmet ÇELİK
[1]Karabük Üniversitesi, Lisansüstü Eğitim Enstitüsü, Makine Mühendisliği Bölümü
[2]Karabük Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği Bölümü
[*]mehcelik@karabuk.edu.tr

Özet: Fosil yakıt rezervlerinin azalması ve bu yakıtların yanmasından kaynaklanan emisyonların çevresel ve sağlık üzerindeki olumsuz etkileri, alternatif yakıtların araştırılmasını zorunlu kılmaktadır. Bu çalışmada, plastik kablo atıklarının pirolizi ile elde edilen yakıtı dizel yakıt ile karıştırılmış (D90P10) ve motor performansı ile egzoz emisyonları üzerine etkileri deneysel olarak incelenmiştir. Ayrıca, söz konusu karışıma farklı oranlarda (25, 50, 75 ve 100ppm) tek duvarlı karbon nanotüp (CNT) katkısı ilave edilerek özgül yakıt tüketimi, termik verim, egzoz gazı sıcaklığı, karbon monoksit (CO), karbon dioksit (CO_2), azot oksit (NOx) ve is emisyonları değerlendirilmiştir. Bulgular, pirolitik yakıt ilavesinin özgül yakıt tüketimini artırırken termik verimi azalttığını; CNT katkısının ise bu olumsuzlukları gidermede etkili olduğunu göstermektedir. CNT katkısı ile motor performansı iyileşmiş, CO ve is emisyonları azalmış, ancak CO_2 ve NOx emisyonlarında artış gözlenmiştir. Sonuçlar, pirolitik yakıtların CNT katkısıyla birlikte kullanılmasının enerji verimliliğini artırma ve çevresel etkileri azaltma potansiyeli sunduğunu, ancak NOx emisyonlarının kontrolü için ek stratejilere ihtiyaç duyulduğunu ortaya koymaktadır.

Anahtar Kelimeler: Pirolitik yakıt, Tek duvarlı karbon nano tüp, Egzoz emisyonları, Motor performansı

Investigation of the Effect of Carbon Nanotube Additives Added to Different Fuel Formulations on Engine Performance and Emissions

[1]Mehmet TARAK, [2,*] Mehmet ÇELİK
[1]Karabük Üniversitesi, Lisansüstü Eğitim Enstitüsü, Makine Mühendisliği Bölümü
[2]Karabük Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği Bölümü
[*]mehcelik@karabuk.edu.tr

Abstract The depletion of fossil fuel reserves and the adverse environmental and health effects of emissions originating from their combustion necessitate the research of alternative fuels. In this study, the fuel obtained by the pyrolysis of plastic cable waste was mixed with diesel fuel (D90P10) and its effects on engine performance and exhaust emissions were experimentally investigated. In addition, different amounts of single-walled carbon nanotube (CNT) additives (25, 50, 75, and 100ppm) were added to the mixture to evaluate specific fuel consumption, thermal efficiency, exhaust gas temperature, carbon monoxide (CO), carbon dioxide (CO_2), nitrogen oxide (NOx), and soot emissions. The findings show that the addition of pyrolytic fuel increases specific fuel consumption while decreasing thermal efficiency; however, the CNT additive is effective in alleviating these negative effects. Engine performance was improved with the CNT additive, CO and soot emissions decreased, but increases in CO_2 and NOx emissions were observed. The results suggest that the use of pyrolytic fuels with CNT

additives offers the potential to increase energy efficiency and reduce environmental impacts, but additional strategies are needed to control NOx emissions.

Keywords: Pyrolytic fuel, Single-walled carbon nanotube, Exhaust emissions, Engine performance

Çekici-Tanker kombinasyonunun aerodinamik direnç katsayısının deneysel olarak belirlenmesi

[1,*]Cihan BAYINDIRLI, [2]Ferhat KEÇELİOĞLU, [2]Onur KARCI
[1]Niğde Ömer Halisdemir Üniversitesi, Niğde Teknik Bilimler Meslek Yüksekokulu, Motorlu Araçlar ve Ulaştırma Teknolojileri Bölümü
[2]OK Kardeşler Treyler San. Ve Tic. A.Ş. (OKT Trailer), Curiosity Center
***cbayindirli@ohu.edu.tr**

Özet: Bu çalışmada Türkiye'de sıvı gıda taşımacılığında kullanılan bir çekici-tanker kombinasyonuna etki eden sürükleme kuvveti 4 farklı serbest akış hızında incelenmiştir. Emme tipi rüzgar tünelinde gerçekleştirilen akış analizlerinde tüm benzerlik şartları sağlanmıştır. Çalışmada taşıt modellerine etki eden sürükleme kuvveti katsayısı çekici ve çekici tanker kombinasyonu için ayrı ayrı belirlenmiştir. Akış analizleri çekici modeli için 175×10^3-421×10^3,çekici tanker kombinasyonu için 292×10^3 - 700×10^3 Reynolds sayıları aralığında karşılık gelen 9.3 m/s - 22.3 m/s serbest akış hızlarında gerçekleştirilmiştir. Çekici modeline geleneksel bir sıvı gıda tanker eklenerek aynı serbest akış hızı ve deney şartlarında tanker ilavesinin aerodinamik kuvvete etkisi ve yakıt tüketimine etkisi hesaplanmıştır. Analiz sonuçlarına göre çekici modelinin C_D katsayısı 0,762 olurken çekici-tanker modelinin C_D katsayısı 0,812 olarak tespit edilmiştir. Çekiciye eklenen geleneksel tanker modeli ilavesi C_D katsayısını ortalama %6.66 arttırmıştır.
Anahtar Kelimeler: Aerodinamik, Çekici, Tanker, Sürükleme katsayısı, Rüzgâr tüneli

Experimental determination of aerodynamic drag coefficient of Truck-Tanker combination

[1,*]Cihan BAYINDIRLI, [2]Ferhat KEÇELİOĞLU, [2]Onur KARCI
[1]Niğde Ömer Halisdemir Üniversitesi, Niğde Teknik Bilimler Meslek Yüksekokulu, Motorlu Araçlar ve Ulaştırma Teknolojileri Bölümü
[2]OK Kardeşler Treyler San. Ve Tic. A.Ş. (OKT Trailer), Curiosity Center
***cbayindirli@ohu.edu.tr**

Abstract: In this study, the drag force acting on a truck-tanker combination used in liquid food transportation in Türkiye was investigated at four different free-flow velocities. All similarity conditions were provided in the flow analyses conducted in a suction-type wind tunnel. The drag coefficient acting on the vehicle models was determined separately for the truck and the truck-tanker combination. Flow analyses were conducted at free-flow speeds of 9.3 m/s to 22.3 m/s, corresponding to Reynolds numbers ranging from 175×10^3 to 421×10^3 for the truck model and from 292×10^3 to 700×10^3 for the truck-tanker combination. A conventional liquid food tanker was added to the tractor model, and the effects of the addition of the tanker on aerodynamic forces and fuel consumption were calculated under the same free-flow speed and experimental conditions. According to the analysis results, the C_D coefficient of the truck model was 0.762, while the C_D coefficient of the truck-tanker model was 0.812. The addition of a conventional tanker model to the tractor increased the C_D coefficient by an average of 6.66%.
Keywords: Aerodynamic, Truck, Tanker, Drag coefficient, Wind tunnel

Simulating the effect of two cylinders on the air flow movement inside a duct using CFD

[1]Ghazwan Mahmoud Abbas, [2]Mohammed Salam Taha, [1]Ali Hussein Abdulkarim, [3,*]Andaç Batur Çolak
[1]University of Kirkuk, College of Engineering, Kirkuk, Irak
[2]Northern Technical University, Technical Institute, Department of Mechanical Techniques, Kirkuk, Iraq
[3]Niğde Ömer Halisdemir University, Faculty of Computer and Information Sciences, Department of Information Systems and Technologies, Niğde, Türkiye.
***bcolak@ohu.edu.tr**

Abstract: This study investigates the impact of placing two cylindrical obstacles inside a rectangular air duct on airflow behavior using Computational Fluid Dynamics simulations via ANSYS Fluent. The primary aim was to analyze how different spacing configurations between the cylinders (35 mm, 40 mm, 45 mm, and 55 mm) affect key aerodynamic parameters, including velocity distribution, pressure variation, and vortex formation, ultimately assessing overall flow stability. A laminar flow model without heat transfer was adopted to isolate pure aerodynamic effects within a 100x100 mm duct containing 10 mm diameter cylinders. Results showed that smaller spacing (35 mm) yielded stable but restricted flow with increased drag, and was less effective for deliberate vortex generation. The 40 mm spacing offered a good balance of stability and moderate vortex formation, though some wake and drag persisted. Conversely, larger spacings (45 mm and 55 mm) introduced significant flow irregularities and turbulence. While the 45 mm configuration allowed more airflow and promoted vortex formation, it also led to increased instability and larger, energy-losing vortices behind the second cylinder. The 55 mm spacing facilitated the largest airflow volume but resulted in significantly more turbulent, unstable flow with strong pressure and velocity oscillations and heightened aerodynamic losses. These findings highlight the critical trade-offs between flow volume, stability, and energy dissipation dictated by inter-cylinder spacing.
Keywords: Computational Fluid Dynamics (CFD); Cylindrical obstacles; Airflow; Inter-cylinder spacing; Flow stability.

The role of materials used in automobile transportation in security

[1,*]Allahverdi Sharifov, [1]Azad Babayev
[1] Azerbaijan Technical University
***azad.babayev@aztu.edu.az**

Abstract: The article reflects the characteristics of materials used in the automotive industry in modern times for the manufacture of components, parts and assemblies of vehicles. The advantages of new generation materials in the automotive industry are substantiated and the areas of their application are noted. Taking into account the deformation of car parts during road accidents, the importance of the materials from which they are made is emphasized. From the point of view of traffic safety, it is important to use each material that reflects a part of the car. The influence of deformation of car parts on injuries to the driver and passengers in accidents has been studied. Depending on the values of the deformation depth and driving speed, the importance of the role of car tire materials in traffic safety is emphasized. The most deformed part of vehicles in a collision was determined, and the influence of the properties and strength of materials in this part on traffic safety was noted.

Keywords: Transport, automotive industry, auto parts, materials, safety, collisions, injuries.

Artificial Intelligence Analysis for Convectionless and Radiated Impact in Nanofluid with Silicon Dioxide and Molybdenum Disulfide

[1,2,*]Hamid Qureshi, [3]Andaç Batur Çolak
[1]Govt. Post Graduate College Asghar Mall, Department of Mathematics, Rawalpindi
[2] Mohi-Ud-Din Islamic University, Department of Mathematics, AJK
[3]Niğde Ömer Halisdemir Unıversıty, Faculty of Computer and Information Sciences, Department of Information Systems and Technologies
***hamid_miu@outlook.com**

Abstract: The core aim of the present research is to highlight the development and assessment of a differential mathematical system applicable to the convectionless and radiated influence in nanofluids with Silicon dioxide and Molybdenum disulfide as viscous materials on an elongated surface. This is achieved through the utilization of stochastic computing coupled with the Neural Network Back Propagation Levenberg-Marquardt Algorithm (NNBP-LMA). This innovative approach enhances the precision, consistency, and efficiency of the computational process for analyzing dynamic behaviors. To account for various scenarios and consider multiple influential parameters in the NNBP-LMA model, a reference dataset is generated using the Adams technique within the Mathematica software. The reference data outcomes are then subjected to training, with a split of seventy percent for training and thirty percent for validation and testing methods. The objective is to improve and compare the predicted results with well-established solutions. The accuracy and efficacy of the developed NNBP-LMA are demonstrated through a comparison of results obtained from the dataset using the Adams technique. This comparative analysis encompasses variations in values of significant parameters such as the coefficient of porosity (λ), characteristic of inertia (F_o), radiation impact (Rd), Prandtl number (Pr), heat exchange coefficient (β), first and second order slip parameter (L_1, L_2), Eckert number (Ec), and Brinkman number (Br). Various performance metrics, including mean square error (MSE), regression studies, error evaluation through histogram plots, and assessment of absolute errors, collectively validate the reliability and precision of NNBP-LMA. Notably, MSE levels of 1.61E-11, 9.91E-12, 5.10E-11, 8.56E-10 and 8.50E-10 against 345, 335, 648, 446 and 460 epochs exhibit excellent performance of the proposed methodology. The error analysis of both the proposed and reference datasets indicates that NNBP-LMA is accurate and dependable, with values ranging from E-08 to E-04 across all scenarios.

Keywords: Artificial intelligence, Levenberg-Marquardt algorithm, nanofluids, velocity slip, Neural network.

A research on ejector enhanced vapor injection heat pumps proposed for hot and cold region applications

[1,*]Aslı Arpınar, [1]Halil Kürşad Ersoy
[1]Konya Technical University, Faculty of Engineering and Natural Sciences, Department of Mechanical Engineering
[*]aarpinar@ktun.edu.tr

Abstract: Global warming and rising energy costs are driving engineers to develop more efficient and environmentally friendly cooling systems. In this context, various thermodynamic improvement methods have been developed to enhance energy efficiency and improve operating conditions in cooling and heat pump systems. Vapor injection and ejector-assisted systems have emerged as innovative solutions that significantly improve system performance. Vapor injection increases cooling capacity by reducing the load on the compressor, while ejectors reduce the need for compression by directing low-pressure fluid to the high-pressure side, thereby improving the system's coefficient of performance (COP). In this study, the operating principles of vapor injection–ejector systems, their effects on energy and exergy efficiency, and various application areas are examined, and a comprehensive evaluation is presented based on current literature.

Keywords: COP, Ejector, Vapor injection.

Parametric investigation of mechanical properties for laser powder bed fusion processed inco718 auxetic metamaterials

[1*]Kubilay Özgönül, [2]Hacı Abdullah Taşdemir
[1]Istanbul Technical University, Faculty of Mechanical Engineering, Mechanical Design Program
[2]Istanbul Technical University, Faculty of Mechanical Engineering, Mechanical Design Program
[*]ozgonul21@itu.edu.tr

Abstract: This study conducts a parametric investigation into the mechanical behavior of sandwich structures incorporating re-entrant unit cells, with a particular focus on designs manufactured from Inconel 718 using additive techniques. While re-entrant structures are widely recognized for their distinctive deformation characteristics, limited research has addressed the influence of geometric variations on their performance when fabricated with advanced alloys. To address this gap, the present work systematically examines how parameters such as cell geometry, wall thickness, unit cell size, and re-entrance angle influence the mechanical response of re-entrant configurations.

Inconel 718, a high-performance alloy commonly employed in aerospace and energy sectors, introduces additional complexity due to its unique mechanical properties and the process-dependent effects of additive manufacturing. The study further explores opportunities for tailoring performance through design optimization, highlighting the interplay between geometry and material distribution in achieving desired mechanical. The findings reveal that strategic modification of geometric parameters can lead to substantial improvements in stiffness, energy absorption, and overall structural efficiency. These results underscore the potential of re-entrant designs as adaptable, high-performance solutions in engineering applications, particularly where lightweight yet mechanically resilient structures are required. By integrating advanced manufacturing flexibility with systematic design optimization, the research offers a foundation for developing efficient, application-specific re-entrant structures. Ultimately, the study contributes to advancing the design methodology for architected materials, providing engineers with valuable guidelines for exploiting both geometry and manufacturing innovations in structural design.

Keywords: Auxetic re-entrant structure, Crush force efficiency, Energy absorption, Metamaterial, Parametric investigation

Analysis of the impact of extrusion screw designs on productivity in the production of machine parts made of pvx-based composite materials

[1]Vaqif Abbasov, [1]Shovgi Asadov, [1,*]Chingiz Mammadov, [1]Ramiz. Veysov, [2]Rauf Mammadli
[1]Azerbajican Technical University, Faculty of Special Techniques and Technology, Special technologies and equipment
[2]Ministry of Defense Industry, Design Department
[*]cingiz.memmedov@aztu.edu.az

Abstract: The article analyzes the effect of extrusion screw designs on productivity in the production of machine parts made of PVC-based composite materials, including the expression of the friction angle of the screw of the endless screw in diameter, the expression of productivity in the dosing zone, which is the most productive zone of the screw, and in the screw channel filled with alloy, in a single time, and the proportionality of the screw productivity to the pressure change and the number of cycles is analyzed. In addition, the article emphasizes the need to conduct large-scale research on increasing the productivity of the screw along the axial zones in the extrusion process of high-precision machine parts made of PVC-based composite materials, by studying the effect of the design of the dosing zone on its geometric dimensions and providing a graphical analysis of the dependence of productivity on the number of cycles.

Keywords: composite materials, extrusion screws, pressure change, torque, productivity.

Pvx əsaslı kompozit materiallardan olan maşın hissələrinin istehsalında ekstruziya şneklərinin konstruksiyalarının məhsuldarlığa təsirinin təhlili

[1]Vaqif Abbasov, [1]Shovgi Asadov, [1,*]Chingiz Mammadov, [1]Ramiz. Veysov, [2]Rauf Mammadli
[1]Azerbajican Technical University, Faculty of Special Techniques and Technology, Special technologies and equipment
[2]Ministry of Defense Industry, Design Department
[*]cingiz.memmedov@aztu.edu.az

Xülasə: Məqalədə PVX əsaslı kompozit materiallardan olan maşın hissələrinin istehsalında ekstruziya şneklərinin konstruksiyalarının məhsuldarlığa təsirinin analizi aparılmış, o cümlədən şnekin sonsuz vintinin vidələrinin sürtünmə bucağının diametrlə ifadəsi göstərilmiş, şnekin ən məhsuldar zonası olan dozalama zonasında və ərinti ilə dolmuş vidə kanalında məhsuldarlığın vahid zamandakı ifadəsi verilmiş, eyni zamanda şnekin məhsuldarlığının təzyiq dəyiməsi və dövrlər sayı ilə mütənasibliyi təhlil edilmişdir. Bundan əlavə məqalədə PVX əsaslı kompozit materiallarından istehsal olunan dəqiqliyi yüksək olan maşın hissələrinin ekstruziya prosesində şnekin oxboyu zonalar üzrə məhsuldarlığının yüksəldilməsində dozalaşma zonasının konstruksiyasının onun həndəsi ölçülərinin təsirinin öyrənilməsi və məhsuldarlığın dövrlər sayından asılılığının qrafiki analizi verilməklə, geniş miqyaslı tədqiqatların aparılmasının zəruriliyi qeyd olunmuşdur.

Açar sözlər: kompozit materiallar, ekstruziya şnekləri, təzyiq dəyişməsi, fırlanma momenti, məhsuldarlıq**.**

Thermodynamic analysis of ramjet engine

[1,*]Zülal Özdoğan, [1]Halil Kürşad Ersoy
[1]Konya Technical University, Faculty of Engineering and Natural Sciences, Department of Mechanical Engineering
[*]zulal.ozdogann@gmail.com.tr

Abstract: In this article, a thermodynamic analysis of a ramjet engine was performed and the operating conditions under which it is more efficient were evaluated. In this study, the mathematical model of the ramjet engine was created using MATLAB. In the performance analysis, the effects of parameters such as altitude, Mach number and diffuser outlet cross-sectional areas on thrust, overall efficiency and thrust specific fuel consumption were investigated theoretically. It has been determined that for a ramjet engine, with the increase in Mach number at a fixed altitude, the overall efficiency and thrust increase until they reach a maximum value and then start to decrease. At constant Mach number, the thrust produced decreases with increasing altitude. As the diffuser outlet cross-sectional area (A2), overall efficiency increases, while thrust specific fuel consumption and generated thrust decrease. Choosing (A2) small ensures increased thrust, reduced fuel consumption and higher overall efficiency.

Keywords: Brayton Cycle, Thermodynamic Analysis, Ramjet, Performance Analysis

Economic development: Technological innovations and energy use

[1,*]Natavan Namazova
[1]Azerbaijan Technical University
***natavan.namazova@aztu.edu.az**

Abstract: The interconnection between economic development, technological innovation, and energy use is central to understanding the dynamics of modern economies. As nations strive for sustained growth, the role of advanced technologies in reshaping production, consumption, and energy systems becomes increasingly significant. This study examines how technological innovations influence energy consumption patterns and contributes to economic development, with a particular focus on efficiency, sustainability, and structural transformation. The paper explores the dual impact of innovation: on one hand, enhancing energy efficiency and reducing dependency on fossil fuels; on the other hand, potentially increasing energy demand due to the growth of energy-intensive industries and digital infrastructures. Using a multidisciplinary approach, the study analyzes empirical data from both developed and emerging economies to assess how innovation-driven sectors (such as ICT, renewable energy, and advanced manufacturing) affect overall energy consumption and economic output. Key findings reveal that while technological innovation generally leads to higher productivity and economic diversification, its energy implications are complex and context-dependent. In high-income countries, innovation tends to decouple growth from energy use through smart technologies and clean energy transitions. In contrast, in developing countries, innovations often stimulate industrial expansion, which can increase energy consumption unless accompanied by strong energy governance and sustainable practices. The paper concludes with policy recommendations emphasizing the need for integrated innovation and energy strategies. These include investing in research and development, promoting clean technologies, and ensuring that energy policy aligns with innovation policy to foster inclusive and low-carbon economic growth.

Keywords: Economic development, technological innovation, energy consumption, energy efficiency, sustainable growth.

Renewable energy consumption and expansion opportunities

[1,*]Shakir VALIYEV
[1]Azerbaijan Technical University
***shakir.valiyev@aztu.edu.az**

Abstract: In the context of accelerating climate change, energy security challenges, and global commitments to sustainability, the shift from fossil fuels to renewable energy has gained unprecedented urgency. Renewable energy consumption is steadily increasing worldwide, driven by technological innovation, falling production costs, and growing public and political awareness of environmental issues. This study provides a comprehensive analysis of the current status and future expansion opportunities of renewable energy consumption, focusing primarily on solar, wind, hydroelectric, and bioenergy resources. The research first outlines global consumption trends and examines regional variations, identifying the socio-economic and policy-related factors influencing adoption rates. It further analyzes how energy transition dynamics differ between developed and developing economies, highlighting capacity, infrastructure readiness, and investment climate as critical differentiators. Barriers such as intermittent energy supply, lack of grid integration, and limited financing mechanisms are also addressed in detail. The study then explores expansion opportunities, particularly in emerging markets and underutilized geographic areas. Key enablers of growth include advancements in storage technologies, digital grid systems, government incentives, and international climate finance. Ultimately, the research argues that a coordinated, multi-sectoral approach is essential to unlocking the full potential of renewable energy. It concludes with strategic recommendations for policymakers, investors, and energy planners to enhance the accessibility, affordability, and resilience of renewable energy systems in line with global decarbonization goals.

Keywords: energy consumption, renewable energy resources, economic effects, social effects, sustainable development.

Development of an energy-based strength condition to prevent damage in SOFC structures of various configurations under real operating conditions

[1]*Ramiz A. Hasanov
[1]Azerbaijan State Oil and Industry University, Faculty of Oil Mechanics, Department of Engineering
***ramiz.hasanov52@gmail.com**

Abstract: The article is focused on the different inelastic deformations of heterogeneous characteristics of the macrostructural material support SOFC with different design and real-time assessment of their deformation behavior to ensure smooth and efficient operation, as well as for providing long – term operation of like this design . The relationship between the change in the loading path and the location (origin of yield curve) of the yield surface of the material support of the electrode system during the operation of a fuel cell in real mode due to the manifestation of heterogeneous properties due to the random distribution of pores in the volume of the macrostructural design of the material and the uncertainty of their dimensional and route characteristics is considered. It has been confirmed based on the Bauschenger effect that heterogeneous properties are manifested due to the dissipation of deformation energy during the operation of the SOFC design. Taking into account the possibilities of the development of the loading path during the operation of the SOFC structure, probable changes in the location of the yield surface are determined, the relationship of the development path is determined both inside the yield surface and beyond its limit based on its location. This made it possible to develop an energy strength condition for assessing the deformation behavior of a macrostructural structure, and, based on this condition, to take into account changes in the mechanical properties of the material execution with heterogeneous characteristics, which can subsequently be used to assess the quality indicators of the SOFC structure in operation with various design versions.

Keywords: SOFC design, deformations, heterogenous, anisotropy, failure

Eriyik sıcaklığı kararsızlığının Czochralski (CZ) Silisyum (Si) külçelerde tek kristalli yapıdan çok ristalli yapıya geçişe etkisi

[1,2*]Furkan Güçlüer, [1,2]Ali Ogün Sarp, [3]Emre Kartal, [4]Elif Damgacı, [2,5]Ayşe Seyhan
[1]Niğde Ömer Halisdemir Üniversitesi, Fen Bilimleri Enstitüsü, Enerji Bilimi ve Teknolojileri Anabilim Dalı
[2]Niğde Ömer Halisdemir Üniversitesi, Nanoteknoloji Uygulama ve Araştırma Merkezi
[3]Erciyes Üniversitesi, Fen Fakültesi, Fizik Bölümü
[4]Nevşehir Hacı Bektaş Veli Üniversitesi, Mühendislik Mimarlık Fakültesi, Metalurji ve Malzeme Mühendisliği Bölümü
[5]Niğde Ömer Halisdemir Üniversitesi, Fen Fakültesi, Fizik Bölümü
***furkan-gucluer@mail.ohu.edu.tr**

Özet: Yarı iletken ve fotovoltaik endüstrilerinin temelini oluşturan tek kristalli silisyum, büyük ölçüde Czochralski (CZ) yöntemi ile üretilmektedir. Bu yöntem, yüksek saflıkta ve büyük çaplı külçelerin üretimine olanak tanısa da proses parametrelerindeki hassas kontrol zorlukları nedeniyle kristal yapısında kusurların oluşumuna açıktır. CZ büyüme sürecinde karşılaşılan en kritik sorunlardan biri, büyümenin belirli bir aşamasında tek kristalli (monokristal) yapının bozularak çok kristalli (polikristal) yapıya aniden geçiş yapmasıdır. Bu yapısal bozulma, külçenin kullanılabilir verimini ciddi oranda düşürmekte, üretim maliyetlerini arttırmakta ve son ürünün satış fiyatını düşürmektedir. Bu yapısal geçişi tetikleyebilecek safsızlıklar ve pota kusurları gibi çok sayıda etken arasında, eriyik sıcaklığının kararlılığı hayati bir rol oynamaktadır. Eriyik içerisindeki sıcaklık dalgalanmaları, katı-sıvı arayüzündeki termal gradyanları ve konvektif akışları bozarak homojen olmayan kristal büyümesine ve yeni, istenmeyen çekirdeklerin oluşumuna zemin hazırlayabilir. Bu çalışmada, büyüme sırasında sıcaklık dalgalanmasından kaynaklı tek kristalli yapıdan çok kristalli yapıya geçiş gösteren bir silisyum külçe incelenmiştir. Külçenin her iki yapısal bölgesinden alınan numuneler, yapısal farklılıkları ortaya koymak amacıyla XRD ile karşılaştırmalı olarak karakterize edilmiştir. Bu analizler, eriyik sıcaklığındaki kararsızlıkların kristal yapısındaki bozulmaya olan etkisini anlamayı ve bu geçişin altında yatan mekanizmaları aydınlatmayı hedeflemektedir.

Anahtar Kelimeler: Czochralski (CZ) Yöntemi, Tek kristalli silisyum külçe, Yarı İletken, XRD, Fotovoltaik.

Effect of Melt temperature instability on the transition from Monocrystalline to Polycrystalline structure in Czochralski (CZ) silicon ingots

[1,2*]Furkan Güçlüer, [1,2]Ali Ogün Sarp, [3]Emre Kartal, [4]Elif Damgacı, [2,5]Ayşe Seyhan
[1]Niğde Ömer Halisdemir Üniversitesi, Fen Bilimleri Enstitüsü, Enerji Bilimi ve Teknolojileri Anabilim Dalı
[2]Niğde Ömer Halisdemir Üniversitesi, Nanoteknoloji Uygulama ve Araştırma Merkezi
[3]Erciyes Üniversitesi, Fen Fakültesi, Fizik Bölümü
[4]Nevşehir Hacı Bektaş Veli Üniversitesi, Mühendislik Mimarlık Fakültesi, Metalurji ve Malzeme Mühendisliği Bölümü
[5]Niğde Ömer Halisdemir Üniversitesi, Fen Fakültesi, Fizik Bölümü
***furkan-gucluer@mail.ohu.edu.tr**

Abstract: Monocrystal silicon, which forms the basis of the semiconductor and photovoltaic industries, is largely produced using the Czochralski (CZ) method. While this method enables the production of high-purity, large-diameter ingots, it is prone to defects in the crystal structure due to the difficulty of precisely controlling process parameters. One of the most critical issues encountered in the CZ growth process is the sudden transition from a monocrystalstructure to a polycrystalline structure at a certain stage of growth. This structural degradation significantly reduces the usable yield of the ingot, increases production costs, and lowers the selling price of the final product. Among the many factors that can trigger this structural transition, such as impurities and crucible defects, the stability of the melt temperature plays a vital role. Temperature fluctuations within the melt can disrupt thermal gradients and convective flows at the solid-liquid interface, paving the way for inhomogeneous crystal growth and the formation of new, unwanted nuclei. This study examines a silicon ingot that exhibited a melt-temperature-induced transition from single-crystal to polycrystalline structure during growth. Samples taken from both structural regions of the ingot were characterized comparatively using XRD to reveal structural differences. These analyses aim to understand the effect of melt temperature instabilities on crystal structure degradation and to shed light on the mechanisms underlying this transition.

Keywords: Czochralski (CZ) method, Monocrystalline silicon ingot, Semiconductor, XRD, Photovoltaic.

14 MEDICINE

Kırgız yaklarının kalp karıncık kasının makro anatomisi üzerine bir çalışma

[1,*]Arı HH, [2] Karadağ H, [1]Tülöbaev A, [1]Yıldırım S
[1]Kırgızistan Türkiye Manas Üniversitesi Veteriner Fakültesi Anatomi ABD
[2]İstanbul Gelişim Üniversitesi Dişçilik Fakültesi
***hasanh.ari@manas.edu.kg**

Özet: Bu çalışma yerel mezbahalardan alınan defeksiz erişkin 20 (10 erkek,10 dişi) yak kalbinde karıncıklardaki kalp kasının makro anatomisini belirlemek için yapıldı. Formaldehitle tespit edilen kalplerin karıncıkta kalp kasının oluşturduğu m papillaris, trabecula carneae, chorda tendinea ve trabecula septomarginalis'in makroanatomisi incelendi. İncelemeler sonunda sol karıncıktaki kalp kasının septal duvarda boşluğun üst bölümünden başlayıp apexe kadar devam eden büyük (ort 1.2x4.1cm) bir papillar kas ile septal duvarda yerleşen iki papillar kasın; sol karıncık duvarında ise iki papillar kasın oluştuğu; sağ kulaçık boşluğunda septal duvar ile parietal duvar arasında bir kalın (ort 0.3x2.2 cm) ile biri ince (ort 0.2x2.4 cm) iki, sol karıncıkta ise ince bir trabecula septomarginalis'in şekillendiği görüldü. Ayrıca, her iki karıncık kasında kalın ve septal duvarda daha yoğun olarak çok sayıda trabecula carnea'nın şekillendiği tespit edildi. Yak kalbinde kapakçıklar ile m papillaris arasında çok sayıda ve kalın chordae tendineae varlığı belirlendi. Yak karıncık kasındaki bu değişiklerin hayvanların yüksek ve sert dağ şartlarına uyum göstermek için olabileceği sonucuna varılmıştır.

Anahtar kelimeler: Yak, Myocard anatomy, Trabecular cord, Papillar kas.

A study on the macroanatomy of the cardiac ventricular muscle of Kyrgyz yaks

[1,*]Arı HH, [2] Karadağ H, [1]Tülöbaev A, [1]Yıldırım S
[1]Department of Anatomy and Faculty of Veterinary Medicine, Kyrgyz-Turkish Manas University
[2]Istanbul Gelisim University Faculty of Dentistry
hasanh.ari@manas.edu.kg

Abstract; This study was conducted to determine the macroanatomy of the cardiac muscle in the ventricles of 20 adult yak hearts (10 male, 10 female) without defects, obtained from local slaughterhouses. Formaldehyde (10%) was fixed in the hearts, and the macroanatomy of the structures formed by the cardiac muscle in the ventricles, including the papillary muscles (m. papillaris), trabecula carnea, tendinous cords, and trabecula septomarginalis, was examined. The investigation revealed a large papillary muscle in the left ventricle, located at the upper part of the septal wall and extending to the apex, measuring approximately 1.2x4.1 cm. Additionally, two papillary muscles were located in the septal wall of the left ventricle. In the left atrial wall, another two papillary muscles were observed. At the same time, the right ventricle contained one thick, approximately 0.3x2.2 cm, and one thin, approximately 0.2x2.4 cm, papillary muscle situated between the septal wall and the parietal wall. There was also a thin trabecula septomarginalis formed in the left ventricle. Furthermore, a significant number of thick carnaeal trabacula were identified in both ventricle walls, with a higher density in the septal wall. The presence of numerous and thick tendinous cords between the valves and the papillary muscles was noted. These variations in the

ventricle muscle were predicted to be associated with the animals' adaptation to high and harsh mountain conditions.

Keywords: Yak, Myocard anatomy, Trabecular cord, Papillary muscle, Carneal trabecula

Next-generation cosmetic safety assessment: ıntegrating novel methodologies, AOP frameworks, and IVIVE-PBK modeling for human-relevant decision-making

[1,*]Ebrahim Alinia-Ahandani, [2]Sahebe Hajipour, [3]Zahra Alizadeh-Tarpoei
[1]Food and Drug Research Center, Food and Drug Administration, Ministry of Health and Medical Education
[2]Department of Plant Biology, Faculty of Basic Sciences, Golestan University
[3]Faculty of Basic Sciences, University of Guilan
***dr.ebrahim.alinia@gmail.com**

Abstract: The global cosmetics industry is undergoing a fundamental paradigm shift, moving away from traditional animal-based safety testing toward modern, ethically aligned, and scientifically robust assessment frameworks. Next-Generation Risk Assessment (NGRA) is at the forefront of this transition, integrating three foundational pillars: New Approach Methodologies (NAMs), Adverse Outcome Pathways (AOPs), and Quantitative In Vitro to In Vivo Extrapolation (QIVIVE) supported by Physiologically Based Kinetic (PBK) modeling. This comprehensive review delineates these core components and their synergistic application in generating decision-ready, human-relevant safety assessments. It critically examines the current scientific landscape (2023–2025), evaluates regulatory readiness, and explores the transformative role of artificial intelligence (AI) and multi-omics data in advancing cosmetic toxicology toward a fully animal-free future.

Keywords: NGRA, Cosmetics, New Approach Methodologies (NAMs), Adverse Outcome Pathways (AOPs), IVIVE, PBK Modeling, Predictive Toxicology, Artificial Intelligence (AI)

From smoke to dose: occurrence, formation drivers, and risk-based mitigation of pahs in smoked rice and fish

[1,*]Ebrahim Alinia-Ahandani, [2]Alireza Mehregan Niko, [2]Setayesh Koukabi
[1]Deputy of Food and Drug, Guilan University of Medical Sciences
[2]Department of Food Science and Technology, Agriculture Faculty, University of Guilan
***dr.ebrahim.alinia@gmail.com**

Abstract: Polycyclic aromatic hydrocarbons (PAHs) in smoked staples and seafood remain a persistent food-safety concern because several congeners are carcinogenic and bioactive at trace levels. This work synthesizes current evidence on PAH occurrence in smoked rice and fish and proposes an exposure-led analytical and risk-assessment framework. We outline a harmonized laboratory workflow—matrix-appropriate extraction, gel-permeation or silica cleanup, and isotope-dilution GC–MS/MS—to quantify priority PAHs and derive benzo[a]pyrene equivalents (B[a]P_eq) for toxicity weighting. Process-level determinants are mapped using controllable levers: wood type and resin content, oxygen availability, smoke temperature/time profiles, fat content and surface area of the substrate, and post-process storage. To translate concentration into public-health meaning, we implement probabilistic dietary exposure modeling (age/sex-specific consumption distributions) and calculate both margin-of-exposure and incremental lifetime cancer risk metrics, capturing uncertainty via Monte Carlo simulation. The framework is designed to distinguish traditional direct-smoke practices from indirect or filtered-smoke systems and to evaluate mitigation options—including smoke-condensate application with PAH removal, barrier coatings, antioxidant marinades, trimming charred surfaces, and temperature control—without eroding sensory quality. We further discuss alignment with regulatory specifications (e.g., marker congeners and PAH4 bundles) and propose surveillance triggers for high-risk product categories. By integrating high-resolution analytics with exposure science, the approach enables risk-proportionate controls and transparent communication across the farm-to-fork continuum for smoked rice, fish, and analogous foods.

Keywords: PAHs; smoked foods; smoked rice; smoked fish; GC–MS/MS; B[a]P equivalents; probabilistic risk assessment; mitigation strategies

Ribosome biogenesis and alternative splicing in cancer: Therapeutic targets and emerging strategies

[1]Nexhibe Nuhii, [1]Anjeza Temaj, [1]YIlka Gashi, [1]Erda Aliu, [1]Sefedin Bilalli, [1]Vesna Stavrova
[1]Driton Selmani, [1]Ilber Besimi, [2,*]Gazmend Temaj
[1] Department of Pharmacy Faculty of Medical Sciences State University of Tetova 1200, Tetovo, Macedonia
[2] Human Genetics, College UBT, Faculty of Pharmacy – Prishtina, Kosovo
***gazmend.temaj@ubt-uni.net**

Abstract: Ribosomes serve as essential molecular platforms for protein synthesis, and their function is markedly disrupted during cancer progression. Enhanced ribosome biogenesis and changes in ribosomal protein composition are established characteristics of diverse malignancies, enabling uncontrolled cell proliferation and biomass expansion. Furthermore, abnormal regulation of alternative RNA splicing drives oncogenic transformation, remodels cellular metabolism, and promotes therapeutic resistance. This review consolidates the latest findings on the molecular pathways by which altered ribosome biogenesis and splicing contribute to tumor development. It further explores downstream effects such as proteotoxic stress and the disruption of transcriptional networks, as well as the impact of spliceosome mutations in hematologic cancers including acute lymphoblastic leukemia. Therapeutic strategies aimed at modulating ribosome biogenesis and correcting splicing anomalies are assessed, highlighting innovative compounds with the capacity to target ribosomal machinery or restore normal splicing. These advances point toward promising new directions for cancer treatment, while underscoring the need to overcome remaining challenges in specificity, toxicity control, and translating laboratory insights into clinical benefit.

Keywords: Ribosome biogenesis, cancer, alternative splicing, therapy, stress

Effects of gestational anemia on adverse outcomes of pregnancy specific anxiety at tertiary care hospitals of hyderabad

[1,*]Shabahat Arain, [1]Tahira Jabeen, [1]Samina Malik
[1]Department of zoology, University of Sindh
***Shabahat113@gmail.com**

Abstract: This study aims to examine the impact of gestational anemia (GA) and pregnancy-specific anxiety (PSA) on adverse maternal and fetal outcomes in tertiary care hospitals in Hyderabad.

Pregnancy is a crucial period in a woman's life, yet it carries increased risks for both the mother and fetus. In developing countries such as Pakistan, anemia and PSA are common complications and are associated with low birth weight, preterm birth, preeclampsia, maternal hemorrhage, and increased neonatal and maternal morbidity and mortality. A descriptive and correlational research design was used, and data were collected from 362 women in their third trimester at the Gynecology & Obstetrics Department of LUH Hyderabad. Women aged 25–38 with singleton pregnancies were included, while those with hypertension, on antihypertensive or psychiatric medications, irregular antenatal follow-up, or endocrine disorders were excluded.

The mean maternal age was 29.12 years, mean serum cortisol level was 431.57 nmol/L, and the mean Hamilton Anxiety score was 19.06. Anemia was identified in 65% of participants: 28.5% mild, 23% moderate, and 13.5% severe. PSA was present in 44% of women. Overall complications included pregnancy-induced hypertension (16%), postpartum hemorrhage (9%), low birth weight (31%), APGAR <7 (41%), preeclampsia (20%), preterm birth (13%), and stillbirth (3.3%).

When stratified by groups, women experiencing both GA and PSA had the highest frequency of complications, including PIH (34%), PPH (18%), LBW (60%), APGAR <7 (83%), preeclampsia (37%), preterm birth (24%), and stillbirth (6%). The findings indicate a strong correlation between GA, PSA, and adverse pregnancy outcomes, concluding that coexistence of anemia and anxiety in the third trimester significantly increases risks to both maternal and fetal health.

Keywords: Gestational anemia, pregnancy-specific anxiety, adverse pregnancy outcomes, maternal health, fetal health

Relation of thyroid timulating hormone, thyroxine and tri-iodothyronine with gender, age, weight among schoolagers of rural and urban locality of region Sukkur and Khairpur, Sindh, Pakistan

[1]Fida Hussain Channa, [2]Tahira Jabeen Ursani
[1]Department of Environmental Sciences, Aror University of Art, Architecture, Design and Heritage, Sukkur
[2]Department of Zoology, University of Sindh, Jamshoro
***tjchandio65@gmail.com**

Abstract: This study examines the impact of thyroid hormones—T3, T4, and TSH—on school-aged children living in rural and urban areas of Sukkur and Khairpur, Sindh, Pakistan. Thyroid function is essential for growth, metabolism, protein synthesis, endocrine activity, cardiac function, and fetal brain development. Thyrotoxicosis can lead to symptoms such as restlessness, heat intolerance, sweating, weight loss, palpitations, muscle weakness, anxiety, fatigue, sleep disturbances, and hand tremors. In contrast, hypothyroidism slows metabolism and causes nonspecific symptoms including fatigue, lethargy, anemia, constipation, cold intolerance, menstrual irregularities, hair loss, and weight gain.

The objective of this comparative study was to evaluate thyroid hormone irregularities in children aged 6, 9, and 12 years from disadvantaged rural areas and urban localities. A total of 120 school-aged children (60 boys and 60 girls) underwent thyroid profile testing using ELISA, and hormone levels were compared against reference ranges.

Among rural boys, elevated levels were found in 44% for T3, 17% for T4, and 33% for TSH. Rural girls showed high levels in 28% (T3), 39% (T4), and 44% (TSH). No abnormal hormone levels were detected in urban boys. However, urban girls showed elevated values of T3 (17%), T4 (5%), and TSH (17%). A significant difference ($p \leq 0.05$) in thyroid hormone levels was observed between rural and urban populations, although no significant sex-based difference was found ($p > 0.05$). Age showed a significant association with T4 and TSH, but not with T3.

The findings indicate that irregular T3, T4, and TSH levels are present particularly among rural children, emphasizing the need for routine screening and timely treatment to support healthy physical and mental development.

Keywords: Thyroid hormone, locality, thyrotoxicosis, underactive thyroid, growth.

Pharmacognostic study of some passiflora species (*passiflora* sp.) cultivated in Azerbaijan

[1,*]Sanam Aliyeva, [1]Humay Abbasova
[1]Department of Pharmacognosy, Azerbaijan Medical University, Baku, Azerbaijan
***seliyeva7@amu.edu.az**

Abstract: The extraction of biologically active substances from natural sources, especially plant raw materials, and the development of new medicinal products based on these substances are among the main tasks of pharmaceutical science. In the modern world, pandemics, wars, economic problems, and the effects of electromagnetic waves negatively impact human health and increase stress levels. This has led to a growing demand for sedative drugs. According to the European Medicines Agency, *Passiflora incarnata* L. holds a special place among plant-based sedative preparations. Due to its antioxidants and bioactive compounds, it is widely used in drug production today. For this reason, *Passiflora incarnata* L. is included not only in the European but also in the British pharmacopoeia. Although this plant does not grow wild in Azerbaijan, it has recently been introduced and cultivated. Therefore, the pharmacognostic study of *Passiflora incarnata* L. and *Passiflora edulis* Sims species cultivated in Azerbaijan is relevant. These species were used in the study. In modern times, flavonoid content is accurately and rapidly determined by spectrophotometric methods. The aerial parts of *P. incarnata* L. and *P. edulis* Sims plants were extracted three times with 50% ethanol in a water bath. The extracts were filtered and diluted to volume with 50% ethanol (solution A). Then, 1 ml of solution A was transferred into a 25 ml volumetric flask, aluminum chloride was added, and the mixture was kept for 40 minutes. The optical density of the solution was measured at 415 nm by spectrophotometry. For the *P. edulis* aerial part study by HPLC, 50 ml of 80% ethanol was used to extract the crushed plant material three times over 3 days (each time 24 hours). The obtained extract was concentrated by vacuum rotary evaporation. For sample preparation at 10 mg/ml, an appropriate amount of extract was dissolved in absolute methanol. Standards used included luteolin, quercetin, and apigenin. The HPLC device was an Agilent 6460 Triple Quadrupole LC-MS/MS, with a G-1316 A C18 (Discovery) column (4.6x250 nm). The mobile phase was a gradient elution of acetonitrile-water-ortho-phosphoric acid (40:60:0.5). Flow rate was 0.9 ml/min, thermostat temperature 25 °C, injection volume 3 µl, analysis time 50 minutes, and the detector was mass spectrometry (MS). Spectrophotometric analysis determined that the aerial part of *P. incarnata* contains 2.03% total flavonoids, while *P. edulis* contains 0.64%. TLC analysis with chloroform:methanol:water (61:32:7, 80:20:2) solvent systems revealed flavonoid substances with Rf values of 0.28, 0.35, 0.53, 0.78, and 0.86. HPLC analysis identified rutin and kaempferol in *P. incarnata* ethanol extracts, and apigenin, luteolin, and quercetin in *P. edulis*. Spectrophotometric analysis of alkaloids revealed a peak corresponding to harmaline.

Keywords: *Passiflora incarnata* L., *Passiflora edulis* L., pharmacognostic study, HPLC, spectrophotometry, flavonoids.

The role of mass media and communication in disseminating scientific and medical knowledge during the covid-19 pandemic

[1]Latofat Sunakbaeva, [1]Nigara Yunussova
[1]South Kazakstan Medical Academy, Shymkent, Kazakhstan
***sunakbaevalatofat08@gmail.com**

Abstract: The COVID-19 pandemic showed how important mass media and communication are in modern society. When the virus spread quickly, people needed fast and reliable information about prevention, testing, and treatment. Both health professionals and ordinary citizens depended on news and communication channels. This paper looks at the role of traditional media (TV, radio, newspapers) and digital platforms (social media, WHO and health ministry websites, online journals). These channels helped share scientific knowledge, medical advice, and official updates. At the same time, the spread of false information became a big challenge, making it harder for people to trust what they read or heard. The study also highlights how new communication technologies helped doctors, researchers, and governments exchange data and clinical experience much faster. This made it possible to develop vaccines and treatment methods in a shorter time and increased people's trust in science. In conclusion, mass media and communication during the COVID-19 pandemic were not only tools for spreading information but also important factors in supporting science, medicine, and public awareness.

Keywords: COVID-19, media, communication, science, health, misinformation

Inflammatory bowel diseases (crohn's disease, ulcerative colitis)

[1]Baymetova Shahnoza Taymatovna
[1]Astana Medical University, Astana, Kazakhstan
***shakhnozabaymetova@icloud.com**

Abstract: Inflammatory bowel diseases (IBD), comprising Crohn's disease and ulcerative colitis, are chronic relapsing disorders of the gastrointestinal tract with multifactorial etiology. Their development is associated with genetic susceptibility, immune dysregulation, and environmental triggers. Clinically, IBD presents with abdominal pain, diarrhea, rectal bleeding, and systemic manifestations, often leading to impaired quality of life and long-term disability. Current treatment strategies focus on suppressing inflammation and maintaining remission through aminosalicylates, corticosteroids, immunosuppressants, and biologic agents. However, therapeutic response is highly variable, necessitating a personalized approach. Advances in molecular biology and immunology have provided new insights into disease mechanisms, offering opportunities for targeted therapies and biomarker-based prediction of treatment outcomes. Continued research into individualized management and optimization of long-term strategies remains essential for improving patient care.

Keywords: Inflammatory bowel disease, Crohn's disease, ulcerative colitis, chronic inflammation, biologic therapy

Hippophae rhamnoides fruit extract and its impact on gut health: A natural strategy for functional constipation

[1,*]Maria Vittoria Morone, [1,2]Alessandro Di Minno, [1]Daniele Giuseppe Buccato, [1]Lorenza Francesca De Lellis, [1]Alessandra Baldi, [1]Angela Cerqua, [1]Luca Borromeo, [3]Roberto Sacchi, [1]Maria Daglia
[1]Department of Pharmacy, University of Naples Federico II
[2]CEINGE – advanced biotechnologies, 80131 Naples, Italy
[3]Applied Statistic Unit, Department of Earth and Environmental Sciences, University of Pavia
***mariavittoriamorone@unina.it**

Abstract: Functional constipation is a common gastrointestinal disorder that significantly reduces quality of life. It is often linked to poor lifestyle and dietary habits, including inadequate fiber and fluid intake, sedentary behavior, stress, and factors that impair intestinal motility and promote dysbiosis. Although synthetic laxatives such as bisacodyl and sodium picosulfate are frequently used, long-term use may result in dependency, electrolyte disturbances, and alterations in the gut microbiota. Consequently, interest has increased in non-pharmacological and plant-based alternatives that can support intestinal health by modulating the microbiota and enhancing epithelial function. Hippophae rhamnoides L. (sea buckthorn), rich in polyphenols, flavonoids, vitamins, and fatty acids, is recognized for its nutraceutical potential and may represent a promising natural remedy for improving intestinal function. This study aimed to characterize the chemical composition of a hydroethanolic extract of H. rhamnoides fruit and to investigate its potential mechanisms of action on intestinal regulation. Western blot analysis was conducted on HT-29 cells to evaluate changes in aquaporin-3 (AQP-3), a key protein involved in water transport across intestinal epithelial membranes and essential for maintaining intestinal motility.Additionally, in vitro oro-gastrointestinal digestion and fermentation were performed using fecal microbiota from healthy and constipated adults to assess how the extract is metabolized and how it influences the production of short-chain fatty acids (SCFAs), which are crucial for colon function and motility. Antioxidant capacity was measured before and after digestion and fermentation using Folin–Ciocalteu, DPPH, ABTS, and FRAP assays, while SCFAs were quantified via UHPLC-RID. Overall, these findings suggest that H. rhamnoides extract may beneficially modulate the gut microbiota, enhance intestinal function, and serve as a promising natural strategy for managing functional constipation.

Keywords: Functional constipation; gut microbiota; polyphenols; plant-based extracts; Hippophae rhamnoides.

Psychoemotional state of women with autoimmune thyroiditis

[1,*]Baymetova Kamola
[1]Regional Endocrinology Dispensary, Shymkent, Kazakhstan
***kamola.2009@mail.ru**

Abstract: Objective: Autoimmune thyroiditis is one of the most common endocrine disorders that significantly affects not only the somatic but also the psychoemotional state of patients. Women are disproportionately affected by this pathology, which underscores the need for a comprehensive assessment of its psychological aspects. The progression of autoimmune thyroiditis is associated with hormonal changes that may lead to depressive symptoms, anxiety, emotional instability, and a reduction in overall quality of life. Current research emphasizes the importance of an interdisciplinary approach that combines endocrinological treatment with psychological support and targeted interventions for psychoemotional disturbances. Analyzing the psychoemotional state of women with autoimmune thyroiditis can enhance the effectiveness of therapy, improve social adaptation, and contribute to better long-term outcomes.

Keywords: Autoimmune thyroiditis; psychoemotional state; anxiety; depression; quality of life.

Topographic anatomy and surgical techniques in thoracic surgery

[1,*]Musakulova Feruza
[1]International Kazakh-Turkish University named after Khoja Ahmed Yasawi
***dilya2003@inbox.ru**

Abstract: Understanding the topographic anatomy of the thorax is essential for the safe and effective performance of thoracic surgical procedures. Precise knowledge of anatomical landmarks, vascular structures, and organ relations allows surgeons to minimize intraoperative complications and optimize patient outcomes. This study reviews the current concepts of thoracic topographic anatomy and its application in operative surgery, highlighting key surgical approaches and technical considerations. Emphasis is placed on the integration of anatomical knowledge into preoperative planning, intraoperative navigation, and postoperative management. Advances in imaging techniques and surgical instrumentation have further enhanced the accuracy of thoracic interventions, underlining the importance of continuous anatomical education for surgeons.

Keywords: Thoracic surgery; topographic anatomy; operative techniques; surgical approaches; clinical anatomy.

Subclavian artery occlusion and steal syndrome: The significance of carotid–subclavian bypass

[1,*]Baymetov Shahruh Taymatovich, [1]Mukhametkaliev S.S.
[1]Astana Medical University, Multidisciplinary City Hospital №2, Astana, Kazakhstan
***Shahruhgoodmoon@gmail.com**

Abstract: Subclavian artery occlusion, although relatively uncommon, represents an important clinical challenge due to its potential to cause vertebral artery steal syndrome. This syndrome occurs when blood is diverted from the posterior cerebral circulation to the upper extremity, leading to neurological deficits, dizziness, syncope, and ischemic manifestations in the affected arm. Early recognition and timely intervention are crucial to prevent complications, particularly cerebrovascular events. The purpose of this study is to highlight the significance of carotid–subclavian bypass in the management of subclavian artery occlusion complicated by steal syndrome. A review of current literature and clinical experience indicates that non-invasive diagnostic methods, such as duplex ultrasound and CT/MR angiography, remain essential tools for accurate diagnosis and preoperative planning. Clinical data further emphasize that careful patient selection, proper intraoperative technique, and close postoperative monitoring are key factors influencing positive outcomes. Reported complications, such as cranial nerve injury, infection, or graft occlusion, remain relatively low and can be minimized by adherence to established surgical protocols. In conclusion, carotid–subclavian bypass remains a reliable and effective surgical option for managing patients with subclavian artery occlusion and vertebral artery steal syndrome. Its role continues to be reinforced as an essential part of modern vascular surgery, offering a balance between safety, efficacy, and long-term durability.

Keywords: Subclavian artery occlusion, steal syndrome, carotid–subclavian bypass, vascular surgery, cerebrovascular insufficiency.

Exercise combined with an antioxidant-rich diet reduces oxidative stress and improves metabolic outcomes in a murine model of fatty liver

[1]Maria del Mar Ribas-Taberner, [2,3]Manuel Jiménez-García, [1]Maria Magdalena Quetglas-Llabrés, [2,3]David Moranta-Mesquida, [2,3,4]Silvia Tejada-Gavela, [1,3,4,*]Antoni Sureda
[1]Research Group on Community Nutrition & Oxidative Stress, University of the Balearic Islands-IUNICS, Palma de Mallorca, Spain
[2]Group of Neurophysiology, Department of Biology, University of the Balearic Islands, Palma de Mallorca, Spain
[3]Health Research Institute of the Balearic Islands (IdISBa), Palma, Spain
[4]CIBEROBN (Physiopathology of Obesity and Nutrition), Madrid, Spain
***antoni.sureda@uib.es**

Abstract: Metabolic dysfunction-associated steatotic liver disease (MASLD) is one of the most prevalent chronic liver disorders worldwide, closely linked to obesity, insulin resistance, and metabolic syndrome. Oxidative stress plays a central role in its progression, making it a critical therapeutic target. This study evaluated the effects of physical exercise combined with either a standard diet or an antioxidant-enriched diet on hepatic and systemic oxidative stress, antioxidant defenses, and metabolic parameters in a murine model of fatty liver. Wistar rats were allocated to five groups: control, fatty liver (high-fat diet, HFD), HFD+Exercise, HFD+StandardDiet+Exercise, and HFD+AntioxidantDiet+Exercise. After five months, body weight, hepatic steatosis, plasma biomarkers, and antioxidant enzyme activities in liver and muscle were assessed. Exercise combined with dietary interventions reduced body weight gain and hepatic fat accumulation compared to HFD, with the antioxidant diet plus exercise group showing the most pronounced benefits. This group also exhibited lower plasma glucose, higher circulating irisin, reduced lipid peroxidation (MDA), and restored antioxidant enzyme activities (catalase, superoxide dismutase, glutathione peroxidase). Similar improvements were observed in muscle tissue, indicating systemic benefits. In conclusion, combining physical exercise with antioxidant-rich diets effectively mitigates oxidative stress and improves metabolic and hormonal regulation in MASLD, supporting its potential as a non-pharmacological therapeutic strategy.

Keywords: MASLD, oxidative stress, antioxidant diet, exercise, liver

Impact of nano-vectorization on the anti-aromatasic activity of curcumin: a cellular and molecular approach and molecular approach

[1,2,3,*]Zoulikha Abdelsadek, [4,5]Rafik Menad, [6]Patrick J. Masset
[1] Institute of Electrical and Electronics Engineering, University of M'hamed-Bougara, Independence Avenue
[2] Laboratory of Sciences of Materials and Chemical Processes (LSMPC), USTHB, B.P. 32 El-Alia
[3] Process Engineering Department, Petrochemical Synthesis Laboratory, M'hamed Bougara University
[4]Small Vertebrates Reproduction, Laboratory of Research on Arid Areas, Faculty of Biological Sciences, Houari Boumediene University of Sciences and Technology
[5] Faculty of Sciences, Department of Natural and Life Sciences, University of Algiers
[6] Technallium Engineering &Consulting, Fliederweg 6, D-92449 Steinberg am See
***zoulisabrina@yahoo.fr**

Abstract: The theme "Impact of nanovectorization on the anti-aromatasic activity of curcumin: a cellular and molecular approach" explores the enhancement of curcumin's therapeutic efficacy through encapsulation in nanoparticles. Although curcumin has recognized anti-inflammatory, antioxidant and anticancer properties, its poor bioavailability due to limited solubility and stability restricts its clinical use. The aim of this research is to encapsulate curcumin in "Double Lamellar Hydroxide" nanoparticles to increase its solubility, stability and cellular uptake. The methodology includes preparation from extraction to intercalation and subsequent characterization of the nanoparticles, followed by in vitro studies to assess the cytotoxicity, cellular internalization and biological activity of curcumin nanovectorized in double lamellar hydroxides on different cell lines. The expected results of this study include increased curcumin bioavailability, improved cellular internalization and enhanced biological activity, demonstrating the positive impact of nanovectorization. This approach could not only improve the therapeutic efficacy of curcumin, but also open up new prospects for clinical applications in the treatment of various diseases, by providing an in-depth understanding of the interactions between nanoparticles and the systems.

Keywords: Aromatase, curcumin, Mg-Al-HDL, nanovectorization, cancer, prostate, spermatogenesis, estrogen, terstosterone.

Therapeutic effects of *Wrightia tinctoria* against cervical and human liver cancer

[1]Iqra Shabeer, [1]Maryam and [1],*Ammara Riaz
[1]Khwaja Fareed University of Engineering and Information Technology, Faculty of Natural and Applied Sciences, Department of Life Sciences
***ammara.riaz@kfueit.edu.pk**

Abstract: Liver and cervical cancer in women is two of the most challenging and deadly types of cancer that exists today. In women, cervical cancer ranks fourth in terms of incidence and seventh overall. Reducing the risk of death from cervical cancer in women requires early identification and treatment. The capacity to dodge growth signals, commence invasion, promote angiogenesis, resist cellular death, rewire the metabolism, and reprogram the metabolism are among the critical cellular alterations that are diverse in term cancer. Alternative therapies must be investigated because the adverse effects of conventional drugs for these tumors are frequently severe. *Wrightia tinctoria's* have potential as a treatment for human liver and cervical cancer, with a particular emphasis on the phytochemical components and cytotoxic properties of the plant. Leaves were gathered and ground up, and then the Methanolic Soxhlet extraction technique was used to prepare the extracts. To evaluate the bioactive components in the extract, phytochemical tests were used for qualitative phytochemical screening. Bioactive qualities of *W. tinctoria* extract are due to the presence of flavonoids, alkaloids, steroids, tannins, and saponins, which were validated by phytochemical analysis. The IC50 value of the *W. tinctoria* extract exceeded 200µg/ml, indicating minimal cytotoxicity in HepG2 cell cytotoxicity experiments. On the other hand, the extract showed an IC50 value of 141.6µg/ml and a concentration-dependent cytotoxic impact on HeLa cells. These results demonstrate *W. tinctoria's* specific cytotoxicity against HeLa cells, suggesting that it may be used as a cervical cancer treatment.

Keywords: *W. tinctoria*, liver cancer, cervical cancer, anticancer, phytochemicals.

Complex Formation Of Palladium (Ii) With Biotin

[1]Hasanov Kh.I., [1]Azizova A.N., [2]Ajalova G.İ., [3]Qulieva N.M., [2]Mansurova G.A., [4,*]Hajiyeva E.M, [1]Qasımov Sh.H.
[1]Azerbaijan Medical University, Research Center
[2]AMU, Department of Pharmaceutical Toxicology and Chemistry
[3]West Caspian University
[4]AMU, Department of Pharmacognosy
***haciyeva_esmira@mail.ru**

Abstract: It is known that the high biological activity of biotin, a water-soluble B vitamin, can manifest itself not only in its free state, but also in the form of complex compounds with platinum group metals. Therefore, the synthesis and study of new noble metal complexes with compounds of this class is relevant. The complex formation of palladium (II) with a multifunctional reagent, biotin (L), whose molecule consists of a tetrahydroimidazole and tetrahydrothiophene ring, has been studied. In the tetrahydrothiophene ringIt is a component of enzymes that regulate protein and fat balance and has high activity. The complexes were first synthesized in an aqueous-ethanol medium by replacing acid ligands with donor ligand atoms, yielding two palladium(II) complexes. It was established that at a given Pd-L ratio of 1:2, a complex of the composition $[Pd(HL)_2Cl_2]$ **I** is formed, which is a yellow powdery substance, moderately soluble in water and polar organic solvents. In the ^{13}C NMR spectrum of this compound, compared to the spectrum of the ligand itself, the signal of the carbon atom at the sulfur atom 180.82 m.d. shifts in a weak field by 22.4 m.d., which indicates the formation of a coordination bond S→Pd. The electronic absorption spectrum of the complex has a set of diffuse bands with maxima at 41000 and 36000 cm^{-1}, corresponding to the Cl→Pt and S→Pt bonds. The absorption band of the ν_{C-S} bond in the IR spectrum of the complex, compared to the ligand spectrum, shifts to the far region by 20 cm^{-1}, which confirms the coordination of the sulfur atom with the central atom. The absorption bands at 348.342 cm^{-1} correspond to valence vibrations of Pd-Cl, while those at 318 and 312 cm^{-1} correspond to Pd-S. Two absorption bands for one bond indicate the cis structure of the complex. The $[Pd(L)_2]$ **II** complex was obtained in an alkaline medium at 50 °C with a Pd-L ratio of 1:2 for three hours. The compound precipitated from the reaction mixture with hexane is a yellow-brown syrupy mass. In the 1H NMR spectrum, the signal of the carbon atom of the carboxyl group is shifted by 6.12 m.d. in the weak field compared to its position in the ligand spectrum. The electronic absorption spectrum shows a broad band with a maximum at 42000 cm^{-1}, as well as bands at 32000 and 19400 cm^{-1} in the form of shoulders. In the IR spectrum, the ν_{C-S} band is shifted by 20 cm-1 compared to its position in the reagent spectrum. The bands at 359 and 344 cm^{-1} correspond to the ν_{Pd-S} bond, and the absorption bands at 1673 and 1695 cm^{-1} correspond to symmetric and asymmetric vibrations attributed to the deprotonated carboxyl group of the ligand. The data obtained indicate the formation of a mononuclear complex $[Pd(L)_2]$ in which the ligand is coordinated bidentately via the sulfur and oxygen atoms of the carboxyl group of the ligand. Both complexes are non-electrolytes. Preliminary biological testing of complexes $[Pd(HL)_2Cl_2]$ **I** $[Pd(L)_2]$ **II** showed that complex **I** exhibits radioprotective properties. Complex **II** possesses cytotoxic and antimicrobial properties. Neither complex exhibits biological properties related to biotin.

Keywords: Biotin, Palladium(II) complexes, Biological activity

Synthesis of silver nanoparticles using *aegle marmelos* fruit extract and its potential biological applications

[1,*]Muhammad Mustaqeem, [1]Zille Huma, [1]Muhammad Fayyaz Ur Rehman, [1]Fouzia batool
[1]Institute of Chemistry, University of Sargodha, Sargodha
***muhammad.mustaqeem@uos.edu.pk**

Abstract: *Aegle marmelos*, often known as the Bael and also known as wood apple, Bengal quince, Japanese bitter orange, or golden apple, is a kind of tree that is inherent to Indian subcontinent and Southeast Asia. It may be found in Bangladesh, India, Sri Lanka, Nepal, and Pakistan as a naturally occurring species. The tree is considered sacred by Buddhists and Hindus. *Aegle marmelos*, a member of the Rutaceae family, has been used widely in conventional medical systems because of its many medicinal advantages. The ethanolic extracts of the fruit of *Aegle marmelos* reveal various bioactive phytochemical components, which are related to the therapeutic efficacy of medicinal plants and their secondary metabolites, or phytochemicals. The unique antibacterial properties of silver nanoparticles, or AgNPs, have garnered a lot of interest. Plant extract-mediated synthesis has shown to be more successful than other biological systems since it is simple, affordable, and easy to utilize. The current study's objective is to create silver nanoparticles utilizing the alcoholic fruit extract from *Aegle marmelos*. Due to the fact that AgNPs are synthesized under diffused solar irradiation, it is both affordable and ecologically benign. FTIR, TGA and UV-visible spectroscopy are the analytical procedures that are employed to comprehensively analyze the produced AgNPs. We can better address the Sustainable Development Goals (SDG-3) in the health sector with the aid of this research.

Keywords: *Aegle marmelos,* AgNPs, Biological evaluation

Efficacy of watermelon seed meal based diet on overall performance of rohu (*Labeo rohita*) fingerlings

[1],*Muhammad Mudassar Shahzad, [2]Syed Makhdoom Hussain, [1]Zawar Hussain, [1]Rabia Gull, [1]Muhammad Yasir Zahoor, [1]Muhammad Sabtain Khan
[1]Department of Zoology, Division of Science and Technology, University of Education
[2]Department of Zoology, Government College University Faisalabad
[3]Institute of Biochemistry and Biotechnology, University of Veterinary and Animal Sciences
***drmudassarshahzad@gmail.com**

Abstract: Rising demand for fish meat and the high cost of fish meal (FM) in aquafeeds highlight the need for alternative protein sources. In Pakistan, watermelon is being eaten from many years with waste in the form of seeds. In the current study, we uses these raw watermelon seeds for the preparation of fish feed. Test diets (TDI-TDVI) were given with different levels of watermelon seed meal (WMSM) as 0%, 20%, 40%, 60%, 80%, and 100%. Fingerlings were shifted in tanks having 70 L water-retaining capacity and were fed twice a day. The feces samples were obtained daily for chemical analysis. It was noticed that fish fed with a 60% WMSM-based diet (TD-IV) achieved the maximum growth indices: final weight (29.27 g), weight gain (21.72 g), WG% (289%), specific growth rate (1.51), and survival rate (98%); the highest hematological indices (RBC: 3.12×106 mm^{-3}, Hb: 8.27 g/100 ml, PLT: 69.38, Ht: 36.13%); and the highest nutrient digestibility values (CP: 73% and CF: 74%). From these findings it was concluded that WMSM can replace FM up to 60% without compromising the health of fish.

Keywords: Aquaculture, Fish meal, Blood indices, Growth indices

Preparation of rocket seed (*Eruca Sativa*) meal based diet and its effect on overall performance of rohu (*Labeo Rohita)* fingerlings

[1,*]Muhammad Mudassar Shahzad, [1]Muhammad Sabtain Khan, [2]Syed Makhdoom Hussain, [3]Syed Zakir Hussain Shah, [4]Aasia Karim, [1]Fatima Yasin
[1]Department of Zoology, Division of Science and Technology, University of Education
[2]Department of Zoology, Government College University Faisalabad
[3]Department of Zoology, University of Gujrat
[4]Department of Zoology, Sardar Bahadur Khan Women University Quetta
***drmudassarshahzad@gmail.com**

Abstract: The rising worldwide need for novel food sources, like fish meat, is pushing scientists to investigate novel aquafeed ingredients. A 70-day feeding trial examined the efficacy of rocket seed meal (RSM) as a protein replacement for fish meal (FM) on the overall performance of *Labeo rohita* fingerlings (initial weight: 4.1±0.05 g/fish). Six isonitrogenous (32% CP), isolipidic (7.6% of crude fat) and isocaloric (4.52 MJ kg^{-1}) diets with 0, 20, 40, 60, 80 and 100% of FM replaced with RSM. Fingerlings were fed in triplicate groups two times a day, and samples of their feces were collected every day for chemical analysis. Current study results showed that RSM can replace FM at significance level ($P<0.05$) and showed best outcomes in growth (BWG; 20g, BWG%; 266.27%, SGR; 1.44% day^{-1}, SR; 97.78%, FCR; 1.20), nutrient digestibility (CP; 71.62%, and GE; 68.40%), hematological parameters (RBC; 2.998×10^{6} mm^{-3}, Hb; 8.21 g dL^{-1}, PCV; 25.81%, PLT; 61.32), carcass composition (CP; 17.58%, CF; 8.47%, and GE; 2.75 kcal g^{-1}), and mineral absorption (P; 66%, Ca; 68%, K; 70%, Na; 72%) at 40% replacement. In conclusion, these results demonstrated that RSM can safely and effectively replace up to 40% of dietary FM, improving the overall performance of fish.

Keywords: Food security; aquaculture; aquafeed; fish meal replacement; growth performance.

Pea-Peel meal utilization in the diet of *labeo rohita* juvenile in intensive aquaculture

[1]Aasia Karim, [2,*]Muhammad Mudassar Shahzad, [2]Zawar Hussain, [3]Muhammad Yasir Zahoor, [1]Brishna, [1]Ambreen Ijaz
[1]Departments of Zoology, Sardar Bahadur Khan Women's University
[2]Department of Zoology, Division of Science and Technology, University of Education
[3]Institute of Biochemistry and Biotechnology, University of Veterinary and Animal Sciences
***drmudassarshahzad@gmail.com**

Abstract: Vegetable protein is the cheapest protein source to replace fishmeal. It is widely used as a perfect replacement for high-quality fishmeal in many classes of aquaculture feed due to its high availability, and stable supply. *Pisum sativum* has been successfully used as an energy- and protein-rich dietary feed in aquaculture feeds designed for various species of aquatic oranisms. A trial was designed to find out the effects of pea peel meal on *Labeo rohita* growth performance. Fish meal was substituted with pea meal in graded levels in the diet of *Labeo rohita* juveniles. Study confirmed that 40% (DIII) fishmeal replacement by pea peel meal had considerable positive effect on growth of Rohu, which is followed by 60% (DII). Both produced very chunky fish in contrast to the control. The optimal protein requirement of *Labeo rohita* was found to be 30% protein and 25%. A decreased growth was observed with increase in fishmeal substitution (such as for 60% to 80% substitution) in DI and DII. It was also observed that pea protein could be used as an alternative protein source to minimize the inclusion level of fishmeal for *Labeo rohita* juveniles.

Keywords: Pea peel meal, Aquaculture, Rohu, Fisheries

Study of the copolymerization reactions of *Ortho-, Meta-, and Para-*carboxyphenylmaleimides with methyl methacrylate

[1,*]Guliyeva Sh.I, [2]Alikhanova A. I., [1]Garayev E.A., [2]Mammadov B.A.
[1] Azerbaijan Medical University, Faculty of Pharmacy, Department of Pharmaceutical Toxicology and Chemistry
[2] Institute of Polymer Materials of the Ministry of Science and Education of the Republic of Azerbaijan,
***guliyevashahana86@mail.ru**

Absract: The development of science and technology at the present stage raises the problem of obtaining new polymer materials with a specified set of properties. In recent decades, the creation and study of polymers based on derivatives of unsaturated dicarboxylic acids, in particular imides, has undergone intensive development in the field of macromolecular chemistry. The increased interest in these objects is due to the uniqueness of itacone, citracon, and maleimide cycles, which lies in their ability to undergo radical, anionic, additive (co)polymerization, cycloaddition, and various photochemical interactions. Such properties of unsaturated imides can be used both for the construction of macro- and oligomeric molecules and for the production of spatially cross-linked polymers and products based on them. Copolymers of methyl methacrylate with *ortho-, meta- and para*-carboxyphenylmaleimides were synthesized and their physical, mechanical and thermal properties were studied. The mechanism of radical copolymerization of methyl methacrylate (MMA) with carboxyphenylmaleimides were investigated. This copolymers were obtained by using benzoyl peroxide in the solvent - initiator methyl ethyl ketone. The conditions of copolymerization of MMA with (*o-, m- and p*-carboxyphenylmaleimides were selected. The structure of copolymers was determined on the basis of IR spectra. The thermal stability of the copolymers were evaluated by thermogravimetric and differential thermal analysis (DTA). Their rigidity, thermal stability, and functional –COOH groups make these copolymers useful for heat-resistant coatings, strong adhesives, electronic materials, high-performance composites, and biomedical applications such as drug delivery systems or medical device coatings.

Keywords: *Ortho-, meta- and para*-carboxyphenylmaleimides, methyl methacrylate, copolymerization, thermal properties.

Complex Management of Perigraft Infection and Acute Limb Ischemia Following Femorofemoral Bypass: A Case Report

[1,*]Mukhametkaliyev Seil Seitkozhanovich, [1]Baymetov Shahruh Taymatovich
[1] Astana Medical University, Multidisciplinary City Hospital
[*]Shahruhgoodmoon@gmail.com

Abstract: A rare clinical case is presented describing the combined course of amniotic infection and acute lower limb ischemia following femorofemoral bypass in a pregnant patient with a complicated medical history. Diagnostic challenges, treatment strategies, and the outcomes of a comprehensive approach—including antibacterial, anticoagulant, and detoxification therapy, as well as multidisciplinary collaboration between vascular surgeons and obstetrician-gynecologists—are discussed. Early diagnosis and timely intervention made it possible to stabilize the mother's condition and preserve fetal viability.

Keywords: amniotic infection, limb ischemia, femorofemoral bypass, vascular surgery, clinical case.

Комплексное лечение околоплодной инфекции и острой ишемии конечности после бедренно-бедренного шунтирования: клинический случай

[1,*] Мухаметкалиев С. С, [1]Байметов Ш. Т.
[1] Медицинский университет Астаны, Многопрофильная городская больница №2, Астана, Казахстан
[*]Shahruhgoodmoon@gmail.com

Абстрактный: Представлен редкий клинический случай сочетанного течения околоплодной инфекции и острой ишемии нижней конечности после бедренно-бедренного шунтирования у беременной пациентки с отягощённым соматическим анамнезом. Рассмотрены диагностические трудности, лечебная тактика и результаты комплексного подхода, включающего антибактериальную, антикоагулянтную и дезинтоксикационную терапию, а также мультидисциплинарное взаимодействие сосудистых хирургов и акушеров-гинекологов. Ранняя диагностика и своевременное вмешательство позволили стабилизировать состояние матери и сохранить жизнеспособность плода.

Ключевые слова: околоплодная инфекция, ишемия конечности, бедренно-бедренное шунтирование, сосудистая хирургия, клинический случай.

Biological properties of chitin and its use as a trendy biotechnological product

[1,*]Bolat Seidanov, [2,3]Zeliha Selamoglu
[1]Al-Farabi Kazakh National University, Faculty of Biology and Biotechnology
[2]Khoja Akhmet Yassawi International Kazakh-Turkish University, Faculty of Sciences, Department of Biology
[3]Department of Medical Biology, Faculty of Medicine, Nigde Omer Halisdemir University
***bolatseidanov@gmail.com**

Abstract: Chitin, a natural polysaccharide composed of β- (1 → 4) - linked N-acetylglucosamine units, ranks as the second most abundant biopolymer on Earth after cellulose. It is primarily obtained from the exoskeletons of arthropods and fungal cell walls, and due to its high crystallinity and low solubility, its extraction and utilization pose technical challenges. Chitin exhibits advantageous traits such as biodegradability, biocompatibility, mechanical robustness, and antimicrobial activity. Its deacetylated derivative, chitosan, introduces free amino groups, enhancing solubility in acidic media and enabling versatile chemical modifications. Chitosan displays antioxidant, anti-inflammatory, antihypertensive, anticoagulant, antitumor, antidiabetic, and hypocholesterolemic properties. Emerging green extraction methodologies- such as microbial fermentation, ionic liquids, and electrochemical treatments- afford more sustainable chitin recovery and facilitate production of chitin-based biomaterials. These materials serve in food science (functional ingredients, active packaging), medicine (wound dressings, tissue scaffolds, drug delivery systems), environmental applications (adsorbents, biofuels), and energy. Chitin and chitosan are widely recognized as pharmaceutical excipients, drug carriers (e.g., micro- and nanoparticles for insulin, antigens, siRNA delivery), and biologically active agents with antioxidant and anti-inflammatory effects. They are also applied in the food industry as stabilizers, emulsifiers, edible films, and adsorbents to remove heavy metals and mycotoxins. These combined features—bioactivity, tunable physicochemical properties, and sustainable sourcing—position chitin and chitosan as highly attractive and trendy biotechnological materials.

Keywords: Chitin, Chitosan, Biomedical applications