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TURK-COSE 2024

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AGRICULTURAL SCIENCES AND TECHNOLOGIES

Nano Iron-Oxide ımproves the physiological traits of soybean

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Abstract: Soybean (*Glycine max*) is highly useful and many-sided crop belongs to legume family. Iron deficiency severly affects the growth and development of the soybean. Especially high soil pH hinders the availability of iron to the plant and casuses iron deficiency chlorosis (IDC) in soybean. Nanotechnology is newly developing field which has a lot of usage area from medicine to agriculture. Nano iron oxide particles which has superior properties according to classical counterparts can be a promising solution to problems related to iron deficency in soybean. Therefore the aim of this study was to evaluate the effects of nano iron oxide nanoparticles on soybean growth and development in hydrophonic system. SPAD, root length, stem wet weight, root wet weight, stem dry weight, root dry weight and chlorophyll content of the leaves of Atakişi and Arısoy cultivars were evaulated. Treatments were three levels of nano-iron oxide (0, 100 and 200 ppm) with positive and negative control (EDTA-Fe and Fe). Application of iron oxide nanoparticles at 100 and 200 ppm was found to improve the root length, stem dry and wet weight, root dry and wet weight and chorophyll content of the leaves in both Atakişi and Arısoy cultivar while there was no significant difference between nano iron-oxide application and positive control in the SPAD value of Atakişi cultivar. Our results indicate that application of nano iron-oxides at 100 and 200 ppm imrpoved the physological traits of the soybean cultivars in hyrophonic system and that nano iron-oxides can successfully serve as substitutes for its conventional counterparts, effectively mitigating yield losses associated with IDC.

Anahtar Kelimeler: Nanotechnology, Soybean, Nano iron-oxide, SPAD, Chlorophyll.

Azospirillum brasilense bakterisinin patateste *in vitro* mikroçoğaltım performansı üzerine etkileri

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Özet: Dünyanın neredeyse her yerinde patates çeşitleri gıda tüketiminin önemli kaynağı olarak kullanılmaktadır. Fakat popüler olduğu kadar büyüme, yetişme ve verim elde etme gibi konularda tüketim teminine engel olan sıkıntılar da vardır. Örneğin iklim, toprak veya sulama açısından, bazı bölgeler patates üretimine uygun değildir ya da ekonomik giderleri yüksek meblağ talep eder. Dolayısıyla sorunun kökünden çözülmesi için her ülkenin kendi tohumluk patates üretimine yönelmesi gerekmektedir. Tohumluk patates üretiminde ise hastalık ve zararlılardan ari, yüksek kaliteli ve yüksek verimli ürün elde etmek için standart üretim yöntemlerini kullanmak yerine bitki büyümesini teşvik edici bakteriler kullanılması faydalıdır. Bitki büyümesini teşvik eden bakteriler toprakta bulunur, ancak popülasyon sayıları, yaygın olarak bulunan ve rizosferde iyi yerleşmiş olan diğer bakteri suşları ile rekabet etmek için yeterli değildir. Bu nedenle, bitki veriminin artırılmasında faydalı özelliklerinden yararlanmak için bitkileri hedef mikroorganizmalarla aşılamak gerekmektedir. Bitkisel üretimde verim ve kalitenin artırılması, kimyasal gübre ve zirai ilaç kullanımının azaltılması için bakterilerden yararlanılması doğal kaynakların etkin kullanımı ve sürdürülebilir tarım açısından da çok büyük önem taşımaktadır. Bu bildiride, boğum kültürü ile çoğaltım aşamasında *Azospirillum brasilense* bakterisinin 2 farklı suşunun (Sp7 ve Sp245) tek başlarına ve birlikte MS büyüme ortamına eklenerek erkenci Deniz patates çeşidinin *in vitro* mikroçoğaltım performansına olan etkileri belirlenmiştir.

Anahtar kelimeler: Tohumluk patates, Bakteri, Mikroçoğaltım**.**

Effect of *Azospirillum brasilense* Bacteria on *in vitro* Micropropagation of Potato

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Abstract: Potato varieties are used as an important source of food consumption almost everywhere in the world. However, as popular as it is, some problems prevent its consumption in terms of growth, cultivation and efficiency. For example, some regions are not suitable for potato production in terms of climate, soil or irrigation, or their economic costs require high amounts. Therefore, it is necessary to solve the problem at its roots and each country should focus on its own seed potato production. In seed potato production, it is beneficial to use plant growth-promoting bacteria instead of using standard production methods to obtain high-quality and high-yield products free from diseases and pests. In general, plant growth-promoting bacteria are present in the soil, but their population numbers are not sufficient to compete with

other bacterial strains that are commonly found and well established in the rhizosphere. Therefore, it is necessary to inoculate plants with target microorganisms to utilize their beneficial properties for increasing plant yield. Utilizing bacteria to increase efficiency and quality in plant production and to reduce the use of chemical fertilizers and pesticides is of great importance in terms of efficient use of natural resources and sustainable agriculture. In this report, the effects of adding two different strains of *Azospirillum brasilense* bacteria (Sp7 and Sp245), alone and/or together, to MS growth medium at the stage of propagation by node culture on the *in vitro* micropropagation performance of three different potato varieties were determined.

Keywords: Seed potato, Bacteria, Micropropagation.

Using locally available black seeds (*Nigella sativa*) in part place of fish meal for rohu fingerlings

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Abstract: Over a period of 90 days, the effect of a black seed meal (BSM)-based diet was assessed on overall performance Labeo rohita fingerlings. BSM was used to make six experimental diets having 0, 10, 20, 30, 40 & 50% and their pellets were formed. Fish were fed two times within 24-hours period, at 4% of their body weight and sample of feces were collected and preserved. The research findings demonstrated that by adding BSM to the fish diet enabled rohu fingerlings to improve significantly. Fingerlings given 20% of BSM, showed the highest growth parameters (WG%: 241%, FCR: 1.31 and SGR: 1.36), nutritional digestibility (GE, 69.51kcal/g; CP, 73%; CF, 72%), hematological parameters (Ht:35%, RBC:2.72×106mm-3, and Hb:8.10g/100ml) and mineral absorption (Ca: 71%, K: 75%, Na: 73%, P: 73%) were noted. This improved fingerlings growth and performance by lowering water discharge, which in turn reduced water pollution.

Keywords: Nigella sativa, Labeo rohita, Growth performance, Hematology, Mineral absorption

Advancements in soya feed by Agrolok: Task 1 outcomes for EU protein assurance

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Abstract: This research examines the influence of hydrobarothermal treatment on Polish non-GMO soybean meal and its impacts on chicken performance, protein digestibility, and availability of amino acids. A preliminary experiment was done on 972 adult laying hens. Subsequently, the processed soybean meal was included into 972 laying hens diets containing 81 groups with 4 replicates containing 3 birds per replicate to evaluate its effects on growth performance, feed efficiency, and nutrient absorption. Initial findings suggest that hydrobarothermal treatment substantially enhances the protein content of soybean meal about 39%, decreasing the level of trypsin inhibitor 3.04mg/g, protein dispersion solubility index 24% and increased the digestibility of soybean meal above 90%. Improved protein digestibility was noticed, accompanied by a significant rise in the presence of crucial amino acids, including lysine, methionine, and threonine. The data indicate that hydrobarothermal treatment improves the nutritional quality of non-GMO soybean meal, leading to enhanced growth performance and nutrient utilization in laying hens. This study illustrates the capacity of the novel high-protein soy-based feed ingredient to improve protein safety in the European Union. The research concludes that the hydrobarothermal treatment of Polish non-GMO soybean meal could be a successful approach to enhance the quality of poultry feed, hence promoting sustainable and efficient poultry production. Additional investigation is advised to examine the enduring consequences and possible financial advantages of this treatment approach in commercial chicken farms.

Keywords: European Union, Protein bioavailability, Soybean meal, Protein digestibility, Amino acids

RNA interference (RNAi) and Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) Cas9 approaches in obtaining male sterile plants

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Abstract: Due to the increasing demand for food in the world, plant breeders are working on increasing the crop yields. For this reason, they resort to various methods. One of the most common methods used here is the hybrid seeds. Hybrids are widely used because they have superior characteristics to their parents. There are various ways to obtain hybrid seeds. One of these is the use of the male sterility approach. Although these are more traditional methods, different methods are now emerging with the biotechnological advances. Some of the methods currently used here are RNA interference and CRISPR methods. With the inclusion of these methods, male sterile plants can be effectively obtained. It is aimed to further develop these techniques in the future and use them actively in this field.

Keywords: Hybrid, Male sterility, RNAi, Crispr

Phytobiotics in poultry nutrition: a path towards sustainable farming and antibiotic-free production

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Abstract: The growing worldwide apprehension over antibiotic usage in chicken farming, attributed to the escalation of antimicrobial resistance, has generated interest in natural alternatives. Phytobiotics, plant-based feed additives derived from herbs, spices, and medicinal plants, have emerged as a promising alternative to antibiotics in poultry nutrition. Bioactive substances originating from plants, have emerged as a possible approach for enhancing poultry nutrition and fostering sustainable agricultural practices. This research examines the impact of several phytobiotics on chicken performance, meat quality, gastrointestinal health, and immune function, emphasising their potential to substitute conventional antibiotics. Phytobiotics have shown the ability to improve feed consumption, nutritional assimilation, and growth efficacy by optimising gut microbial equilibrium and intestinal structure. Moreover, their antioxidant and anti-inflammatory characteristics enhance meat quality, oxidative stability, and animal welfare. Poultry farming may become more ecologically friendly and sustainable by using phytobiotics, which also lessen the need for antibiotics. These results highlight the promise of phytobiotics as a feasible substitute for antibiotics, facilitating the development of more sustainable and efficient poultry systems. Their multifaceted benefits, including enhanced gut health, and support for the immune system, pave the way for a healthier, and antibiotic-free future for poultry production. Future study should concentrate on optimising doses, combinations, and delivery systems of phytobiotics to enhance their efficacy and further decrease antibiotic use in poultry production.

Keywords: Antibiotic alternatives, Gut health, Productivity, Oxidative stability, Immune function

Azelaik asit ön uygulamasının (priming) tuz stresi altındaki arpa (*Hordeum vulgare* L.) tohumlarında çimlenme ve bazı fide parametreleri üzerine etkisi

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Özet: Bu çalışma, azelaik asit (AzA) ön uygulamasının tuz stresi koşullarındaki arpa (*Hordeum vulgare* L.) tohumlarının çimlenme ve bazı fide parametreleri üzerindeki etkilerini değerlendirmek amacıyla yürütülmüştür. Araştırma, tam şansa bağlı deneme desenine göre, dört farklı tuzluluk düzeyinde (0 mM NaCl; kontrol, 25 mM NaCl, 50 mM NaCl, 100 mM NaCl) ve 2 farklı dozda AzA (0 mM; kontrol, 0.5 mM) uygulaması, 3 tekerrürlü olarak yürütülmüştür. Bitkisel materyal olarak arpa çeşidi Larende kullanılmıştır. Çalışmada çimlenme ve bazı fide gelişim parametreleri (çimlenme oranı, ortalama çimlenme zamanı, çimlenme gücü indeksi, kök uzunluğu, sürgün uzunluğu, kök yaş ağırlığı, sürgün yaş ağırlığı, tuz tolerans indeksi) saptanmıştır. Varyans analiz sonuçlarına göre arpada AzA ön uygulaması; sürgün uzunluğu, kök yaş ağırlığı, sürgün yaş ağırlığı üzerine ve tuz tolerans indeksine önemli düzeyde ($p \leq 0.01$) etki etmiş olup, diğer parametreler üzerine etkisi önemsiz bulunmuştur ($p \geq 0.05$). Elde edilen ortalama değerlere göre en yüksek sürgün uzunluğu (10.3 cm), kök yaş ağırlığı (0.190 gr), sürgün yaş ağırlığı (0.180 gr) ve tuz tolerans indeksi (125,9) 0.5 mM AzA ön uygulamasından; en düşük sürgün uzunluğu (9.5 cm), kök yaş ağırlığı (0.140 gr), sürgün yaş ağırlığı (0.149 gr) ve tuz tolerans indeksi (72.1) değerleri ise AzA ön uygulaması yapılmayan konudan elde edilmiştir. Artan NaCl stresi incelenen tüm özellikleri olumsuz etkileyerek önemli düzeyde etkilemiştir ($p \leq 0.01$). AzA x NaCl interaksiyonunda ise 0.5 mM azelaik asit ön uygulaması özellikle 25 mM NaCl stresi şartlarında kök yaş ağırlığı, sürgün yaş ağırlığı ve tuz tolerans indeksi üzerinde artırıcı etki oluşturmuş ($p \leq 0.01$) ve en yüksek değerler sırasıyla; 0,236 gr, 0,213 gr ve 156,2 olarak elde edilmiştir. Arpa bitkisinde tuzluluk seviyelerinin özellikle çimlenme parametreleri üzerindeki etkilerine bakıldığında, 0, 25 ve 50 mM uygulamalarından elde edilen değerler aynı önemlilik grubunda yer almıştır. Bu sonuca göre, 50 mM ve altındaki değerlere sahip tuz (NaCl) içeren suların, çimlenme açısından değerlendirildiğinde, kullanılabileceği kanısına varılmıştır. AzA ön uygulamasının etkilerinin daha net anlaşılabilmesi için farklı dozlarda ve farklı tuz seviyelerinde denenmesinin uygun olacağı düşünülmektedir.

Anahtar Kelimeler: Tuz stresi, Azelaik asit, Arpa, Ön uygulama, Priming

Kesme çiçeklerde vazo ömrünün uzatılmasında bitki ıslahının önemi

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Özet: Süs bitkileri içerisinde ekonomik olarak dünya'da en fazla ticareti yapılan sektör kesme çiçek sektörüdür. Üretimin giderek yoğunlaşması ve talebin artması nedeniyle kesme çiçekler daha uzun mesafelere daha farklı kıtalara gönderilmektedir. Dolayısıyla depolama, nakliye ve dayanma kabiliyeti, kültürü yapılan süs bitkilerinin satış politikası için önem arz etmektedir. Vazo ömrünü artırmak için çeşitli hasat sonrası işlemler kullanılmakta, ancak bunlar zaman zaman başarısız sonuçlanırken ve çoğu zamanda maliyetli olabilmektedir. Bu nedenle, en sürdürülebilir strateji uzun ömürlü yeni süs bitkisi çeşitlerinin elde edilmesidir. Yapılan birçok melezleme çalışmasına göre vazo ömrü yüksek derecede kalıtsallık özelliği göstermiştir. Böylece etkin bir seleksiyon ile vazo ömrü özelliği kademeli olarak iyileştirilebilmektedir. Uzun ömürlülük özelliğinin moleküler genetik analizler ile ayrıntılı karakterizasyonu ve ilgili genlerin belirlenmesi karanfil ve petunyalar türleri üzerinde belirlenmiştir. Bu bulgular, uzun ömürlülük özelliğinin kalıtımını karakterize etmek için ıslah programlarında ancak bir noktaya kadar kullanılabilmiştir. Ayrıca yaşlanmanın moleküler mekanizmaları özellikle etilen hormonunun etkisi üzerine yapılan çalışmalar süs bitkilerinde hasat sonu ömrünü arttırmak için transgenik yöntemlerin başarılı olduğunu göstermektedir. Fakat günümüzde genetiği değiştirilmiş ürünlere olan talebin düşüklüğü, hasat sonu ömrünün uzatılması için genetik ıslah metotları ve seleksiyonun uzun ömürlü süs bitkileri çeşitlerinin geliştirilmesinde belirleyici rol oynadığı göz önüne alınmalıdır. Son yıllarda önemli süs bitkilerinden kesme güllerde ve karanfillerde uzun vadeli ıslah başarıları elde etmek mümkün olmuştur.

Anahtar Kelimeler: Süs bitkileri, Vazo ömrü, Kesme çiçek, Melezleme, Biyoteknolojik yaklaşımlar

Investigation of viroids causing diseases in grapevine (*Vitis vinifera* L.)

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Abstract: Six species of viroids have been identified as infecting grapevines: hop stunt viroid (HSVd), citrus exocortis viroid (CEVd), Australian grapevine viroid (AGVd), grapevine latent viroid (GLVd), grapevine yellow speckle viroid 1 (GYSVd-1), and grapevine yellow speckle viroid 2 (GYSVd-2). Additionally, there are three putative viroid species: Japanese grapevine viroid (JGVd), grapevine yellow speckle viroid 3 (GYSVd-3), and a hammerhead viroid-like RNA. In a survey conducted between 2015 and 2016, 270 grapevine samples were tested using RT-PCR across all major grapevine-growing provinces in Turkey. The overall viroid infection rate among these samples was 35.5%. The most prevalent viroid was HSVd, with an infection rate of 27.0%, followed by GYSVd-1 at 17.8%, GYSVd-2 at 5.9%, and CEVd at 3.3%. No AGVd or GLVd were detected. Most of the samples exhibited multiple infections. This study provides new insights into the prevalence of grapevine-infecting viroids in Turkey.

Keywords: HSVd, GYSVd-1, GYSVd-2, CEVd, GLVd

Herbicide resistant weeds in potato fields: identification and implications

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Abstract: Chemical control is the most common weed management practice due to its convenience and efficiency. However, intense application of herbicides with the same site of action over a long period (≥10 years) is one of the most important reasons for the evolution of herbicide resistance in weed species. This work aimed to identify potential herbicide resistance in weed species in potato fields to assess the resistance level in suspected populations. Several herbicide-resistant weed species, including *Chenopodium album*, *Amaranthus retroflexus*, *Phalaris brachystachys*, *Amaranthus palmeri*, *Phalaris paradoxa*, and *Avena fatua* have been identified in potato fields worldwide. Herbicide resistance mechanisms in these species are primarily associated with the sites of action such as photosystem II, acetyl CoA carboxylase (ACCase), and enolpyruvilshikimate-3-phosphate synthase (EPSPS) inhibitors. Non-chemical weed management methods such as planting cover crops, crop rotation, and rotating herbicides with different modes of action, along with monitoring resistant populations, can successfully control and decrease the risk of herbicide resistance in weeds. Raising awareness regarding the evolution of herbicide resistance is essential for effective management. This work aims to inform sustainable management guidelines that mitigate or delay the evolution of herbicide resistance, thereby promoting long-term productivity in potato cultivation.

Keywords: Weed, Herbicide, Herbicide resistance, Potato.

Patates tarlalarında herbisite dayanıklı yabancı otlar: tanımlama ve çıkarımlar

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Uygunluğu ve etkinliği nedeniyle kimyasal kontrol, en yaygın yabancı ot yönetimi yöntemidir. Ancak, uzun bir süre (≥10 yıl) boyunca aynı etki noktasına sahip herbisitlerin yoğun uygulanması, yabancı ot türlerinde herbisit dayanıklılığın evriminin en önemli nedenlerinden biridir. Bu çalışma, şüpheli popülasyonlardaki dayanıklılığın seviyesini değerlendirmek amacıyla, patates tarlalarındaki yabancı ot türlerinde potansiyel herbisit dayanıklılığın belirlemeyi hedeflemektedir. *Chenopodium album, Amaranthus retroflexus*, *Phalaris brachystachys*, *Amaranthus palmeri*, *Phalaris paradoxa* ve *Avena fatua* dahil olmak üzere çeşitli herbisite dayanıklı yabancı ot türleri dünya genelinde patates tarlalarında tespit edilmiştir. Bu türlerdeki herbisit direnç mekanizmaları, öncelikle fotosistem II, asetil CoA karboksilaz (ACCase) ve enolpirüvilşikimat-3-fosfat sentaz (EPSPS) inhibitörleri gibi etki noktalarıyla ilişkilidir. Örtü bitkileri ekimi, ürün rotasyonu ve farklı etki biçimlerine sahip herbisitlerin dönüşümlü kullanımı gibi kimyasal olmayan yabancı ot yönetimi yöntemleri, dayanıklı

popülasyonların izlenmesiyle birlikte, yabancı otlarda herbisit dayanıklılığın riskini başarılı bir şekilde kontrol edebilir ve azaltabilir. Herbisit dayanıklılığın evrimi konusunda farkındalığı artırmak, etkili yönetim için esastır. Bu çalışma, herbisit dayanıklılığın evrimini azaltan veya geciktiren sürdürülebilir yönetim yönergelerini geliştirmeyi ve böylece patates yetiştiriciliğinde uzun vadeli verimliliği teşvik etmeyi amaçlamaktadır.

Anahtar kelimeler: Yabancı ot, Herbisit, Herbisit dayanıklılık, patates

Heterodera schachtii (Schmidt, 1871) (Nematoda: Heteroderidae)'nin Niğde ili şeker pancarı üretim alanlarında yapılan popülasyon takibi

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Özet: Niğde ili şeker pancarı (*Beta vulgaris var. saccharifera*) üretiminde otuz dördüncü sırada yer almaktadır. Aralık 2021-2022 yılları arasında şeker pancarı üretimi yapılan alanlarından 104 toprak örneği alınarak, *Heterodera schachtii* (Schmidt, 1871) (Nematoda: Heteroderidae)'nin kist yoğunluğu belirlenmiştir. Alınan toprak örneklerden kistler ayrılarak, yoğunluğu en fazla olan iki tarladan, düzenli olarak her ay bir yıl boyunca iki tarladan popülasyon takibi yapılmıştır. Alınan toprak örnekleri laboratuvara getirilerek, örneklerin ekstraksiyonu sonucu elde edilen kistler ışık mikroskobu altında sayılmıştır. Kist popülasyonunun en yoğun olduğu ay Kasım ayı iken, larva yoğunluğunun en fazla olduğu ay ise Nisan ayı olarak belirlenmiştir. Popülasyonun konukçunun bulunmadığı aylarda düştüğü gözlenmiştir. Popülasyon yoğunluğunun belirlenmesinin mücadele zamanının belirlenmesine yardımcı olacağı düşünülmektedir. Bölgede kist nematodları şeker pancarı ekim alanlarında ekonomik kayıplara sebep olmaktadır ve verimi düşürmektedir.

Anahtar Kelimeler: Şeker pancarı,Kist, Nematod, Niğde, Popülasyon takibi

Mısır üretiminde teknoloji kullanımı

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Özet: Dünyada önemli tahıl ürününden biri olan mısır, başta insan beslenmesinde olmak üzere hayvan yemi ve çeşitli endüstrilerde ham madde olarak temin edilmektedir. Küreselleşmeyle birlikte modern tekniklerin kullanımının yaygınlaşması akıllı tarım uygulamaları kapsamında tarımsal teknoloji kullanımının çiftçilere kazandırılmasını zorunlu hale getirmektedir. Sosyal, kültürel ve ekonomik açıdan önemli olan mısır bitkisini geleneksel yöntemlerle üretmek gelişen teknoloji çağında yeterli olmamaktadır. Bu çalışmada; mısır yetiştiriciliği faaliyetinde bulunan işletmelerde tarımsal teknoloji kullanımı incelenmiş ve teknoloji kullanımında karşılaşılan sorunlar araştırılmıştır. Çalışmanın ana materyalini Kahramanmaraş ilinde yaşayan 100 mısır üreticisi ile yapılan anketlerden elde edilen veriler oluşturmuştur. Anket verileri tanımlayıcı istatistiklerle ve Ki-kare testi ile analiz edilmiştir. Analiz sonuçlarına göre mısır üretiminde teknolojiyi benimseme durumu üzerinde yaş, aile birey sayısı, mısır üretim deneyimi, tarım kuruluşlarına danışma, yenilikleri benimsemede desteklerden faydalanma durumu etkilidir. Bilgi teknolojileri okuryazarlığının tarım sektöründe yer alması üreticilerin dijital teknolojiye bakış açılarının geliştirilmesinde ve tarımsal teknolojiye yönelik altyapının yeterli düzeye ulaşmasında etkili olacaktır. Akıllı tarım veya dijital tarımın, üretim ve pazarlama aşamalarına sağlayacağı faydaların yapılacak olan seminerler ve eğitimlerle çiftçilere aktarılması gereklidir.

Anahtar Kelimeler: Mısır yetiştiriciliği, Tarımsal teknoloji, Teknolojiyi benimseme, Kahramanmaraş

Tarım sektöründe kadın işgücü

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Özet: Tarım sektörü, ülkelerin ekonomik yapıları içerisinde kritik bir öneme sahiptir. Bu sebeple, tarım alanındaki sorunların incelenmesi ve çözüm odaklı yaklaşımlar geliştirilmesi büyük bir gereklilik arz etmektedir. Toplumun vazgeçilmez parçası olan kadının tarım alanındaki yeri ve emeği sıklıkla göz ardı edilmektedir. Yapılan çeşitli araştırmalar, tarım sektöründe çalışan kadın tarım işçilerinin iş memnuniyetinin yeterli olmadığını ortaya koymuştur. Bu çalışmada, tarım sektöründe istihdam edilen kadın işçilerin iş memnuniyetini etkileyen faktörleri belirlemek ve bu doğrultuda çözüm önerileri sunmak amaçlanmıştır. Bu amaçla Karaman ili tarım sektöründe çalışan 151 kadın ile yüz yüze anketler yapılmıştır. Elde edilen veriler yüzde ve çapraz tablolarla değerlendirilmiştir. Analiz sonuçlarına göre, tarım sektöründe çalışan kadınların ortalama yaşı 39.46 yıl, aile birey sayısı ortalama 5.35 kişi ve ortalama gelirleri yaklaşık 16.000 TL/ ay olarak hesaplanmıştır. İş memnuniyetini olumsuz etkileyen faktörler dikkate alınarak; çalışma esnasında dinlenme sürelerinin artırılması, mesai saatlerinin sağlık koşulları dikkate alınarak düzenlenmesi, zorlu çalışma koşulları düşünülerek (uzun süre güneş altında çalışma vb.) ücretlerin temel ihtiyaçları karşılayabilecek düzeye yükseltilmesi, iş yerinde cinsiyet ayrımcılığına son verilmesi için uygun politikalar geliştirilmesi ve kayıt dışı çalışan kadınların çalıştıkları süre boyunca sigorta kapsamına alınması gibi çözümler, iş memnuniyetlerini artıracak ve işlerine daha fazla odaklanmalarını sağlayacaktır. İlgili kurumların, tarımsal iş gücünü artırmaya yönelik bir eylem planı hazırlaması kadın işgücü açısından büyük önem arz etmektedir. Böylece kadın işçilerin hem aile hem de ülke ekonomisine katkıları artırılmış olacaktır.

Anahtar Kelimeler: Kadın işgücü, İş memnuniyeti, Tarım

Investigation of morphological, physiological, and biochemical responses to abiotic stresses of carrot

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Abstract: This study aimed to investigate stress responses in Nantes-type carrots under cold, drought, and salt stresses through physiological, morphological, and biochemical analyses. Abiotic stresses were applied to carrot plants 3 weeks after germination. For drought, plants were not watered for 10 days; for cold, they were kept at -20°C for varying durations (15 min to 5 h); and for salt stress, seedlings were irrigated with NaCl solutions (100-300 mM) every three days in 22 days. Morphologically, the drought stress group significantly decreased root and leaf width, while salt stress decreased root width, root, stem, leaf length, and leaf number compared to their control groups. Cold stress had no significant morphological effect. Physiological analyses showed that leaf temperature increased in both drought and salt stress groups compared to their control, with the highest increase in the salt stress group, where cold inducted no significant change. Relative water and chlorophyll a/b contents decreased in all stress groups compared to their controls, with relative water content showing a similar decline across all treatments. The most significant reduction in chlorophyll a/b was observed in the drought group compared to its control, while the smallest decrease occurred in the salt stress group. Biochemically, MDA content decreased in the cold and salt stress groups compared to their control, with the largest reduction in the salt group, while it increased in the drought group. Based on the data, carrot showed a relatively well adjustment to 150 mM NaCl stress compared to all the abiotic stresses.

Keywords: Carrot, Cold stress, Salt stress, Drought stress, Biochemical

Evaluating the pathogenicity of novel antagonistic fungal strains against the sugar beet cyst nematode *Heterodera schachtii*

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Abstract: Plant parasitic nematodes (PPNs) cause considerable damage to crops worldwide and are often underestimated due to non-specific symptoms. Biological control, particularly using antagonistic fungi, presents a promising alternative to chemical methods. This study investigates the effect of the representatives of fungal species *Ijuhya vitellina*, *Niesslia gamsii*, *Polydomus karssenii*, and the so-far undescribed isolate JKI72728 on the sugar beet cyst nematode (SBCN) *Heterodera schachtii*. Fungal mycelia were propagated in potato dextrose broth and assessed at three concentration levels: 1) Base concentration, 2) X^{10} base concentration, and 3) X^{-10} base concentration. Obtained fungal mycelia were used to inoculate healthy-looking cysts incubated in soil, to do so, *H. schachtii* cysts in mesh bags were placed growing cuboid pots (4×4×12 cm) containing a substrate mixture of loess soil + peat moss as pots were pre-inoculated in two stages (50% and 80% filled). After 4 months, mesh bags containing cysts were extracted and cysts were examined to determine their fungal infection status/percentage, cyst exhibiting discoloration or symptoms of fungal infection were considered infected. Results showed that *Niesslia gamsii* and JKI72728 had the highest average infection percentages across the 3 concentrations, followed by *Ijuhya vitellina* and *Polydomus karssenii*. The highest infection percentages were observed at X^{10} base concentration for *Niesslia gamsii*, JKI72728, and *Polydomus karssenii*. However, *Ijuhya vitellina* showed a similar infection percentage of cysts across the base and X^{10} base concentration. *Polydomus karssenii* exhibited similar infection percentages at the base and X^{-10} base concentrations. These findings suggest that *Niesslia gamsii* and JKI72728 have potential as biocontrol agents against SBCN without overlooking the potential of *Ijuhya vitellina* and *Polydomus karssenii*.

Keywords: Antagonistic fungi, Biological control, *Heterodera schachtii*, Plant parasitic nematodes, Sugar beet cyst nematode

Investigation on the productivity of some alfalfa (*Medicago sativa* L.) cultivars under Nigde ecological conditions

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Abstract: Nigde, located in central Anatolia, is characterized by its diverse agricultural landscape and by extreme climatic conditions, which include hot summers and cold winters. The adaptation of new alfalfa varieties is essential, as different genotypes exhibit varying performance based on ecological factors such as soil type, climate, and management practices. This study aimed to evaluate yield and quality characteristics of some alfalfa (*Medicago sativa* L.) cultivars under Nigde ecological conditions. For this purpose, six alfalfa cultivars and genotypes (Nimet, Prosementi, Queen, Magnum-5, Bilensoy-80 and Population-54) were used as plant materials in this study. The experiment was carried out according to the randomized complete block design with 4 replications in the growing season 2023-2024 at Nigde Omer Halisdemir University. In this study, plant height, green herbage yield, and hay yield were evaluated. According to the results after three cuttings during the 2023-2024 growing season, the Bilensoy-80 cultivar exhibited the highest plant height (88 cm), while the highest green forage yield (5586 kg/da) and dry forage yield (1401 kg/da) were obtained from the Queen cultivar. Based on these results, it can be concluded that the cultivar Queen can be recommended for use and successful cultivation under Nigde ecological conditions.

Keywords: Alfalfa, Cultivars, Yield, Adaptation, Nigde

Genetic diversity and polymorphism studies of some Nigerian cattle breeds using hemoglobin (Hb), carbonic anhydrase (Ca) and transferrin (Tf) makers.

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Abstract: A study was carried out to determine the polymorphisms and genetic diversity of biochemical makers (Hb, CA, and Tf) of Nigerian cattle breeds: Bunaji (BNJ), Sokoto Gudali (GDL), and Fresian x Bunaji (Fr x BNJ). A total of 60 cow's comparisons of 20 each of BNJ, GDL, and Fr x BNJ were used for this study. Blood samples (5 ml) were collected from the animals for analysis. Hb, CA, and Tf genotypes were determined by cellulose acetate electrophoresis. GENALEX was used to estimate allele frequency, Ho and He, number of alleles (Na), Shannon index (I), and fixation index (F). The result showed that BNJ presented higher Ho and He at Tf locus (0.900 and 0.496), while the means of the entire cattle populations were 2.00±0.00 and 1.93±0.03, Ho and He were 0.656±0.051 and 0.481±0.009, and F was negative -0.36±0.095. In all cases, Ho is higher than He, and all studied loci were highly polymorphic. Since there was inbreeding as shown in the study, all the populations exhibit genetic resemblance. The population was inbred, an indication that there are relatives mating in the population.

Keywords: Cattle, Maker, Polymorphism, Genetic diversity.

Use of clayey and saline soils in agriculture in Kazakhstan and the difficulties encountered

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Abstract: Kazakhstan has enormous agro-challenges: the near-ubiquity of clayey and saline soils across the country, but mainly in the arid and semi-arid regions. Such conditions are more likely to seriously impede the quest for sustainable farming. Clayey soils are poorly drained and compactly structured; that limits the root growth, hence denying the crops water and nutrients. Saline soils have high salt concentrations that cause osmotic stresses inhibitive to plant growth and yield reduction. This problem is further exacerbated by poor irrigation practices that allow the salt to accumulate in the upper layers of the soil. Under such circumstances, there is a continuing difficulty for farmers to maintain productivity, especially in light of the limited access to advanced agricultural technologies, to which the increasing pressure of climate change is added. The traditional methods of managing the soil, including crop rotation, organic amendments, and improved drainage systems, have not been effective to produce an impact against the twin challenges posed by soil salinity and heavy clay texture. Moreover, investment in advanced soil management techniques, such as precision irrigation and soil desalination, is scant and keeps progress impeded. This paper reviews the status of agriculture in Kazakhstan, with a particular emphasis on clayey and saline soils. The problems faced by farmers are pointed out; the effectiveness of the existing approaches of soil management is reviewed, and there is a need for innovative and sustainable approaches which best suit the country's unique environmental conditions. In this regard, it will be important to develop and apply improved soil management practices in order to achieve food security and develop sustainable agriculture in Kazakhstan.

Keywords: Clayey soil, Saline soil, Agriculture, Food security, Kazakhstan

Bazı patates (*Solanum tuberosum* L.) ıslah hatlarının fenolojik ve morfolojik özelliklerinin belirlenmesi

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Özet: Bu çalışma, patates çeşitlerinin geliştirilmesi amacıyla başlatılan ıslah programı kapsamında seçilen genotiplerin ana ürün koşullarında bazı fenolojik ve morfolojik özelliklerinin belirlenmesi ve genotiplere ait kimlik kartlarının oluşturulması amacıyla 2021 yılında Niğde Ömer Halisdemir Üniversitesi Ayhan Şahenk Tarım Bilimleri ve Teknolojileri Fakültesi Araştırma ve Uygulama Arazisinde, tesadüf blokları deneme desenine göre kurulmuş ve yürütülmüştür. Denemede 11 farklı ıslah hattı (MEÇ1407.05, MEÇ1407.17, MEÇ1406.07, MEÇ1407.08, MEÇ1301.20, MEÇ1302.20, MEÇ1302.05, MEÇ1305.05, MEÇ1409.09, MEÇ1411.06 ve MEÇ1302.18) ve 4 standart çeşit (Alegria, Doruk, Ayaz ve Lady Olympia) kullanılmıştır. Çalışmada çıkış, çiçeklenme ve olgunlaşma süresi gibi fenolojik gözlemler, bitki büyüme şekli, bitki örtüsü, bitki tipi, çiçeklenme yoğunluğu, çiçek taç yaprak rengi ve meyve sıklığı gibi bitki özellikleri ile yumru şekli, göz derinliği, kabuk rengi ve et rengi gibi yumru özellikleri incelenmiştir. Çalışma sonucunda çıkış süresi en kısa ve olgunlaşma süresi bakımından en erkenci olan ıslah hattı MEÇ 1406.07 olmuştur. Denemede incelemeye alınan genotiplerin tamamı (MEÇ 1302.05 hariç) dik büyüme tipine sahip olurken, orta ve uzun boylu, bitki sapı hiç görünmez veya çok az görünür formda, yoğun çiçekli, beyaz çiçek rengine sahip, meyve ve yoğunluğu az veya orta grubunda yer almışlardır. Ayrıca genotipler yumru özellikleri bakımından oval ve uzun oval, göz derinliği yüzeysel ve derin arasında, kabuk rengi sarı, et rengi ise açık sarı ve sarı arasında yer almıştır.

Anahtar kelimeler: *Solanum tuberosum*, Genotip, Fenolojik gözlemler, Bitki fiziksel özellikler

Some Potato (*Solunum tuberosum L.)* Breeding Lines Determination of Phenological and Morphological Features

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Abstract: This study was carried out in 2021 in Niğde Ömer Halisdemir University Ayhan Şahenk Faculty of Agricultural Sciences and Technologies Research and Application Land, in order to determine the phenological, morphological and technological characteristics of the selected genotypes in the main product conditions and to create identity cards for the genotypes within the scope of the breeding program initiated to develop potato varieties. It was established and carried out according to the experimental design. In the experiment, 11 different breeding lines (MEÇ1407.05, MEÇ1407.17, MEÇ1406.07, MEÇ1407.08, MEÇ1301.20, MEÇ1302.20, MEÇ1302.05,

MEÇ1305.05, MEÇ1409.09, MEÇ1411.06 and MEÇ1302.18) and 4 standard varieties (Alegria, Doruk, Ayaz and Lady Olympia) were used. In the study, phenological observations such as emergence, flowering and maturation period, plant growth pattern, vegetation, plant height, plant type, flowering density, flower petal colour and fruit density and plant characteristics such as tuber shape, eye depth, skin colour and flesh colour were examined. As a result of the study, the breeding line with the shortest establishment period and the earliest maturity period was the genotype MEÇ 1406.07. All of the genotypes examined in the experiment (except MEÇ 1302.05) had an upright growth type, were medium and tall, had no visible or very little visible stem, had dense heat, had white flower colour, and had low or medium fruit and density. In addition, genotypes were oval and long oval in terms of tuber characteristics, eye depth was between superficial and deep, skin colour was yellow, flesh colour was between light yellow and yellow.

Keywords: *Solanum tuberosum*, Genotype, Phenological observations, Physical characteristics of plant and tuber

Besin elementleri alımının arttırılmasında bitki biyostimulantlarının rolü

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Özet: Modern tarımda gübre kullanımı oldukça yoğundur; uygulanan gübrenin büyük bir kısmı çevreye salınır ve bu da çevresel bozulmaya neden olur. Tarımda gübre kullanımının bitki beslenmesine zarar vermeden azaltılabileceği bir yol da bitkinin besin alımını artırmayı sağlayan biyostimülanların kullanımıdır. Biyogübre veya biyopestisitler olarak kategorize edilen maddeler de dahil olmak üzere bitki biyostimülanlarının geniş bir tanımı mevcuttur. Bitki biyostimülanları, besin maddeleri ve pestisitler hariç tohumlara, bitkilere veya yetiştirme substratlarına belirli formülasyonlarda uygulandığında bitkilerin fizyolojik süreçlerini, büyüme ve gelişmelerini, bitkilerin beslenmesini, üretilen ürünün kalitesini, toplam ürün miktarını ve bitkilerde oluşan stres faktörlerine karşı dayanımı arttırma kapasitesine sahip maddelerdir. Ayrıca bazı biyostimulantların toprak yapısını iyileştirici etkileri de söz konusudur. Bu tanım, bildiride incelenecek olan humik maddeler, deniz yosunu özütü, amino asitler ve bitki büyümesini teşvik eden bakteriler gibi çeşitli maddeleri içerir. Çalışmada biyostimülant uygulamasının bitki besin alımı üzerindeki olumlu etkilerine ve toprak yapısında veya besin çözünürlüğünde, kök morfolojisinde, bitki fizyolojisinde ve simbiyotik ilişkilerde olumlu değişiklikler içeren mekanizmalar incelenecektir.

Anahtar Kelimeler: Biyostimulant, Besin elementi kullanım etkinliği, Hümik-fulvik asit

Role of plant biostimulants in enhancing of nutrients uptake

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Abstract: The use of fertilizers in modern agriculture is quite intensive; a large portion of the applied fertilizer is released into the environment, causing environmental degradation. One way to reduce fertilizer use in agriculture without harming plant nutrition is to use biostimulants that increase plant nutrient uptake. Plant biostimulants are broadly defined, including substances categorized as biofertilisers or biopesticides. Plant biostimulants are substances, excluding nutrients and pesticides, that when applied in specific formulations to seeds, plants or growing substrates, have the capacity to increase plant physiological processes, growth and development, plant nutrition, quality of product produced, total yield and resistance to stress factors in plants. In addition, some biostimulants have soil structure-improving effects. This definition includes various substances, such as seaweed extract, humic substances, amino acids, and plant growth-promoting bacteria, which will be examined in the paper. In this study, the positive effects of biostimulant application on plant nutrient uptake and the mechanisms that include positive changes in soil structure or nutrient solubility, root morphology, plant physiology, and symbiotic relationships were examined.

Keywords: Biyostimulant, Nutrient use efficiency, Humic-fulvic acid

Kırgızistan'ın Çatkal Vadisi'ndeki Madencilik Faaliyetleri Sonucu Kirlenmiş Toprağın Genotoksikliği

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Özet: Araştırma kapsamında, Çatkal Vadisi'nde yürütülen madencilik faaliyetlerinin toprak kirlenmesine etkisi, Allium-test yöntemi ile yapılan sitogenetik araştırmalarla incelenmiştir.
Materyal: Deneysel çalışma materyali olarak Kırgızistan'ın Çatkal Vadisi'ndeki Terek-Say (Limited Şirket 'Terek-Say gençliği'), Çandalaş ('Asta' inşaat) ve Aygır – Jal bölgelerinden alınan toprak örnekleri kullanılmıştır.
Yöntem: Toprağın genotoksikliğini değerlendirmek ve çevresel genetik izlemede etkisini araştırmak için standart olarak önerilen Allium – test (*Allium cepa* L., soğan) metodu kullanıldı. Hücrelerdeki kromozom anormalliklerinin analizinde ana-telofaz yöntemi kullanıldı. Bu yöntemde, hücrenin mitotik döngüsünün anafaz ve telofaz evrelerindeki kromozom anormalliği sıklığı sayıldı. Ana-telofaz yöntemi, hücre mitotik döngüsünün anafaz ve telofaz evrelerinde gözle görülen kromozom anormalliklerini kaydeden genetik bir testtir.
Sonuç: *Allium cepa* L., kök meristem hücrelerinen hazırlanan geçici mikropreparasyonlar, 40 x 10, 100 x 10 büyütmelerde bir Boeko Jean Nikon ECLIPSE 50i mikroskobu altında incelendi. Farklı mitoz aşamalarındaki hücrelerin mikrografları Nikon Digital Sight DS-Fi1 video kameralar kullanılarak elde edildi. Çalışmalara dayanarak, aşağıdaki kromozom anormallik türleri keşfedildi: kromozomun metafaz plakasının dışında yer alan halka kromozomu, alıştırma ve gecikmeli kromozomlar, kromozom fragmanları, kromozom köprüleri.
Sonuç olarak, Çatkal Vadisi'nin bazı bölgelerinde yürütülen madencilik faaliyetlerinin toprak genotoksikliği üzerinde olumsuz etkiler yarattığı ve bu durumun bölgede yetişen bitkilerin mutajenik durumu ile doğal çevrenin tehlikeli faktörlerine yol açabileceği belirlenmiştir.

Anahtar Kelimeler: Allium-test, sitogenetik, genotoksik, kromozom anormallikleri, ana-telofaz yöntemi.

Elma üzerine moleküler genetik çalışmalara ilişkin bir değerlendirme

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Özet: Elma (*Malus*), dünya genelinde en çok tüketilen meyvelerden biridir. Birleşmiş Milletler Gıda ve Tarım Örgütü`nün (FAO) 2022 yılındaki verilerine göre dünya çapında 95835964.97 ton üretilerek elma, en çok üretilen meyveler listesinde ikinci sıradadır. Çok üretilmesi yanı sıra moleküler genetik çalışmaları, elmanın genetik yapısını, özelliklerini, çevre koşullarına dayanıklılığını ve tarımsal verimliliğini artırmak için kritik öneme sahiptir. Son yıllarda gerçekleştirilen elma genom dizileme projeleri, elmanın genetik haritasını çıkarmış ve 60.000'den fazla genin işlevlerini belirlemiştir. Bu veriler, elmanın evrimi ve genetik çeşitliliği hakkında derinlemesine bilgi sağlamaktadır. Bunun sayesinde, hastalıklara dayanıklı ve yüksek kaliteli elma çeşitleri elde edilmesi hedeflenmektedir. Elma bitkileri, çeşitli hastalıklara karşı duyarlıdır. Moleküler genetik teknikler, hastalıklara karşı dirençli genlerin izolasyonu ve aktarımını kolaylaştırmaktadır. Bu çalışmalar, tarımsal üretimin sürdürülebilirliğini artırma potansiyeline sahiptir. Tat, aroma ve besin değeri gibi meyve kalitesi özelliklerini etkileyen genlerin belirlenmesi, tüketici taleplerine yönelik yeni çeşitlerin geliştirilmesine katkıda bulunur. Elmada moleküler genetik çalışmaları, hem temel bilimler açısından önemli veriler sunmakta hem de tarımsal uygulamalarda devrim niteliğinde yenilikler getirmektedir. Bu çalışmada, elma üzerinde yapılan moleküler genetik çalışmalar, araştırmaların temel alanları ve gelecekteki potansiyel uygulamaları derlenmiştir.

Anahtar Kelimeler: Malus, Hastalıklara dayanıklılık, Elma genomu

Evaluation of Molecular Genetic Studies on Apple

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Abstract: Apple (Malus) is one of the most consumed fruits in the world. According to the data of the Food and Agriculture Organization of the United Nations (FAO) in 2022, apples are the second most produced fruits with 95835964.97 tons produced worldwide. In addition to being produced a lot, molecular genetic studies are of critical importance to increase the genetic structure, characteristics, resistance to environmental conditions and agricultural productivity of apples. Apple genome sequencing projects carried out in recent years have created the genetic map of apples and determined the functions of more than 60,000 genes. This data provides in-depth information about the evolution and genetic diversity of apples. Thanks to this, it is aimed to obtain disease-resistant and high-quality apple varieties. Apple plants are susceptible to various diseases. Molecular genetic techniques facilitate the isolation

and transfer of disease-resistant genes. These studies have the potential to increase the sustainability of agricultural production. Identification of genes affecting fruit quality traits such as taste, aroma and nutritional value contributes to the development of new varieties for consumer demands. Molecular genetic studies on apples provide important data for basic sciences and also bring revolutionary innovations in agricultural practices. In this study, molecular genetic studies on apples, basic areas of research and potential future applications are compiled.

Keywords: *Malus,* Disease resistance, Apple genome

Implications of L. Malic acid addition in coconut meal on body composition, minerals absorption, hematologic indices and growth of Cyprinus carpio

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Abstract: L. Malic acid is substantially potent alternative to antibiotic growth promoters used in aqua feeds which has been least investigated for its results on growth performance of fish and gut health. Current research highlights the effect of dietary malic acid addition on growth parameters, blood hematologic indices, body composition, mineral and nutrient absorption in Cyprinus carpio fingerlings. Six experimental diets substituted with various levels of L. Malic acid (0, 1, 2, 3, 4, 5g/kg) were formulated. Present results showed that malic acid persuaded notable changes in survival rate and overall growth performance of fish. The highest amount of crude protein, gross energy and body fat was recorded in COM-D4. There were elevations in blood cell count, W.B.C.s (8.56×103mm-3), RBC (3.02×106mm-3) and platelets (66/L). Substitution of L. Malic acid (3g/kg) increased Hb, Ht, PCV and neutrophil. The rate of mineral absorption for Na, Ca, K, and P was highest in COM-D4. Present findings imply that, 3g/kg L. malic acid in coconut meal diet could be promising alternative to confer better growth and health status in C. carpio juveniles.

Keywords: Coconut meal (COM), Blood indices, L. malic acid, Nutrients, Carcass, C. carpio

Assessment of essential oil utilization in poultry nutrition

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Abstract: This review aims to critically discuss the integration of essential oils (EOs) into poultry diets with concentration on their functional interfaces as feed supplements. As the use of antibiotic growth promoters (AGPs) has been restricted in the world, the importance of essential oils of aromatic plants to replace them has attracted special interest and consideration because of their antimicrobial activity, antioxidant, and immunomodulatory effects. Essential oil includes bioactive ingredients like terpenes and phenols, and they are a potential source of improving the performance of poultry under the current global trend of reducing the use of antibiotics in poultry feeds. This review highlights new findings on the chemical profile of essential oils and the mechanisms by which they influence the dietary value of poultry feeds with regard to growth, feed conversion, intestinal health, and immunity. Also, this paper presents a discussion of the current literature on how essential oils affect gut microbiota, alter the antioxidant profile, and act as antibiotic growth promoters in broiler chickens. Nevertheless, the applicability of essential oils is not without limitations such as inconsistency in composition, uncertainty about the proper dosage, and compatibility with other dietary matrices. Possible research avenues are presented to help deal with such challenges and enhance the use of essential oils in poultry diets.

Keywords: Antimicrobial, Antioxidant, Essential oils, Poultry

Formulation of economically sustainable and eco-friendly fish feed by replacing fish meal with Coconut meal in Thaila fingerlings

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Abstract: Fishmeal's unprofitable price and diminishing supplies open the door to the quest for substitute, protein-rich plant sources. The current experiment was performed for determining the best percentage of coconut meal (CM) to use as a partial fishmeal replacement when making inexpensive fish feed and its effect on the body composition, hemato-biochemical indices, growth, mineral and nutrient digestibility of Catla catla fingerlings. Fish having average weight was fed twice (@4%) a day for 90 days. Six experimental diets (0, 10, 20, 30, 40 and 50%) were prepared using CM as an alternative feed ingredient by adding 1% in-digestible marker. At the end of trial period blood and whole body samples were collected for analysis and found highest growth (SGR; 1.31, weight gain% 225%), hematological parameters (PLT; 63.72, Ht; 34.82%; RBC; 2.76 ×106mm-3, Hb; 7.84g/100ml), carcass, nutrient digestibility (CF; 69.14%; CP; 69% and GE; 67kcal/g) and mineral absorption at 10% replacement of fish meal. According to the findings, it is recommended to replace 10-20% of CM with fish meal when making economical and environment friendly fish feed.

Keywords: CM based diet, Catla catla, Hemato-biochemical indices, mineral absorption, Proximate body composition

Effect of supplementing different levels of chesnut hydrolysable tannins to berseem-based dairy ration on protein utilization efficiency, and and dairy cow performance and health

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Abstract: Protein in forage legumes, such as berseem, are rapidly and extensively degraded in the rumen to ammonia (NH3), causing greater gaseous N losses to the environment, and negatively affecting metabolizable protein (MP) supply, productivity, and health of dairy animals. Supplementing lower amount (< 5% of dry matter (DM)) of hydrolyzable tannins have been shown to reduce protein degradation, and improve protein utilization efficiency, animal production and health. This study was conducted to determine the effects of supplementing 0% (control), 0.20% (CHT0.20), 0.40% (CHT0.40), and 0.60% (CHT0.40) of chestnut hydrolysable tannins (CHT) on DM basis, to berseem based total mixed ration (TMR) on DM intake, milk yield, milk composition, protein and feed utilization efficiency, and dairy cow performance. Sixteen multiparous dairy cows were assigned to the four diets according to randomized

complete block design. The results showed that increasing levels of CHT in the diet consistently increased (P < 0.05) yields of milk, milk fat and milk protein. The milk composition analysis revealed that lactose, solid not fat, and salts were not altered (P > 0.05) by the inclusion of different levels of CHT in the diet. Milk urea nitrogen (MUN) and urinary urea nitrogen (UUN) decreased significantly (p<0001), but blood urea nitrogen (BUN) decreased numerically as CHT levels increased in the diet. The DM intake was higher (p <0001) for the diets with high levels of CHT supplementation. , whilst the health score did not differ (P > 0.05) with the different levels (0 to 0.06%) of CHT supplementation. In conclusion, CHT supplementation improved feed and protein utilization and increase DM intake and yields of milk, milk protein and fat in dairy cows fed with berseem based TMR.

Keywords: Ration, Cow, Fat, TMR

Topraktan ve yapraktan humik asit uygulamalarının fasulye bitkisinin verim ve besin maddesi alımı üzerine etkisi

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Özet

Amaç: Bu araştırmada humik asit uygulamalarının fasulye bitkisinin verim ve bazı makro ve mikro besin maddelerinin alınımına olan etkisi araştırılmıştır.

Materyal Yöntem: Deneme sera koşullarında yürütülmüştür. Saksılara temel gübreleme amacıyla her saksıya eşit miktarda 200 mg/kg N (Amonyum Sülfat formunda); 100 mg/kg P_2O_5 (Mono kalsiyum fosfat formunda) ve 200 mg/kg K_2O (potasyum sülfat formunda) toprakla iyice karıştırılarak ekimden önce verilmiştir. Test bitkisi olarak fasulye (Phaseolus vulgaris L. var. *nannus* cv. Başpınar) bitkisi yetiştirilmiştir. Denemede humik asit hem topraktan hem de yapraktan uygulanmıştır. Topraktan humik asit 0, 100, 200, 350 ve 400 ppm düzeylerinde, yapraktan humik asit ise 0, 25, 50, 75, 100 ppm düzeylerinde 3 kez uygulanmıştır.

Araştırma Bulguları: Topraktan yapılan uygulamada humik asitin fasulye bitkisinin kuru madde miktarı üzerine etkisi istatistiki yönden önemli bulunmazken, bitkinin N, K, Mg, Fe, Cu ve Zn alınımını üzerine etkisi ise önemli bulunmuştur. Topraktan yapılan humik asit uygulaması fasulye bitkisinin P, Ca ve Mn alınımı ise etkilememiştir. Yapraktan yapılan uygulamada humik asitin fasulye bitkisinin kuru madde miktarı üzerine ve bitkinin N, P, K, Mg, Fe, Cu, Zn ve Mn'ın alınımı üzerine etkisi istatistiki yönden önemli bulunmuştur. Yapraktan yapılan humik asit uygulaması fasulye bitkisinin Ca alınımını ise etkilememiştir.

Sonuç: Humik asit uygulamalarının fasulye bitkisinin kuru madde ve bitki besin maddesi içeriği üzerinde etkileri olduğu, fakat bu etkilerin toprak ve yaprak uygulamalarına bağlı olarak farklılıklar gösterdiği sonucuna varılmıştır.

Anahtar Kelimeler: Humik Asit, Bitki besin maddesi, Fasulye, Yaprak gübrelemesi

The effect of humic acid applications to soil and foliar on the yield and the uptake of macro and microelement nutrients of bean plant

Abstract

Objective: In this study, it was investigated the effects of the applications of humic acid on the yield and the uptake of macro- and microelement nutrients of bean plant.

Material and Method: The experiment was carried out in greenhouse conditions. 200 mg/kg N (as ammonium sulphate), 100 mg/kg P_2O_5 (as mono calcium phosphate) and 200 mg/kg K_2O (as potassium sulphate) were applied to each pot soil in equal amounts as base fertilization before sowing. Humic acid was applied to both soil (at the levels of 0, 100, 200, 350, ve 400 ppm) and leaf (at the levels of 0, 25, 50, 75, 100 ppm).

Results:The effect of humic acid applied to the soil on the amount of dry matter of the bean plant was not statistically significant, while the effect of the uptake of N, K, Mg, Fe, Cu, and Zn by plant was significant. The application of humic acid to the soil did not affect the uptake of P, Ca and Mn by bean plant. The effect of humic acid applied as foliar fertilization on the amount of dry matter of the bean plant and of the uptake of

N, P, K, Mg, Fe, Cu, Zn and Mn by plant was statistically significant. The application of humic acid as foliar fertilization did not affect the uptake of Ca by bean plant.
Conclusion: It was concluded that humic acid applications had effects on dry matter and plant nutrient content of bean plants, but these effects differed depending on soil and foliar applications.

Keywords: Humic acid, Plant nutrient, Bean, Foliar fertilization

Farklı olgunlaşma dönemlerinde hasat edilen Hachiya ve Fuyu Trabzon Hurması (*Diospyros kaki* L.) çeşitlerinin bazı pomoloji özelliklerindeki değişimlerin belirlenmesi II

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Özet: Bu çalışmada Trabzon Hurması (*Diospyros kaki* L.) türüne ait Fuyu ve Hachiya çeşitlerinin farklı olgunlaşma dönemlerinde (ağaç olumu ve yeme olumu) bazı pomolojik özelliklerine ait değişimlerin belirlenmesi amaçlanmıştır. Çalışma Kahramanmaraş Sütçü İmam Üniversitesi Ziraat Fakültesi Bahçe Bitkileri Bölümü'ne ait Araştırma ve Uygulama Bahçesi'nde bulunan Trabzon Hurması parselinde yürütülmüştür. Denemede her çeşitten 4 ağaç belirlenmiştir. Aynı yaştaki seçilen ağaçlarından, renk, irilik vb. özelikler açısından homojen ve herhangi bir sebepten dolayı zararlanmamış meyveler kullanılmıştır. Ağaçların üzerinden ayrı ayrı, ağaç olumuna ve yeme olumuna gelmiş 30'ar meyve toplanmıştır. Hasat 25 Kasım 2023 tarihinde yapılmıştır. Toplanan bu meyvelerde; meyve ağırlığı (g), meyve eni ve boyu ve genişliği (mm), meyve kabuk ve et rengi (L*, a*, b*), asitlik (%), suda çözünebilir kuru madde içeriği (%) ve pH gibi pomolojik özelliklere bakılmıştır. Farklı olgunlaşma dönemleri dikkate alındığında Hachiya çeşidinde meyve ağırlığı açısından en yüksek değer 167,65 g ile yeme olumu döneminden elde edilmiştir. Fuyu çeşidi kendi içerisinde değerlendirildiğinde yine en yüksek ağırlık değeri 86,84 g ile ağaç olumu dönemine ait olmuştur. Meyve kabuk rengi en parlak ve en kırmızı olan çeşit Hachiya çeşidi ve bunun ağaç olumunda hasat edilen meyvelerine ait olmuştur. Her iki çeşitte de en yüksek SÇKM oranı yeme olumu döneminde belirlenmiştir. Sonuç olarak Kahramanmaraş yöresinde bu çalışmada incelenen Fuyu ve Hachiya Trabzon hurması meyvelerinin Ağaç Olumu döneminde hasat edilmesi ile, en yüksek kalitede pazara sunulmasının mümkün olduğu, ancak bu dönemde hasat edilen Hachiya çeşidi meyvelerinde mutlaka tanenden kaynaklanan burukluğun giderilmesine yönelik uygulamalar yapılması gerektiği kanısına varılmıştır.

Anahtar Kelimeler: *Diospyros kaki* L., Trabzon Hurması, Pomolojik özellik, Ağaç olumu, Yeme olumu

Genetic diversity of herbicide-resistant *Lolium rigidum* gaudin populations in wheat cultivation areas in Turkey

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Abstract: One of the major challenges in wheat cultivation in Turkey is the control of weeds. The frequent use of herbicides with similar modes of action has led to the development of resistance in weed populations. This study aimed to determine the genetic diversity of *Lolium rigidum* populations resistant to ALS inhibitor herbicides and their impact on resistance traits. Seeds of *L. rigidum* were collected from 16 different locations in the wheat cultivation areas of Balıkesir, Bursa, Çanakkale, and Tekirdağ. The SSR (Simple Sequence Repeat) marker technique was employed to assess genetic variation. In the SSR analyses, 15 different primers were used for the species to screen both resistant and sensitive populations. The analysis revealed a total of 341 allele formations across the 16 *L. rigidum* populations from 15 locations. Low polymorphism was not detected in the study. The total genetic diversity rate among *L. rigidum* populations was determined to be 81%, with significant genetic differences observed between resistant and sensitive populations. The results indicate that the genetic diversity and resistance status of the species should be considered in developing integrated management strategies.

Keywords: Genetic diversity*, Lolium rigidum*, SSR

Hasat öncesi putresin, jasmonik asit ve salisilik asit uygulamalarının dalbastı kiraz çeşidinin muhafazası süresince etilen salınımı ve solunum hızı üzerine etkileri

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Özet: Kirazda hasattan tüketimine kadar olan süreçte soğuk zincirin yanında bazı hasat öncesi uygulamaların muhafaza süresinin uzatılmasında ve kalitenin korunmasında olumlu etkileri olduğu yapılan çalışmalarla ortaya konmuştur. Bu çalışma; Malatya Kayısı Araştırma Enstitüsü, Tecde Kampüsünde kurulu, Dalbastı kiraz çeşidine ait parselde yürütülmüştür. Çalışmada, bu çeşide; hasattan 15 gün önce Salisilik asit, Jasmonik asit ve Putresin uygulamaları yapılmıştır. Uygulama yapılan meyveler; modifiye atmosfer koşullarında 0-1 ^{0}C sıcaklık ve % 85-90 oransal nemde 4 hafta muhafaza altına alınmıştır. Bu uygulamaların; soğuk ortamda etilen salınımı ve solunum hızı üzerine etkileri ortaya konulmuştur. Örnekler 7 gün arayla alınmıştır. 4 haftalık muhafaza sürecinde en yüksek etilen salınımı ortalamalarını kontrol uygulaması verirken en düşük ortalama değerleri Salisilik asit ve putresin uygulamaları vermiştir. Yine aynı şekilde 4 haftalık muhafaza sürecinde en yüksek solunum hızı ortalamalarını kontrol uygulaması verirken en düşük ortalama değerleri Salisilik asit ve putresin uygulamaları vermiştir. Bu sonuçla uygulamalarımızdan Salisilik asit ve putresin uygulamalarının solunum hızının düşürülmesi ve etilen salınımının azaltılması bakımından kontrol uygulamasına göre daha etkin olduğu ve muhafaza süresini olumlu etkilediği sonuçlarına varılmıştır.

Anahtar Kelimeler: Kiraz, Dalbastı, Muhafaza, Putresin, Jasmonik asit, Salisilik asit

History and significance of studying phytomelioration of oil-contaminated soils in Azerbaijan

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Abstract: The restoration of fertility in oil-contaminated soils in Azerbaijan using the method of phytomelioration is an important issue. This paper discusses the significance of researching the history of phytomelioration. Various published books, monographs, and scientific literature were used to prepare the article. The presented article highlights the study and significance of phytoremediation in oil-contaminated soils.

Keywords: Phytomelioration, Phytoremediation, Biodegradation, Bioremediation, Biocenosis

Allelic diversity of functional genes in some commercial winter wheat varieties cultivated in Turkey

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Abstract: Wheat, one of Turkey's most crucial agricultural products, was first cultivated in the Fertile Crescent region—including present-day Turkey—around 10,000 years ago. With a production volume of 22 million tons, it is the country's most extensively grown crop, playing a vital role in the agricultural sector. To maintain food security in Turkey, we must integrate new technology into wheat breeding programs. DNA molecular markers are one of them. We can use them directly without any phenotyping to speed up our selection progress in wheat breeding programs. In this study, we used competitive Allele Specific Marker System (KASP) markers in 25 winter wheat to examine several key genes: Glu-Ax2_IND, Glu-Ax1/x2*_SNP, BX7OE_866_SNP, and Glu-D1d_SNP, all of which are related to bread-making quality. We also looked into Lr34_TCCIND, Yr15_R8, and snp3BS-8, which are linked to multiple disease resistance. Additionally, we assessed PHS1-666, which evaluates pre-harvest sprouting, Rht-D1_SNP associated with dwarfism, TaPpdDD001 related to photoperiod sensitivity, and TaDreb_SNP and fehw3_SNP, which evaluate drought tolerance and resistance. The genotypes studied revealed the presence of the drought-tolerant allele TaDREB-B1a in the Tekfen 2239 and Bayraktar varieties, the NW97S186 type allele indicating high germination potential in the Bayraktar and Tekfen 2001 varieties, and the Lr34_TCCIND, Yr15_R8, and snp3BS-8 alleles related to multiple pathogen resistance in the Esperia, Tekfen 2077, and Odeska varieties. The KASP marker screening showed the allelic distributions in winter bread wheat varieties grown in Central Anatolia, offering valuable insights for wheat breeders.

Keywords: Bread wheat, Allelic distribution, KASP (Competitive Allele Spesific PCR), Agromorphological traits, Quality

Effect of dietary supplementation of grape pomace on performance and egg quality characteristics of laying quails

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Abstract: Current study was conducted to determine the effect of dietary supplementation of grape pomace powder (GPP) additive on performance and the internal and external egg quality. In this study, 200 quails were distributed into 4 treatment groups, and each group was further subdivided into 5 replicates containing 8 females and 2 males in each replication. In the 8-week study, 0% (control), 1%, 2%, and 4% GPP were added to quail mixed feeds. The result indicated that supplementation diet of grape pomace powder significantly affected feed intake, egg production and egg weight. Supplementing 4% of grape pomace powder in the feeding diet of quails significantly decreased feed intake compared to the other groups. Higher egg production obtained at 1% and 2% grape pomace powder supplemented groups. There were significant differences in eggshell breaking strength, Haugh Unit and white index among groups. Egg shell breaking strength increased with the addition of grape pomace powder. Haugh unit and white index value were higher than the control group. In conclusion, the study shows that grape pomace supplementation to quails diet improved performance and some egg quality characteristics.

Keywords: Egg quality, Grape pomace, Performance, Quails

Circular economy business models applicability for Kyrgyz dairy producers

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Abstract: Over the past decade, there has been increasing attention on the depletion of natural resources. As finite resources and essential factors of production, they play a crucial role in economic development. However, traditional linear production models contribute significantly to resource consumption and environmental pollution. This article examines the principles of the circular economy and circular economy business models, which promote environmental preservation through continuous reuse. Specifically, we investigate the potential for reusing whey, a primary byproduct of cheese production. The study focuses on the dairy industry in Kyrgyzstan, particularly the current state of whey processing and its valorization prospects. Using a case-study approach, we analyze three key dairy processing companies in the Issyk-Kul region. Through a qualitative, in-depth analysis, we evaluate whey valorization opportunities within these firms. Findings reveal that substantial quantities of whey are produced but not utilized sustainably. This research aims to explore the characteristics of the Kyrgyz dairy industry, the unique capabilities of each company, and current whey production and usage. The primary goal is to understand the scale of whey production and identify pathways for creating value from whey in local dairy processing operations.

Keywords: Circular economy, Whey valorization, Kyrgyzstan, Sustainable production, Dairy processing

Bıldırcın karma yemlerinde yaban mersini kullanımının performans ve karkas özelliklerine etkisi

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Özet: Bu çalışma Japon bıldırcını (*Coturnix coturnix japonica*) karma yemlerine yaban mersini tozunun performans ve kaskas özelliklerine etkisini belirlemek amacı ile yapılmıştır. Çalışmada 480 adet günlük bıldırcın civcivleri 4 deneme grubuna ayrılmış ve her grup her tekerrürde 30 bıldırcın bulunan 4 tekerrürden oluşturulmuştur. Araştırmada ticari etlik civciv başlangıç yemi kullanılmış ve yeme % 0, 1, 2 ve 4 düzeyinde yaban mersini tozu ilave edilmiştir. Araştırmada deneme gruplarında haftalık canlı ağırlık kazancının çalışmanın 3 ve 5. Haftasında istatistiki olarak farklılık gösterdiği ve kontrol grubunun katkılı gruplardan daha fazla yüksek canlı ağırlık artışına sahip olduğu görülmüştür. Yem tüketimi ve yemden yararlanma oranının denemenin 5. haftasında gruplar arasında farklı olduğu ve en fazla yem tüketiminin olduğu deneme gruplarında yemden yararlanma oranının kötü olduğu belirlenmiştir ($P<0.05$). Karkas parametrelerinden but, sırt ve boyun yüzdesi bakımından gruplar arasında farklılık gözlenirken ($P<0.05$) diğer karkas parametreleri bakımından farklılık gözlenmemiştir $P>0.05$). Araştırma sonunda yaban mersinin bıldırcınların karma yemlerinde doğal bir ürün olarak kullanımının performansı ve karkas özeliklerini olumsuz etkilemediği ortaya konulmuştur.

Anahtar kelimeler: Bıldırcın, Karkas parametreleri, Performans, Yaban mersini

Farklı CNT uygulamalarının mısır bitkisi gelişimine etkisi

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Özet: Tarımsal üretimde sürdürülebilirliği arttırmak amacı ile farklı stratejiler geliştirilmektedir. Nanopartiküllerin de bu amaçla kullanılan alternatiflerden birisidir. Yapılan çalışmada ise Karbon Nanotüpün (CNT) farklı uygulama (priming, kök ve yaprak) koşulları altında mısır bitkisinin gelişimi incelenmiştir. Bu amaçla 100 ppm CNT ile tohum priming işlemine tabi tutulmuştur. Kökten ve yapraktan uygulama ise hidroponik sistemde kontrollü koşullar altında gerçekleştirilmiştir. Sonuç olarak CNT uygulamalarında kök gelişmi iyileştirilirken, klorofil indeksi de arttırılmıştır.

Anahtar Kelimeler: Karbon nanotüp, Priming, Mısır, Nanopartikül

Effect of different CNT applications on maize development

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Abstract: Different strategies are being developed in order to increase sustainability in agricultural production. Nanoparticles are also one of the alternatives used for this purpose. In the study, the development of corn plant under different application (priming, root and leaf) conditions of Carbon Nanotube (CNT) was examined. For this purpose, the seed was subjected to priming process with 100 ppm CNT. Root and leaf application was carried out under controlled conditions in the hydroponic system. As a result, while root development was improved in CNT applications, the chlorophyll index was also increased.

Keywords: Carbon nanotube, Priming, Corn, Nanoparticle

Problems encountered in agricultural production of Sudan

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Abstract: In Sudan, most of the population depends primarily on agriculture for their livelihood. Agricultural production mainly supports the economy of Sudan and contributes significantly to the GDP. However, Sudan faces many obstacles that prevent the agricultural sector from growing and producing to its full potential. This review discusses the main obstacles facing the agricultural industry in Sudan, which include environmental concerns, economic difficulties, and the lack of widespread use of technology, where production depends on traditional systems. Inadequate infrastructure hinders the efficient distribution of agricultural products. Limited access to modern agricultural equipment and technology, especially for smallholder farmers, also hampers productivity. Political upheavals and wars also hinder agricultural progress. Environmental degradation, such as deforestation and soil erosion, negatively affects agriculture.

Keywords: Sudan, Agricultural production, Challenges

Revolutionizing ruminant nutrition: exploring alternative protein sources

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Abstract: The demand for animal products worldwide, based on the need for sustainable resource utilization, has changed the pattern of nutrition to include other protein sources. The emerging alternative sources of protein includes single-cell proteins, algae, and insect meals which will give ruminants additional feed options. Among these, insect meal is a valuable source of protein containing high level of amino acids, better conversion of nutrient, and efficient organic waste recycling, delivering essential nutrients needed for animal growth and development. There have been evidences of the positive effects of insect meal on ruminant performance levels. Algae also offers sustainable ruminant nutrition through their amino acids content, rich protein, and environmentally friendly propagation techniques. The supplementation of algae in ruminant feed can improve rumen fermentation, and animal productivity. The utilization of single-cell proteins from microbes also gives certain amino acid concentration and improve ruminant digestion. The advancement in technology have made single cell protein a widely used protein source for ruminant feeds. The incorporation of alternative sources of protein in ruminant feed have several challenges such regulatory issues involving approval evaluation and acceptance by the consumers. Efforts to find solution to these challenges offers new area of study for alternative source of protein in ruminant diets. This study therefore recommends that collaborative efforts among policy makers and ruminant consumers is vital for sustainability trends within the ruminant nutrition. The use of novel alternatives for protein sources in ruminant nutrition will lead to efficient production among and eco-friendly environment for stakeholders.

Keywords: Protein alternative sources, Ruminant nutrition, Algae, Insect meal, Single cell protein

Ethnoveterinary practices for poultry health management by household owners in Iyri-Suu, Ozgon district (Kyrgyz Republic)

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Absract: The Kyrgyz people, whose territory is 94% mountainous, are divided into regions based on geographical locations and live in isolation from other ethnic groups, preserving many aspects of their cultural heritage.This research documents traditional practices for treating domestic poultry in private households in the Iyri-Suu village of the Uzgen District. It highlights the use of natural remedies, some of which have been scientifically validated. The aim of the study was to conduct a survey and document the ethnoveterinary practices used by private farm owners for the treatment of poultry. The research was conducted during the summer of 2023 in the territory of the Iyri-Suu village. The dialog partners were selected by the researchers using both the snowball sampling method and random sampling. Data were collected through interviews and analyzed using two numerical values: the Informant Consensus Factor (Fic) and Use Value (UV). Based on 1,286 user reports (UR) collected from 84 dialog partners, 782 home remedies (HR) were identified as treatments for various poultry diseases used by the local population. Of these remedies, 413 are plant-based (550 UR), 49 involve a combination of plants (122 UR), and 237 are derived from animal products (446 UR). These home remedies are used for the traditional treatment of poultry diseases, which have been categorized into five groups (diarrhea, breathing problems, ectoparasite, endoparasite and weakness). The study examined the Use Value (UV) index of 18 plant types for treating poultry diseases, revealing varied levels of use among them. Cultivated plants like *Allium cepa* L. and *Allium sativum* L. had the highest UV index reflecting their significant role in local treatment practices and intensive use by the local population.

Keywords: Poultry health management, Traditional knowledge, Homemade remedies, Disease categories.

Iyri-Suu, Özgön Bölgesi'nde (Kırgız Cumhuriyeti) Hane Sahipleri Tarafından Uygulanan Kümes Hayvanların Sağlık Yönetimi için Etnoveterinerlik Uygulamaları

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Özet: Kırgızistan'da toprakların %94'ü dağlık olan bölgelerde bulunduğu için Kırgızlar coğrafi konumlarına göre bölgelere ayrılmışlardır. Diğer etnik gruplardan izole bir şekilde yaşayan Kırgızlar, kültürel miraslarının birçok yönünü korumuşlardır. Bu araştırma, Kırgız Cumhuriyeti'nin Özgön Bölgesi'ndeki Iyri-Suu köyünde özel hanelerde kümes hayvanlarının tedavisinde kullanılan geleneksel uygulamaları belgelemektedir. Çalışma, bilimsel olarak doğrulanmış bazı doğal ilaçların kullanımını vurgulamaktadır. Araştırmanın amacı, kümes hayvanlarının tedavisinde özel çiftlik

sahipleri tarafından kullanılan etnoveterinerlik uygulamalarını araştırmak ve belgelemektir. Araştırma, 2023 yazında Iyri-Suu köyünde gerçekleştirilmiştir. Diyalog kurulan kişiler, araştırmacılar tarafından hem 'kartopu örnekleme' yöntemi hem de rastgele örnekleme ile seçilmiştir. Veriler, görüşmeler yoluyla toplanmış ve iki sayısal değer kullanılarak analiz edilmiştir: Bilgilendirici Konsensüs Faktörü (Fic) ve Kullanım Değeri (UV). Toplanan 1.286 kullanıcı raporuna (UR) dayalı olarak, 84 diyalog partnerinden 782 evde yapılan ilaç (HR), yerel halk tarafından çeşitli kümes hayvanı hastalıklarının tedavisi için kullanılan yöntemler olarak tanımlanmıştır. Bu ilaçlardan 413'ü bir bitkiden (550 UR), 49'u bitkilerin kombinasyonu (122 UR) ve 237'si hayvansal ürünlerden türetilmiştir (446 UR). Bu ev ilaçları, beş gruba (ishal, solunum problemleri, ektoparazit, endoparazit ve halsizlik) ayrılan kümes hayvanı hastalıklarının geleneksel tedavisi için kullanılır. Çalışma, kümes hayvanı hastalıklarını tedavi etmek için 18 bitki türünün Kullanım Değeri (UV) endeksini inceleyerek bunlar arasında farklı kullanım seviyeleri ortaya koydu. *Allium cepa* L. ve *Allium sativum* L. gibi yetiştirilen bitkiler, yerel tedavi uygulamalarındaki önemli rollerini ve yerel halk tarafından yoğun kullanımlarını yansıtan en yüksek UV endeksine sahipti.

Anahtar Kelimeler: kümes hayvanları sağlık yönetimi, geleneksel bilgi, ev yapımı ilaçlar, hastalık kategorileri.

BIOLOGY

Bolkar dağları'ndan c13 karesi için yeni kayıt briyofitler

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Özet: Bu çalışmada, Bolkar Dağları (Adana-Konya-Mersin-Niğde)'nda yapılan arazi çalışmaları sonucunda toplanan briyofit örneklerinin teşhisleri yapılmış, ciğerotlarından 5 ve yapraklı karayosunlarından da 42 olmak üzere toplam 47 taksonun Türkiye briyofitleri kareleme sistemine göre C13 karesi için yeni kayıt olduğu saptanmıştır. Tespit edilen bu taksonların ekolojik özellikleri ve Türkiye yayılışları verilmiştir.

Anahtar Kelimeler: Briyofit, Bolkar Dağları, C13.

Antioxidant Properties and Total Phenolic Contents of Kombucha Prepared with *Glycyrrhiza glabra*

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Abstract: Kombucha is a fermented tea known for its health benefits. In this study, Licorice (Glycyrrhiza glabra) root was used as raw materials to prepare kombucha beverages. The antioxidant activities, total phenolic contents, concentrations of bioactive components kombucha beverages were assessed. Additionally, the effects of fermentation on kombucha beverages were compared. The results found that G. glabra kombucha beverages possessed strong antioxidant activities and high total phenolic content. In addition, fermentation with G. glabra could remarkably enhance the antioxidant activity and total phenolic contents. Furthermore, concentrations of several bioactive compounds could be increased by fermentation with G. glabra. Therefore, it might be a better strategy to produce kombucha by fermentation process of G. glabra.

Anahtar Kelimeler: Kombucha, licorice root, antioxidant, fermentation

Prozercon katae'nin (Acari: Zerconidae) Türkiye'den ilk kaydı

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Özet: Mart 2023 ile Mayıs 2023 tarihleri arasında Türkiye'nin batısındaki Spil Dağı Milli Parkı'nda kermes meşesi (Quercus coccifera) ve sabin ardıcı (Juniperus sabina) habitatlarından humus, döküntü, toprak ve yosun örnekleri gibi çeşitli biyolojik materyaller toplandı. Toplanan materyallere dayanarak, Zerconidae familyasına ait akar örnekleri stereo mikroskop altında pens ve pipet kullanılarak ayıklandı. Daha sonra, zerkonid akarlar %60'lık laktik aside yerleştirildi ve ağartıldı. Güncel literatürlere dayanarak zerkonid akarların teşhis işlemleri ışık mikroskobu kullanılarak gerçekleştirildi. İncelenmesi tamamlanan örnekler içerisinde %70'lik etil alkol ve 1-3 damla gliserin bulunan saklama şişelerine aktarıldı ve PAU'de (Pamukkale Üniversitesi, Fen Fakültesi, Akaroloji Laboratuvarı) muhafaza altına alındı. Tanımlanan türler arasında yer alan Prozercon katae, Türkiye akar faunası için ilk kez kaydedildi. Dişi bireylerin açıklamaları, ölçümleri, şekilleri verildi. Ancak, türün erkek, deutonimf ve protonimf bireylerine rastlanılmadı. Türün coğrafi dağılımı da sunuldu ve tartışıldı.

Anahtar Kelimeler: Mesostigmata, yeni kayıt, Spil Dağı Milli Parkı, İzmir, Manisa.

Bioecological and faunistic research on *bombus* (latreille, 1802) species in nevşehir province and surroundings of Cappadocia Region

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Abtract: Insects are pollinator organisms that are vital for the functioning of ecosystems. *Bombus* bees also have an important place in this group. Turkey hosts a rich Bombus fauna. The aim of this study is to reveal the taxonomic and ecological characteristics of *Bombus* (Latreille, 1802 (Insecta:Hymenoptera)) species distributed in different habitats of Nevşehir Province and Surroundings in Cappadocia Region, which has a special ecogeography in Turkey. The field period of the study covers the years 2019-2024, March-November. In the laboratory studies carried out parallel to the field studies, sample materials are prepared and identified and preserved in sample cabinets as museum materials. Within the scope of the study, approximately 300 sample materials were examined in terms of biomorphology, ecology and taxonomy, and new faunistic record statuses were determined

Key words: *Bombus,* Hymenoptera, Ecology, Taxonomy, Cappadocia

Kapadokya bölgesi nevşehir ili ve çevresi *bombus* (latreille, 1802) türleri üzerine biyoekolojik ve faunistik araştırma

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Özet: Böcekler, ekosistemlerin işleyişi için hayati öneme sahip olan tozlayıcı organizmalardır. *Bombus* arıları da bu grup içerisinde önemli bir yere sahiptir. Türkiye, zengin bir Bombus faunasına ev sahipliği yapmaktadır. Bu çalışmanın amacı, Türkiye'nin önemli tarım bölgelerinden olan Kapadokya bölgesinin Nevşehir sınırlarında dağılım gösteren *Bombus* (Latreille, 1802 (Insecta:Hymenoptera) türlerinin taksonomik ve ekolojik özelliklerini ortaya koymaktır. 2022 yılından itibaren araştırma kapsamında farklı habitatlarda toplanan yaklaşık 260 örnek, morfolojik karakterler temel alınarak teşhis edilmiştir. Elde edilen veriler, Türkiye'deki *Bombus* faunasına yeni bilgiler katacak, türlerin coğrafi dağılışı, habitat tercihleri ve ekolojik ilişkileri hakkında önemli ipuçları sunacaktır. Bu sunumda, çalışmanın ilk bulguları ve gelecekteki araştırma planları hakkında detaylı bilgi verilecektir.

Anahtar Kelimeler: *Bombus* Arıları, Tozlayıcı, Taksonomi, Ekoloji, Kapadokya

Kırgızistan'daki Türkistan denız topalak (*Hippophae turkestanica*) bitkisi mevcut durumu

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Özet: Günümüzde dünyadaki en acil konulardan biri biyolojik çeşitliliğin korunması ve nüfusa ekolojik olarak temiz gıda sağlanması, şifalı bitkilerden doğal ilaçların üretilmesidir. Kırgızistan, flora çeşitliliği bakımından diğer ülkelerden farklıdır. Kırgızistan florası yaklaşık 4.000 daha yüksek bitki, yaklaşık 200 liken, tüylü ot ve mantar içerir. Bunlar arasında 600'den fazla bitkinin tıbbi özellikleri vardır. Kırgızistan, flora ve doğal kaynak çeşitliliği ile ekolojik ürünlerin üretim merkezi haline gelebilir. Bunlar arasında deniz topalak bitkisi doğal ürünlerin elde edilmesinde büyük önem taşımaktadır. Deniz topalak, Orta Asya'da, Kırgızistan vadilerinde, nehirlerin ve göllerin kıyısında kalın bir çalı olarak yetişir. Dağlarda deniz seviyesinden 3100 m yükseklikte bulunabilir. Kırgızistan'ın toplam orman alanı 2613740 hektardır. Bunun dışında 6,5 hektar deniz topalak ormanları tarafından işgal edilmiştir. Tüm dünyada yaygın olarak kullanılan *Hippophae turkestanica* (*H. rhamnoides* aust) (Türkistan deniz topalak) harika besleyici ve tıbbi özelliklere sahiptir. Bu adlandırılmış bitkinin çeşitli kısımları, geleneksel halk tıbbında öksürükleri, sindirimi, kan dolaşımını iyileştirmek ve ağrıyı hafifletmek için eski zamanlardan beri kullanılmaktadır. Deniz topalak, meraların ve tarlaların korunmasında, toprak erozyonunun önlenmesinde, toprağın minerallerle zenginleştirilmesinde, ormanların yetiştirilmesinde ve yeşillendirme işlemlerinde büyük önem taşır. Bugün Kırgızistan'ın selvi ormanlarının durumu tatmin edici değil. Deniz topalak ormanları, antropojenik etkilerin (yangın, kesme, sığır otlatma, çakıl ve kum işleme, pirinç tarlaları yapma, meralar oluşturma, tarımsal ürünlerin ekimi için araziyi temizleme, yatılı evlerin topraklarını genişletme)bir sonucu olarak yavaş yavaş yok oluyor: Ek olarak, doğal deniz topalaklarının dikeni ve meyvelerinin küçük boyutu toplanmasını zorlaştırır. Bütün bunlar yeni ısırgan tarlaları yaratma ihtiyacını yaratıyor.

Anahtar kelimeler: *Hippophae Turkestanica*, Kırgızistan, Tıbbi Özellikleri, Dağılımı, Ekolojisi.

Current status of the Turkestan sea buckthorn (*Hippophae turkestanica*) in Kyrgyzstan

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Abstract: One of the most urgent issues in the world today is the preservation of biodiversity and the provision of ecologically clean food to the population, the production of natural medicines from medicinal herbs. Kyrgyzstan differs from other countries in its diversity of flora. The flora of Kyrgyzstan includes about 4,000 higher plants, about 200 lichens, downy grasses and fungi. Among them, more than 600 plants have medicinal properties. Kyrgyzstan can become a center for the production

of ecological products with the diversity of flora and natural resources. Among these, the sea buckthorn plant is of great importance in obtaining natural products. Sea buckthorn grows as a thick bush in Central Asia, in the valleys of Kyrgyzstan, on the banks of rivers and lakes. It can be found in the mountains at an altitude of 3100 m above sea level. The total area of forests of Kyrgyzstan is 2613740 ha. Out of it, 6.5 hectares are occupied by sea buckthorn forests. *Hippophae turkestanica* (*H. rhamnoides* aust) (Turkstan sea buckthorn), widely used throughout the world, has great nutritional and medicinal properties. Various parts of this named plant have been used since ancient times in traditional folk medicine to cure coughs, improve digestion, improve blood circulation, and relieve pain. Sea buckthorn is of great importance in protecting pastures and fields, preventing soil erosion, enriching the soil with minerals, growing forests, and greening. Today, the condition of the cypress forests of Kyrgyzstan is not satisfactory. Sea buckthorn forests are gradually disappearing as a result of anthropogenic influences: fire, felling, cattle grazing, gravel and sand processing, making rice fields, creating pastures, clearing land for cultivation of agricultural crops, enlarging the territories of boarding houses. In addition, the thorniness of the natural sea buckthorn and the small size of its fruits make it difficult to collect. All this creates the need to create new nettle plantations.

Key words: *Hippophae Turkestanica*, Kyrgyzstan, Medicinal Properties, Distribution, Ecology.

Festuca steppes of the high mountain Ak-Sai valley in the Inner Tien-Shan of Kyrgyzstan

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Absract: The geographical location of the Ak-Sai Valley and the natural conditions of the highlands are characterized by a complex ecological situation that regulates the activity of the biota. Extreme conditions determine all processes occurring in the soil and vegetation, reflecting the uniqueness inherent in the high-altitude ecosystems of the Tien-Shan. In the highlands, steppes are widespread, dominated by: *Festuca valesiaca*, *F. kryloviana*, *Helictotrichon desertorum*, *Stipa subsessiliflora, S. purpurea*, *Hordeum turkestanicum*, *Leymus secalinus*, *Puccinellia hackeliana*, *Poa litvinoviana* and others. The most characteristic species in almost all steppe phytocenoses, in addition to dominants and subdominants, are *Astragalus managildensis, Euphorbia alatavica, Leontopodium nanum, Potentilla evestita, Plantago minuta, Gentiana olivieri*. The total projective coverage ranges from 25-75%. The yield varies – 3.0-6.0 c/ha. Of all the formations of the high - altitude steppes, the most common *Festuca* and *Festuca-Stipa* steppes. Floral composition of steppes from Festuca is richer, productivity is slightly higher, and the cenotic structure is more complex compared to Stipa. In the ecological and biological spectrum of the steppes of the Ak-Sai Valley, almost all plants in their life form belong to hemicryptophytes. We have identified the following associations of Festuca steppes: *Poa litvinoviana, Leontopodium ochroleucum, Dracocephalum paulsenii*. The productive capacity of Ak-Sai vegetation is highly dependent on anthropogenic abiotic factors. Natural vegetation is excessively disturbed as a result of long-term year-round unsystematic grazing of farm animals. The consequences of grazing are determined by the amount, duration and frequency of alienation of plant phytomass and the level of their endurance. There are no woody and shrubby plants in the Ak-Sai valley, the entire aboveground part of the phytomass dies annually. Improper use of pastures negatively affects the botanical composition of the herbage and reduces the accumulation of aboveground mass. Planned alternation of areas for grazing cattle in order to prevent degradation of grass stand and its rational use, the introduction of mineral fertilizers to improve the nutritional conditions of plants, increasing their yield, makes it possible to improve the grass stand on natural high-mountain pastures.

Keywords: Ak-Sai, Tien-Shan, Climate, Steppes, High Mountain Valley

Kırgızistan'ın İç Tien-Shan bölgesindeki yüksek dağ Ak-Sai vadisinin Festuca bozkırları

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Özet: Ak-Sai vadisinin coğrafi konumunun özellikleri, yaylaların hakim doğal koşulları, biyotanın aktivitesini düzenleyen karmaşık bir ekolojik durumla ayırt edilir. Tien Shan'ın

yüksek dağ ekosistemlerinin doğasında var olan benzersizliği yansıtan, toprakta ve bitki örtüsünde meydana gelen tüm süreçleri belirleyen aşırı koşullardır. Yaylalarda bozkırlar yaygındır ve bunların hakimiyetindedir: *Festuca valesiaca*, *F. kryloviana*, *Helictotrichon desertorum*, *Stipa subsessiliflora, S. purpurea*, *Hordeum turkestanicum*, *Leymus secalinus*, *Puccinellia hackeliana*, *Poa litvinoviana* ve diğerleri. Baskın ve alt baskın türlerin yanı sıra hemen hemen tüm bozkır fitosenozlarındaki en karakteristik türler şunlardır: *Astragalus managildensis, Euphorbia alatavica, Leontopodium nanum, Potentilla evestita, Plantago minuta, Gentiana olivieri*. Toplam projektif kapsam 25-75 % arasında değişmektedir. Verim değişmektedir – 3,0-6,0 c/ha. Yüksek dağ bozkırlarının tüm oluşumları arasında en yaygın olanı Festuca ve Festuca-Stipa bozkırlar. Festuca bozkırlarının floristik bileşimi daha zengindir, verimlilik biraz daha yüksektir, cenotik yapı Stipa otlarına göre daha karmaşıktır. Ak-Sai vadisi bozkırlarının ekolojik ve biyolojik spektrumunda yaşam formlarına göre neredeyse tamamı hemikriptofitlere aittir. Festuca bozkırlarının aşağıdaki birlikteliklerini belirledik: *Poa litvinoviana, Leontopodium ochroleucum, Dracocephalum paulsenii*. Ak-Sai bitki örtüsünün üretim kapasitesi büyük ölçüde antropojenik abiyotik faktörlere bağlıdır. Çiftlik hayvanlarının uzun yıllar boyunca sistematik olmayan şekilde otlatılması sonucunda doğal bitki örtüsü aşırı derecede bozulmaktadır. Otlatmanın sonuçları, bitki kütlesinin yabancılaşma miktarı, süresi ve sıklığı ile dayanıklılık düzeyine göre belirlenir. Ak-Sai vadisinde ağaç veya çalı bulunmamaktadır; bitki kütlesinin toprak üstü kısmının tamamı her yıl ölmektedir. Meraların yanlış kullanımı, çimin botanik bileşimini olumsuz etkiler ve yer üstü kütle birikimini azaltır. Çim örtüsünün bozulmasını ve rasyonel kullanımını önlemek için otlatma alanlarının sistematik olarak değiştirilmesi, bitkilerin beslenme koşullarını iyileştirmek, verimliliklerini artırmak için mineral gübrelerin kullanılması, doğal yüksek dağlardaki meraların iyileştirilme fırsatını sağlar.

Anahtar Kelimeler: Ak-Sai, Tien-Shan, İklim, Bozkırlar, Yüksek Dağ Vadisi

Morphological features of the digestive system of pheasants (*Phasianus colchicus mongolicus*)

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Absract: *Phasianus colchicus mongolicus* J.F. Brandt, 1844, inhabits the Kyrgyz lands and has been hunted since ancient times. Recently, however, there has been a growing interest in domesticating this wild bird, leading to an increase in successful breeding and incubation of pheasant eggs. In our capital, the number of cafes and restaurants serving various dishes made from pheasant meat has also risen. Unfortunately, scientific research on the biology and morphology of domesticated pheasants, particularly regarding their digestive systems, is lacking.
Aims: To determine the anatomical and morphometric characteristics of the digestive organs of domesticated *Phasianus colchicus mongolicus* (J.F. Brandt, 1844).
Study Area: The morphological portion of this study was conducted in the educational-scientific laboratory within the Faculty of Science at Kyrgyz-Turkish Manas University, Department of Biology. The pheasants used for the study were purchased from a private farm in Bishkek.
Materials: The study primarily focused on the digestive systems of 11- to 12-month-old pheasants, which were euthanized via cervical spine injury. The examination included the entire digestive tract, from the beak to the cloaca, as well as the liver and pancreas.
Methods: Before slaughter, the weight of each pheasant was recorded. Following the slaughter process, external observations were conducted. The digestive system was carefully separated from other organ systems, and each organ was subjected to anatomical and detailed morphometric analysis. A standard kitchen scale was used for general weight measurements, while an electronic scale was utilized for the liver and pancreas weights. Calipers (0.05 mm) and a measuring tape (0.1 mm) were employed for the length and width measurements of the organs. The numerical data were statistically processed using Microsoft Excel.
Results: The length of the digestive system in male pheasants was measured at 157.3±5.73 cm, whereas in female pheasants, it was 131.7±6.12 cm. The length ratios of the digestive organs in male and female pheasants were as follows: beak 2.22%-2.6%, from the mouth to the esophagus 2.99%-3.3%, esophagus 11.82%-13.29%, glandular stomach 1.65%-2.05%, muscular stomach 3.12%-3.49%, duodenum 11.19%-9.19%, jejunum 35.93%-33.56%, ileum 16.4%-16.86%, cecum 8.01%-8.2%, rectum 5.78%-6.68%, and cloaca 0.89%-0.83%. The absolute weight of the liver was found to be 28.6±0.17 g in males and 14.52±0.28 g in females, while the pancreas weighed 1.71±0.22 g in males and 1.24±0.58 g in females.
Conclusion: The anatomical and morphometric dimensions of the digestive organs in 11-12-month-old pheasants have been determined, contributing valuable information to the field of basic morphological science. The data obtained can serve as a foundation for further research in this area.
Keywords: Male And Female Pheasants, Digestive System, Macromorphology, Morphometry.

Current Methods of Analysis in Molecular Biology

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Abstract
The objective of this paper is to examine the contemporary research methodologies employed in the field of molecular biology. The preceding techniques for investigation and diagnosis were characterized by a considerable investment of time; however, the advent of novel methodologies has enabled a reduction in this temporal commitment. It is widely acknowledged that we are currently witnessing a period of remarkable technological advancement. These innovative technologies are capable of autonomously diagnosing and identifying organisms with a high degree of accuracy.
As can be observed, the advancement of technology has facilitated the acceleration of skills acquisition in processes that were previously time-consuming. This method represents merely one of the most contemporary techniques, with further insights into recent developments in research methodologies and the prevention of genetic mutations to be found in the subsequent sections of this article.

Keywords: Molecular biology, History, Methods.

Study of lipid peroxidation indices and activity of antioxidant defense enzymes

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Abstract: Lipid peroxidation is a physiological process occurring in cell membranes and having a chain mechanism. The substrates of lipid peroxidation are polyunsaturated fatty acids, the main lipids of blood plasma cholesterol and triglycerides. The imbalance in the system of lipid peroxidation and antioxidant defense leads to oxidative stress. Occurrence of oxidative stress is an important factor in the development of pathological processes. Currently, the study of this process is very relevant in patients with various pathological conditions. The article presents the study of lipid peroxidation indices and activity of antioxidant defense enzymes in patients with acute cholecystitis after laparotomy cholecystectomy. It is shown that in acute cholecystitis there is an activation of free-radical oxidation, while the activity of key enzymes of antioxidant defense decreases. The third day of the postoperative period was characterized by increased activity of free-radical oxidation and for this period of examination the suppression of superoxide dismutase and catalase activity was preserved. After laparotomy cholecystectomy the processes of lipid peroxidation increase and the activity of antioxidant defense enzymes remains reduced.

Keywords: peroxide lipid oxidation, antioxidant defense enzymes, reactive oxygen species, acute cholecystitis, laparotomic cholecystectomy

Ekstrem habitat olan kaya likeninden izole edilen funguslar ile kongo red ve malaşit green boyalarının renk gideriminin belirlenmesi

Determination of Color Removal of Congo Red and Malachite Green Dyes by Fungi Isolated from Extreme Habitat Rock Lichen

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Özet: Malaşit yeşili ve Kongo red gibi tekstil endüstrisinde kullanılan toksik boyaların degradasyonu doğamız ve canlılar için elzem hale gelmiştir. Bu boyaların degradasyonu için mikroorganizmalar kullanılmakta ve yeni türler aranmaktadır. bu amaçla yeni fungal kaynaklar olarak liken endofiti fungusların bu çalışmada kullanılmıştır. Her iki boya için % 100 degrede eden türler bulunmuş ve en az %94 oranında parçalayabildikleri belirlenmiştir. Elde edilen sonuçlar ile liken endofiti fungusların malaşit ve Kongo boyalarının degradasyonunda kullanabileceği bulunmuştur.

Anahtar Kelimeler: Ekstremofil Fungus, Kongo Red, Malaşit Green,renk giderimi

Burdur gölü ramsar alanı hakkında bir değerlendirme

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Özet: Genel bilgi: Burdur Gölü, Göller Yöresi'nde yer alan 180 km² yüzölçümünde, ekolojik dengede önemi yüksek olan bir göldür. Yüzey alanının çoğu Burdur, kısmen de Isparta il sınırları içerisindedir. Bu alan karasal İç Anadolu ve Akdeniz iklimi arasında geçiş bölgesi niteliğindedir. Zengin bir flora ve faunaya sahiptir. Gölde bulunan yüksek tuz ve arsenikten dolayı göl içi biyolojik çeşitlilik zayıftır. Buna rağmen *Pseudophoxinus burduricus* gölde yaşayan küçük bir balık türüdür ve Burdur Gölü için endemiktir. Burdur Gölü genellikle kuş cenneti olarak adlandırılmaktadır. Su kuşlarının önemli habitatlarındandır. Dünya'da yok olma tehlikesi altında olan Dikkuyruk (*Oxyura leucocephala*) adı verilen ördek türü için önemli bir yaşam alanıdır. Burdur Gölü bu önemli özelliklerinden dolayı 13.07.1994 tarihinde 25.096,00 ha ile Ramsar alanları içerisine dâhil edilmiştir.
Amaç ve yöntem: Bu çalışma son zamanlarda kurumaya yüz tutan Burdur Gölü'ne dikkat çekerek yetkili mercilere bir bilgi vermek ve çevre bilinci oluşturmak amacıyla hazırlanmıştır. Bu çalışma alan üzerinde 2013 yılından bu yana yaptığımız arazi gözlemlerini kapsamaktadır.
Bulgular ve sonuç: Gölü besleyen akarsular üzerine 25 kadar tarımsal amaçlı baraj yapılarak doğal su girdisi tamamen bitmiştir. Yağışların da giderek azalmasıyla göl kuruma tehlikesi altına girmiştir. Organize Sanayiinin ve Burdur kent merkezinin arıtılmış gibi gösterilen atık sularından başka kaynağı kalmamıştır. Son zamanlarda Burdur ili mermer ve taş ocaklarıyla ün kazanmış ve rehabilite edilmeyen ocaklar canlı çeşitliliğini ve yaşamını tehdit eder bir duruma gelmiştir. Topoğrafya bozulmuş, kötü görüntü alana gelen turistleri ürkütmektedir. Türkiye'deki 14 Ramsar alanından birisi olan Burdur Gölü ve çevresinde acil koruma önlemlerine ve rehabilitasyona ihtiyaç vardır.

Anahtar Kelimeler: Burdur Gölü, Ramsar alanı, Sulak alan, Mermer ocakları, Tehditler

Memeli genomlarindaki transpozonlar

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Abstract: Transpozonlar memeli genomlarının önemli bileşenleri olup, insan genomunun %40'ından fazlasını oluşturmaktadır. Bu mobil genetik elemanlar, evrim, gen düzenlemesi ve genetik hastalıkların gelişimi gibi çeşitli biyolojik süreçlerde kritik roller oynamaktadır. Bu derleme, memeli genomlarındaki transpozonlarla ilgili mevcut araştırmaları incelemekte. Bunların retrotranspozonlar ve DNA transpozonları olarak sınıflandırılmasını, genetik çeşitlilik, adaptasyondaki etkilerini vurgulamaktadır. Kapsamlı araştırmalar, transpozonların genetik materyalin önemli bir bölümünü oluşturduğunu, retrotranspozonların ise çoğunluğu temsil ettiğini ortaya koymaktadır. Transpozonlar, genetik çeşitliliği artırarak çevresel değişikliklere uyum sağlamak için yeni işlevlerin ortaya çıkmasına yardımcı olmaktadır. Ayrıca, transpozonlar, komşu genlerin aktivitesini etkileyebilen promotör işlevi görerek gen ekspresyonunu düzenlemekte rol oynamakta. Hastalık bağlamında, kontrolsüz transpozon aktivitesi çeşitli genetik bozukluklarla ilişkilendirilmiştir. Bu durum Kanser ve Alzheimer hastalığı gibi nörodejeneratif hastalıkların gelişiminde önemli bir etkiye sahiptir. Özellikle Alzheimer hastalarında artmış metillenmiş LINE-1 elemanları, erken teşhis için moleküler belirteçler olarak potansiyel sunmaktadır. Transpozonlar, hastalıklara karşı dayanıklılığı artırmak ve verimliliği iyileştirmek amacıyla genetik çalışmaların temel unsurları olarak değerlendirilmektedir. Bu makale, transpozonların memeli genomlarındaki çok yönlü rollerini derinlemesine anlamak için daha fazla araştırma yapılmasının gerekliliğini vurgulamaktadır. Tıp, biyoteknoloji gibi alanlarda gelecekteki gelişmelere zemin hazırlamaktadır.

Anahtar Kelimeler: Transpozonlar, Retrotranspozonlar, DNA Transpozonları, Genetik Çeşitlilik, Hastalık Patogenezi

The relationship between e3-ubiquitin ligase atpub18 and glutathione-related enzymes in response to aba-mediated drought stress in plants

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Abstract: The Ubiquitin/26S proteasome system (UPS) is a critical protein modification system involved in multiple cellular pathways like cell cycle progression, biotic/abiotic stress responses, circadian clock, hormone signaling, and aging in plants. Misfolds or damage on proteins caused by stresses are recognized, degraded and eliminated by it. Thus, the system has a vital role in plant defense and environmental stress adaptations. One of the enzymes in the UPS pathway is E3 ligases. In plants, they are categorized into four families, and the PUB family is one of them identified in many plant species. AtPUB18 is a negative regulator in abscisic acid (ABA)-induced stomatal closure which is a key response to drought stress. Under drought conditions, plants tend to lose their redox balance, and the glutathione metabolism is important for the plant to preserve the balance. Yet, it still needs to be enlightened whether AtPUB18 has a role in, or not. To clarify the matter, ABA application has been fulfilled on *Arabidopsis thaliana* wild-type Columbia and AtPUB18 mutant plants, on purpose to determine the effects of the AtPUB18 in ABA-induced drought stress within the process. To evaluate the role of AtPUB18 in this signaling pathway, GSH, GSSG, GSNOR, GR enzyme activities and NO content were measured. The results indicated that AtPUB18 plays a significant role in ABA-induced drought stress.

Key words: *Arabidopsis Thaliana*, ABA, Atpub18, Glutathione, U-BOX E3 Ubiquitin Ligases

Interesting moss record from bolkar mountains (türkiye)

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Abstract: In this study, the first record of Stegonia latifolia (Schwägr.) Venturi ex Broth. a rare moss species, in the C13 square, the third for Türkiye, and the fourth for Southwest Asia is provided from the Bolkar Mountains. The morphological characters of the species are given with photographs, and its ecology and distribution in Türkiye are described in detail.

Keywords: Bolkar Mountains, Bryophyte, Stegonia latifolia, Türkiye.

Investigation of genetic diversity in glyphosate-resistant *conyza bonariensis* populations using SSR markers

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Abstract: This study aims to determine the genetic diversity within and between populations of Conyza bonariensis (L.) using SSR (Simple Sequence Repeat) analysis. The negative effects of weeds on agricultural production, including yield losses and impacts on product quality, are emphasized. Among the weed species found in Turkey's orchards and vineyards, the genetic diversity of Conyza bonariensis was evaluated based on 18 different genotypes. The results showed that this species has a high level of genetic diversity. The genetic similarity of Glyphosate-resistant populations was determined to be 93.3%. This finding indicates that resistant populations possess a significant potential for high genetic diversity, contributing to their resilience.

Key Words: Genetic diversity, Conyza bonariensis, Weed management

Cyrba algerina (lucas, 1846) (araneae: salticidae) türünün seta morfolojisinin araştırılması

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Özet: Bu çalışmada, Salticidae familyasından Cyrba algerina (Lucas, 1846) türünün prozoma, opistozoma ve bacakları üzerindeki setaların morfolojileri Taramalı Elektron Mikroskobu (SEM) ile belirlenmiştir. Türün vücut yapısında plumose (tüysü) tipte setalar olduğu görülmüştür. Bu çalışma ülkemizde yayılış gösteren Cyrba algerina (Lucas, 1846) türünün seta morfolojisini belirlemek üzerine yapılan ilk çalışmadır.

Anahtar Kelimeler: Salticidae, Cyrba algerina, seta morfolojisi, Araneae, Türkiye

Saklıkent milli parkı'nın zerkonid akar faunası (acari: mesostigmata)

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Özet: Akdeniz Bölgesi'nde zengin bir bitki örtüsüne sahip olan Saklıkent Milli Parkı ve yakın çevresinin zerkonid akar faunasını belirlemek amacıyla Mayıs 2021- Aralık 2023 dönemleri arasında çalışma alanından çeşitli biyolojik materyaller toplandı. Alan içerisindeki 75 farklı lokaliteden humus, bitki döküntüsü, çürümüş ağaç kökü, toprak ve yosun örnekleri alınarak toplam 257 örnekleme yapıldı. Toplanan tüm biyolojik materyaller Pamukkale Üniversitesi, Fen Fakültesi, Biyoloji Bölümü, Akaroloji Araştırma Laboratuvarı'na transfer edildi ve zerkonid akar türlerinin ekstraksiyon ve analizleri gerçekleştirildi. Işık mikroskobu kullanılarak yapılan teşhis işlemlerinin ardından 1 Prozercon (P. yavuzi) ve 9 Zercon (Z. cokelezicus, Z. colligans, Z. fethiyensis, Z. huseyini, Z. kallimcii, Z. marinae, Z. muglaensis, Z. quadricavum ve Z. sp.) olmak üzere 10 farklı zerkonid akar türü tespit edildi. Zerkonid türlerinin incelenen birey sayıları ile Türkiye ve dünya yayılışları da güncel literatürler eşliğinde sunuldu. Ayrıca, alanda bulunan tüm türler için bir teşhis anahtarı da düzenlendi. Tespit edilen zerkonidlerin tamamı Saklıkent Milli Parkı'ndan ilk kez kaydedildi.

Anahtar Kelimeler: Zerconidae, biyoçeşitlilik, Antalya, Muğla, Türkiye.

Tibellus oblongus (Walckenaer, 1802) (Araneae: Philodromidae) Türünün Seta Morfolojisi

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Özet: Tibellus oblongus (Walckenaer, 1802) türünün seta morfolojisi ülkemiz örnekleri üzerinde ilk kez bu çalışmayla ortaya konmaya çalışılmıştır. Bu türün prosoma, opistosoma ve bacaklarındaki setalar Taramalı Elektron Mikroskobu (SEM) kullanılarak incelenmiştir. Yapılan incelemeler sonucunda türün tüysü (pulmose) tipte setalar taşıdığı tespit edilmiştir.

Anahtar Kelimeler: Philodromidae, Tibellus oblongus, seta morfolojisi, Araneae, Türkiye

Nutrıtıonal benefıts of chlorophyll and mıneral elements ın wheatgrass

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Abstract: Wheatgrass (WG) is a food derived from the plant Triticum aestivum and is considered a powerful health food with various benefits for human health. Due to its high concentration of essential nutrients, including chlorophyll and a wide range of minerals, it has become a superfood. This review explores the nutritional benefits of WG, focusing on its rich chlorophyll content, a green pigment with detoxifying and antioxidant properties, and its significant levels of minerals such as calcium (Ca), magnesium (Mg), cooper (Cu), zinc (Zn), phosphorus (P), manganese (Mn), selenium (Se), potassium (K), and iron (Fe). Chlorophyll is known for its ability to enhance oxygen transport in the body, support liver detoxification, and promote cellular health. The mineral composition of WG contributes to bone health, muscle function, and electrolyte balance. Moreover, WG is valued for its role in boosting immunity, increasing energy levels, and improving digestion. The synergy between chlorophyll and essential minerals makes WG a valuable nutritional supplement, supporting metabolic processes and overall well-being. This review highlights the potential health benefits of WG as a nutrient-dense natural food, with a promising role in disease prevention and health promotion.fazla 250 kelime

Keywords: Wheatgrass, Essential Nutrients, Heavy Metals, Nutritional Benefits

Criminalistic Evaluation and Investigation of the Effect of Physical and Biological Factors on the DNA Content of Saliva

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Abstract

Purpose: Accurate evaluation of evidence is very important in clarifying the crime. Biological evidence at the crime scene is of great importance, especially with its DNA content. Considering the criminally important body fluids, especially blood, semen and saliva are more commonly used in the evaluation of evidence. Evidence property of bodily fluids is related to their DNA content. Saliva contains enzymes, various chemicals and DNA. In addition, the person may leave saliva on areas such as clothes and butts, in fights and struggles while talking. The DNA quality and quantity of saliva on these samples vary depending on the material, time and temperature. In addition, oral hygiene or oral microbial content is one of the factors affecting the DNA content of saliva.

Artificial saliva samples with specific DNA content on paper, fabric, glass, wood and ceramics were allowed to dry and DNA quality and quantity was determined spectrophotometrically by re-isolation. It was evaluated with three different temperature and microbial density parameters. The results obtained were evaluated from a criminalistic point of view and the methodology for the use of evidence and DNA isolation was established.

Methods: In this study, saliva samples with specific DNA content were dried on paper, fabric, glass, furniture and ceramics and the quality and quantity of DNA isolated using the kit was determined spectrophotometrically. Criminalistic evaluation of the results was carried out using three different temperature and microbial density parameters. As a result of this evaluation, the method was optimised for use as evidence and for DNA isolation.

Findings: The study did not find any significant changes over time, but did find changes depending on the surface material used and the microbial load.

Conclusion: It was determined that the sampling methods and kits used by crime scene experts are very important, and that DNA can be obtained from saliva even after a long period of time.

Keywords: Saliva, DNA, Body fluids, Criminalistic.

Research techniques in modern biology and current areas of use

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Abstract

Bioscience lend a hand to distinguish every sustenance living thing from the smallest bacteria to the disconsolate whales. Acknowledged biologists recurrently focus on an inconsequential subset of sustenance living thing much as birds, vegetables or bacteria. This body of knowledge is extremely utilitarian to influence where any afflictions and house animal or literary draw nigh from, much as infections, animal like pathologies and destruction to plants. Bioscience protects the contemplate of the functions of sustenance living thing the phylogenesis of species and the constituents that constitute diseases, extremely as the breakthrough of contemporary drugs. This drilling acknowledges anthropoid beings to inquire into subject-matters much as gene-splicing, evaluation utilizations with father apartments and the international warming. It furthermore lends a hand to distinguish individualism and how general public creatures and vegetables interact in life. Bioscience proffers a perceive of how sustenance inanimate object germinate on top of time. Distinguish the reprimands of extinction and how a species upon be contingent on and lay hold of the environment where its existences ameliorate the effectualness of safe keeping efforts. Biology plays a crucial role in our daily lives, influencing health, agriculture, and environmental protection. It helps us better understand how organisms' function, which contributes to the development of new medicines, improving food safety, and protecting ecosystems.

Keywords: Modern Biology, Genetic engineering, Research techniques, PCR

Your Biography Predetermines Your Biology

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Abstract: Your emotional biography shapes your physiology, and together they script your life. Research in both neurobiology and psychology strongly suggests that living through even the mildest negative experiences in childhood has a profound and lasting effect on the human neuroregulatory system. We tend to think of childhood as the happiest and most carefree time of our lives, forgetting how defenseless children are in the face of stress and pain. Numerous studies have confirmed that suffering of any order disrupts the complex workings of the immune system, which is the body's main control center. Childhood experiences at the level of all four pairs of mental processes cause this center to malfunction. In this article we will discuss the importance of a happy childhood, and how to help yourself or your loved ones if there are “weak” negative experiences from childhood.

Keywords: Emotional biography, Childhood experiences, Childhood trauma, Physiology, Biology

BIOTECHNOLOGY

Isolation and characterization of medium halophilic nitrogen-fixing bacteria from saline soils and the enzyme activities in these bacteria

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Abstract: Saline soils are in general very concentrated with salt, form unfriendly conditions for microbial life, but support specific and unique microbial populations that could have great biotechnological potential. The present work involved the isolation and characterization of medium halophilic nitrogen-fixing bacteria from saline soil environments. For this purpose, various saline ecosystem samples were collected, and bacterial isolates were developed by the use of selective nitrogen-free culture media. The classification was done based on morphological features, biochemical traits, and molecular characteristics. Nitrogen fixation ability was verified by using acetylene reduction assay, while the growth rates were measured for a series of salt concentrations in order to define the halophilic nature. These range from the study of enzymatic activities like those dealing with nitrogen fixation, resistance to salinity, to other metabolic enzymes such as catalase, peroxidase, and nitrate reductase in these bacterial strains. Besides this, they were proficient in nitrogen fixation under saline conditions. Moreover, they possessed advanced enzymatic machinery in order to reduce oxidative stress and facilitate effective utilization of the incorporated nitrogen. Such observations may perhaps imply that medium halophilic nitrogen fixers have a potential application in enhancing the fertility of salt-affected soils and could become useful in the development of novel biotechnological approaches to agricultural methodology and environmental remediation.

Keywords: Nitrogen-fixing bacteria, Halophilic nitrogen-fixing bacteria, Saline soil, Agriculture, Food security, Environmental remediation.

Metallerin fungal polisakkaritlerin üretimi ve antioksidan kapasitesi üzerine etkisi

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Özet: Funguslar çok farklı morfolojik, ekolojik, metabolik çeşitliliğe sahip canlılardır. Bu organizmalar doğal metabolik faaliyetleri sonucu çeşitli biyoaktif maddeler üretmektedir. Ayrıca karşılaştıkları zorlu şartlar ile mücadele etmek için ürettikleri bu biyoaktif maddelerin yapısını, miktarını ve çeşidini değiştirebilmektedir. Ürettikleri bu biyoaktif maddelerin birçok alanda yararlı kullanımı vardır. Özellikle polisakkaritlerin yeni etkin antibakteriyal ajan olarak kullanılma potansiyelinin var olduğu bilinmektedir. Ayrıca polisakkaritlerin metal şelatlama etkisi bilindiğinden besiyerine metallerin konulmasıyla daha etkili polisakkaritler üretilebilir mi ve üretilen bu polisakkaritlerin antioksidan ve antibakteriyal etkisinin ne olacağı bu çalışma ile belirlenmeye çalışılmıştır. Bu amaçla besiyerine demir, bakır ve kobalt tuzları konulmuş ve elde edilen polisakkaritin antioksidan kapasitesindeki değişim ve antibakteriyal etkisi ölçülmüştür. Çalışma sonucunda elde edilen bulgular oldukça ilgi çekicidir. Demir ve bakır konulan besiyerinden elde edilen polisakkaritlerin antioksidan kapasitesi diğer gruplardan yüksek çıkmış fakat kobalt içeren polisakkaritin antibakteriyal etkisinin daha fazla olduğu belirlenmiştir. Bunun sebebinin kobaltın demir ve bakır elementine göre daha fazla toksik etkiye sahip olabileceği olarak düşünülmüştür.

Anahtar Kelimeler: Polisakkarit, Metal şelatlama, Antibakteriyal, Antioksidan kapasite

Memeli genomlarındaki transpozonlar

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Özet: Transpozonlar memeli genomlarının önemli bileşenleri olup, insan genomunun %40'ından fazlasını oluşturmaktadır. Bu mobil genetik elemanlar, evrim, gen düzenlemesi ve genetik hastalıkların gelişimi gibi çeşitli biyolojik süreçlerde kritik roller oynamaktadır. Bu derleme, memeli genomlarındaki transpozonlarla ilgili mevcut araştırmaları incelemekte. Bunların retrotranspozonlar ve DNA transpozonları olarak sınıflandırılmasını, genetik çeşitlilik, adaptasyondaki etkilerini vurgulamaktadır. Kapsamlı araştırmalar, transpozonların genetik materyalin önemli bir bölümünü oluşturduğunu, retrotranspozonların ise çoğunluğu temsil ettiğini ortaya koymaktadır. Transpozonlar, genetik çeşitliliği artırarak çevresel değişikliklere uyum sağlamak için yeni işlevlerin ortaya çıkmasına yardımcı olmaktadır. Ayrıca, transpozonlar, komşu genlerin aktivitesini etkileyebilen promotör işlevi görerek gen ekspresyonunu düzenlemekte rol oynamakta. Hastalık bağlamında, kontrolsüz transpozon aktivitesi çeşitli genetik bozukluklarla ilişkilendirilmiştir. Bu durum Kanser ve Alzheimer hastalığı gibi nörodejeneratif hastalıkların gelişiminde önemli bir etkiye sahiptir. Özellikle Alzheimer hastalarında artmış metillenmiş LINE-1 elemanları, erken teşhis için moleküler belirteçler olarak potansiyel sunmaktadır. Transpozonlar, hastalıklara karşı dayanıklılığı artırmak ve verimliliği iyileştirmek amacıyla genetik çalışmaların temel unsurları olarak değerlendirilmektedir. Bu makale, transpozonların memeli genomlarındaki çok yönlü rollerini derinlemesine anlamak için daha fazla araştırma yapılmasının gerekliliğini vurgulamaktadır. Tıp, biyoteknoloji gibi alanlarda gelecekteki gelişmelere zemin hazırlamaktadır.

Anahtar Kelimeler: Transpozonlar, Retrotranspozonlar, DNA transpozonları, Genetik çeşitlilik, Hastalık patogenezi

Use of copper nanoparticles as biocontrol agents against aphids

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Abstract: Nanotechnology is currently regarded as one of the most promising new pest control technologies in recent years, with the potential to drastically change the sector in the near future. Microbial nanoparticle synthesis is a green chemistry strategy that incorporates nanotechnology with microbial biotechnology. Aphids are major pest associated with plant health. Synthetic insecticides have hazardous effects on humans and the environment. Copper nanoparticles (Cu NPs) were synthesized using Pseudomonas aeruginosa. The synthesized Cu NPs were characterized by using UV-Vis spectrophotometer and FTIR. Cu NPs produced by microbial synthesis were used as biocontrol agents against aphids (Hylopterus pruni). It was observed that viability decreased with increasing time and Cu NP concentration (100-800 µg/mL). At the lowest concentration of 100 µg/mL, viability decreased to 80% after 24 h, 60% for 200 µg/mL, 40% for 400 µg/mL and 30% for the highest concentration of 800 µg/mL. According to the results, the death rate increased considerably as the concentration of Cu NPs increased. Because of their insecticidal properties against aphids, Cu NPs have the potential to be effective and promising insecticides.

Keywords: Copper Nanoparticle, Aphid, Green synthesis, Biocontrol

Fumonisin b_1 toksinine karşı *arabidopsis thalina'nın* ros dengesinin düzenlenmesinde gigantea (gi) geninin rolü

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Özet: Fumonisin (FB_1), *Fusarium oxysporum* tarafından üretilen bir sfingozin analoğu olan mikotoksindir. Bu mikotoksin bitkilerdeki plazma membranının lipid tabakasının dışında lokalize olan sfingolipidlerin seramid omurgasını oluşturan seramid sentaz enzimini inhibe eder. Bunun sonucunda hücrede programlanmış hücre ölümü tetiklenir ve hücrede sitotoksite meydana gelir. Diğer yandan FB_1 hücrede ROS miktarında ve lipid peroksidasyon seviyesinde artışa yol açarak hücre redoks dengesinin bozulmasına da sebep olur. Ancak FB_1 in konukçu bitki hücrelerinde meydana getirdiği bu hasarın altında yatan temel mekanizma hala tam olarak bilinmemektedir. Son yıllarda yapılan araştırmalar çiçeklenmeden sorumlu Gigantea (GI) geninin biyotik ve abiyotik stres tepkilerinin ana düzenleyicisi olduğu ortaya konmuştur. Yapılan çalışmalar gi mutasyonları, hipokotil büyümesi, tuz toleransı, dona dayanıklılık/soğuk aklimasyon oksidatif stres tepkisi, kuraklık kaçış tepkisi, sukroz metabolizması ve artmış uzun ömür fenotipleri üzerinde etkili oldukları belirlenmiştir. Çalışmada, gi mutant alellerindeki artan fumonisin duyarlılığının öncelikle bazı antioksidan enzimlerin azalan temizleyici aktivitesinden kaynaklanıp kaynaklanmadığını inceledik. Çalışmamızda, FB_1 mikotosinine maruz kalan Arabidopsis yabani tip Col ve GI eksik mutantı gi-4 bitkilerindeki zamana bağlı olarak hücre redoksundaki değişimler ve arasındaki farklılıklar karşılaştırılmıştır. Buna göre çalışmamızda en yüksek H_2O_2 ve O_2^- radikal miktarlarının tüm uygulama zamanlarında gi-4 mutantlarında gözlendi. Buna bağlı olarak FB_1-uygulanmış gi-4 mutantlarının lipid peroksidasyon seviyesi Col.'ünkinden de yüksek olduğu bulundu. Diğer yandan Col-0 bitkileriyle karşılaştırıldığında gi-4 mutantında SOD aktivitesinin önemli ölçüde daha yüksek olduğu, ancak POX aktivitesinin ise daha az olduğu tanımlanmıştır. Sonuç olarak bu çalışmayla ilk kez geç çiçeklenen *A. thaliana* gi-4 mutantının fumonisin kaynaklı hasara karşı duyarlı olduğu bulunmuş, GI geninin, bitkilerin FB_1 direncini pozitif düzenleyicisi olabileceği sonucuna varılmıştır.

Anahtar Kelimeler: Fumonisin B_1, *Arabidopsis thalina*, Gigantea, ROS, *Fusarium oxysporum*

Orman bitkilerinde allelopati'nin önemi

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Özet: Bitkiler çevresindeki bitkilerin veya diğer canlıların büyümesini ve gelişmesini engellemek ya da teşvik etmek için çeşitli allelokimyasallar üretebilir ve/veya yayabilmektedir. Bu durum allelopati olarak bilinmekte olup doğal ve yönetilen ekosistemlerde bitki ve diğer canlı türleri arasında önemli bir etkileşim aracıdır. Orman yapılarının bozulmasından sonra doğal orman habitatını yeniden kurmak için aktif yönetimler kullanılmaktadır. Fakat istilacı egzotik bitki türlerinin ağaç oluşumunu ve orman rejenerasyonunu engelleyebildiği ifade edilmiştir. Allelopati farklı mekanizmalar aracılığıyla doğal orman yenilenmesine katkıda bulunmaktadır. Çeşitli bitki türlerinin ihitiva ettiği fenolikler, terpenoidler ve azot içeren bileşikler dahil olmak üzere çeşitli özel metabolitler, otlaklarda ve ormanlarda allelopati mekanizmasının oluşumunda etkili biyoaktif maddelerdir. Bu derlemede orman bitkilerinde allelopati kavramı hakkında bilgiler verilecek olup güncel çalışmalar detaylı bir şekilde irdelenecektir.

Anahtar Kelimeler: Allelopati, Orman regülasyonu, Sekonder metabolit, Bitki biyoteknolojisi

Bacterial isolation and Antibiotic resistance Profiling with Vitek 2, Colistin Susceptibility via Broth Microdilution, Nigde (2023-2024)

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Abstract: Antimicrobial resistance is a pressing global health concern, particularly with the rise of multidrug-resistant (MDR) pathogenic bacteria and several resistance genes, such as NDM-1 and MCR-1. Furthermore, the recent emergence of the plasmid-encoded colistin-resistance gene mcr-1 in Enterobacteriaceae has posed a significant threat to infection treatment in clinical settings, highlighting the global impact of this issue. Therefore, early detection of these resistance genes is crucial for monitoring and epidemiological studies in clinical settings. This comprehensive study aimed to isolate and characterize bacterial strains from clinical samples, profile their antibiotic resistance, and develop a rapid and effective method for detecting colistin and carbapenem resistance. We collected 100 gram-negative ESKAPE bacteria clinical samples from patients hospitalized at Nigde Ömer Halisdemir University Training and Research Hospital between December 2023 and June 2024 in Nigde, Turkey. T.asp and urine samples accounted for almost 70% of the available samples. We employed Vitek2, broth microdilution. Among the isolates, A. baumannii exhibited the highest XDR rate (95%), while *E. coli* had a high MDR rate of 86.6%. K. pneumoniae showed an alarming XDR prevalence of 80.7%, while P. aeruginosa exhibited more balanced resistance profiles. Broth microdilution showed 15% colistin resistance, and carbapenem resistance was detected in approximately 80% of the samples. This study will demonstrate the efficacy of Vitek 2 and Broth microdilution in detecting the colistin and carbapenem resistance genes, highlighting the need for rapid diagnostic tools to combat antibiotic resistance. In completing our study, we can compare Vitek methods for Carbapenem resistance detection and LAMP-PCR while using Colistin broth microdilution as the parallel method for colistin and LAMP-PCR. Additionally, this study will determine the frequency of resistance genes in clinical samples obtained from Niğde Hospital.

Keywords: ESKAPE bacteria, Antibiotic resistance, Pathogenicity.

Effects of drought stress and UV-B priming on growth parameters and photosynthetic pigment amounts in pepper

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Abstract: Day by day, due to environmental factors such as climate change, etc. as well as anthropogenic effects, the amount of usable water in the world is decreasing and the amount of land exposed to drought is increasing. In order to alleviate the impacts of drought stress and protect food security, high-impact, easy-to-implement, and low-cost strategies are needed. The aim of the study was to determine the effects of drought on the growth and photosynthetic pigment amounts of pepper seedlings and whether UV-B priming was useful in alleviating these effects. Seeds that were treated with UV-B priming (15' or 30') and/or exposed to drought (0.5 M PEG or 1 M PEG) were planted in pots filled with peat and then left for germination and seedling development in the growth chamber (16 h light/8 h dark photoperiod, 45% humidity, 24±2 ^{0}C temperature). Morphological measurements (root and shoot length and fresh and dry weights) as well as photosynthetic pigment amount analyses (chl a, chl b, total chl and carotenoids) were carried out on seedlings harvested on the 120th day according to a randomized experimental design. Root length decreased in 1 M PEG + 15' UV-B treatment compared to the control, and increased in the other treatments. Root fresh and dry weights decreased in 0.5 M PEG + 15' UV-B, 1 M PEG + 15' UV-B and 1 M PEG + 30' UV-B treatments compared to the control, while they increased in the other groups. While 0.5 M PEG + 15' UV-B and 0.5 M PEG + 30' UV-B treatments caused increases in shoot length and fresh-dry weights compared to the control, decreases were determined in the other treatments. In all treatments except 1 M PEG+15' UV-B treatment in chlorophyll amounts, and 1 M PEG+15' UV-B and 0.5 M PEG+30' UV-B treatments in carotenoid amounts were found to decrease compared to the control. It was concluded that UV-B preparation techniques could be used in alleviating drought stress in pepper with detailed studies.

Keywords: *Capsicum annuum* L., Carotenoid, Chlorophyll, Drought Stress, UV-B

Biberde büyüme parametreleri ve fotosentetik pigment miktarları üzerine kuraklık stresinin ve UV-B hazırlamanın etkileri

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Özet: Her geçen gün iklim değişiklikleri vb. çevresel etmenlerin yanı sıra antropojenik etkiler sebebiyle dünyada kullanılabilir su miktarı azalmakta, kuraklığa maruz kalan alan miktarı artmaktadır. Kuraklık stresinin etkilerini hafifletmek ve gıda güvenliğini koruyabilmek amacıyla etki derecesi yüksek, kolay uygulanabilen ve az maliyetli stratejilere ihtiyaç vardır. Çalışmada kuraklığın biber fidelerinin büyüme ve fotosentetik pigment miktarı üzerindeki etkilerini saptamak ve UV-B hazırlamanın bu etkileri

hafifletmede faydalı olup olmadığını belirlemek amaçlanmıştır. UV-B hazırlanan (15' veya 30') ve /veya kuraklığa (0,5 M PEG veya 1 M PEG) maruz bırakılan tohumlar torfla doldurulmuş saksılara ekildikten sonra büyüme odasında (16 saat aydınlık/ 8 saat karanlık fotoperiyot, %45 nem, 24±2 0C sıcaklık) çimlenme ve fide gelişimine bırakılmıştır. Tesadüfi deneme desenine göre 120. günde hasat edilen fidelerde morfolojik ölçümlerin (kök ve sürgün uzunluğu ile taze ve kuru ağırlıkları) yanı sıra fotosentetik pigment miktar analizleri (kla, klb, toplam kl ve karotenoid) gerçekleştirilmiştir. Kök uzunluğu kontrole oranla 1 M PEG+ 15' UV-B uygulamasında azalmış, diğer uygulamalarda artmıştır. Kök taze ve kuru ağırlıkları ise kontrole oranla 0,5 M PEG+ 15' UV-B, 1 M PEG+ 15' UV-B ve 1 M PEG+ 30' UV-B uygulamalarında azalırken diğer gruplarda artmıştır. Sürgün uzunluğu, taze-kuru ağırlıklarında 0,5 M PEG+ 15' UV-B ve 0,5 M PEG+ 30' UV-B uygulamaları kontrole göre artışlara neden olurken diğer uygulamalarda azalmalar belirlenmiştir. Klorofil miktarlarında 1 M PEG+ 15' UV-B uygulaması, karotenoid miktarında 1 M PEG+ 15' UV-B ve 0,5 M PEG+ 30' UV-B uygulamaları dışındaki tüm uygulamalarda kontrole oranla azalmalar saptanmıştır. Detaylı çalışmalarla UV-B hazırlama tekniklerinin biberde kuraklık stresini hafifletmede kullanılabileceği sonucuna varılmıştır.

Anahtar Kelimeler: *Capsicum annuum* L., Karotenoid, Klorofil, Kuraklık Stresi, UV-B

Sustainable use of *Thymus* species

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Abstract: *Thymus* is defined as a perennial shrub of the Lamiaceae family that contains high amounts of bioactive substances. It is widely used in the food sector as a spice plant, in the pharmaceutical and cosmetic sectors as a raw material, and in landscaping as an ornamental plant. In recent years, due to the increase in demand for thyme species worldwide, there has been a significant increase in thyme production areas in Türkiye and Pakistan. This increase has made Türkiye one of the important actors in the world thyme market. In order to ensure sustainability in thyme production and use, to increase trade volume, and to protect its place in the world market, some measures need to be taken. Among these measures and strategies, certified production, provision of healthy production material, conscious use of pesticides, development of cultural practices, increase in contracted production and prevention of adulteration are of great importance. In addition, climate change and anthropogenic effects cause a decrease in biodiversity. In-situ and ex-situ conservation methods are also needed to protect *Thymus* species. Micropropagation processes carried out using plant biotechnology provide new opportunities in the propagation of thyme, its sustainable production and the increase in the active substance. *Thymus* is an important part of our country's and world biodiversity, as well as an important raw material for the food and pharmaceutical industries. Biotechnological studies on the protection and sustainable use of *Thymus* need to be increased.

Keywords: Essential oils, *Ex-situ* conservation, *In-situ* conservation, Micropropagation, Thyme

Thymus türlerinin sürdürülebilir kullanımı

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Özet: *Thymus*, yüksek miktarlarda biyoaktif madde içeren *Lamiaceae* familyasının çok yıllık çalısı olarak tanımlanmıştır. Dünyada baharat bitkisi olarak gıda sektöründe, hammadde olarak ilaç ve kozmetik sektörlerinde ve süs bitkisi olarak peyzajda geniş kullanıma sahiptir. Son yıllarda dünya genelinde kekik türelerine olan talebin artması nedeniyle Türkiye'de ve Pakistan'da kekik üretim alanlarında önemli bir artış meydana gelmiştir. Bu artış, Türkiye'yi dünya kekik pazarında önemli aktörlerden birisi haline getirmiştir. Kekik üretimi ve kullanımında sürdürülebilirliğinin sağlanması, ticaret hacminin arttırılması ve dünya pazarındaki yerin korunması amacıyla bazı önlemlerin alınması gerekmektedir. Bu önlemler ve stratejiler arasında sertifikalı üretim, sağlıklı üretim materyalinin sağlanması, bilinçli pestisit kullanımı, kültürel uygulamaların geliştirilmesi, sözleşmeli üretimin arttırılması ve tağşişin önlenmesi büyük önem arz etmektedir. Ayrıca iklim değişiklikleri ve antropojenik etkiler biyoçeşitliliğin azalmasına

neden olmaktadır. *Thymus* türlerinin korunması amacıyla da *in-situ* ve *ex-situ* koruma yöntemlerine ihtiyaç duyulmaktadır. Bitki biyoteknolojisi kullanılarak gerçekleştirilen mikro çoğaltım işlemleri kekiğin çoğaltılmasında, sürdürülebilir üretiminde ve etken maddenin artırılmasında yeni olanaklar sağlamaktadır. *Thymus* ülkemiz ve dünya biyoçeşitliliğinin önemli bir parçası olmasının yanı sıra gıda ve ilaç endüstrileri için önemli bir hammadde konumundadır. *Thymus*'un korunması ve sürdürülebilir kullanımı konusunda biyoteknolojik çalışmaların artırılması gerekmektedir.

Anahtar Kelimeler: Ex-situ koruma, İn-situ koruma, Kekik, Mikroçoğaltım, Uçucu yağlar

CREBBP gen ekspresyonunun körfarelerde hipoksik ortamda değişimi

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Özet: Kanser, dünya genelinde önemli bir sağlık sorunu olup, bilim insanları bu hastalığın nedenlerini ve tedavi yöntemlerini anlamak için çeşitli araştırmalar yürütmektedir. Bu çabaların bir parçası olarak, *Nannospalax* cinsi körfareler üzerinde yapılan çalışmalar, bu organizmaların hipoksik ortamlara adaptasyon mekanizmalarını ve kansere karşı doğal dirençlerini anlamak açısından büyük bir potansiyele sahiptir. Bu çalışma, Aksaray ilinden kapan kurma metoduyla yakalanan körfarelerin hipoksiye maruz kalmaları durumunda CREBBP gen ekspresyonundaki değişiklikleri araştırmaktadır. Her iki grup için toplam 14 körfare bireyi, normoksi (%21 oksijen) ve hipoksi (%5 oksijen) gruplarına ayrılarak, 24 saat boyunca hipoksik veya normoksik koşullarda tutulmuştur. Bu sürenin ardından böbrek dokularından RNA izolasyonu yapılarak cDNA sentezi gerçekleştirilmiş ve CREBBP gen ekspresyonu GAPDH housekeeping geni kullanılarak real-time PCR yöntemiyle ölçülmüştür. Sonuçlar, 24 saat hipoksik koşullarda CREBBP gen ekspresyonunun 0,83 kat azaldığını ancak bu değişimin istatistiksel olarak anlamlı olmadığını ($p>0,05$) göstermiştir. Bu durum, CREBBP geninin hipoksik ortamlara uyumda stabil kalabileceğini düşündürmektedir. Bulgular, hipoksinin kanserle ilişkili gen düzenlemelerindeki etkisini anlamak için ipuçları sunmaktadır. Örnek sayısının artırılması, gelecekte daha kapsamlı sonuçlar elde edilmesini sağlayabilir ve bu bağlamda CREBBP geninin rolünü daha iyi anlamak için yeni araştırma fırsatları yaratacaktır.

Anahtar Kelimeler: Körfare, *Nannospalax*, Hipoksi, CREBBP, Gen Ekspresyonu

Artificial intelligent applications in biotechnology

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Abstract: Nowadays artificial intelligence is applied in almost all fields of biotechnology. Due to new technologies artificial intelligence has an important place in biotechnology and can be applied in different fields like biomedicine, biophamacology, bionics, bioinformatics, plant bioengineering, plant biotechnology. With artificial intelligence and deep learning, laboratory research is better optimised, repetition of experiments is reduced, and significant time and cost savings are achieved. Artificial intelligence-supported planning in the animal and plant experimentation phase ensures that research is conducted both in terms of time and using fewer plants and animals. In the clinical research phase, artificial intelligence plays a very important accelerating role in the design of human phase studies, accurate recruitment of volunteers (patients) and collection of reliability and efficacy data. Artificial intelligence based predictive measures can be planned by collecting, studying and analysing information on all contingencies that occur during the clinical trial and after the drug is put into use. Artificial intelligence can also be applied to in vitro cultivation of plants. For example: monitoring plants with artificial intelligence, thanks to new technologies they can detect spoilage of the environment, change of temperature or pH and humidity, they can also record changes in plants, record growth and data collection. Thanks to image processing and machine learning, results of very high accuracy are ensured.

Keywords: Artificial intelligence, Biotechnology, Biomedicine, Bioinformatics**.**

CHEMISTRY

Effect of wool fiber ratio in acrylic yarn composition on yarn strength properties

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Abstract: Acrylonitrile and polyacrylonitrile (PAN) were among the first synthesized polymers (1890s) (Moureau, 1893, Mark, 2013). DuPont produced the first commercial acrylic fiber in 1950 under the trade name Orlon, using DMF as a spinning solution. Later, Chemstrand, now known as Solutia produced Acrilan acrylic fiber with solvent N, N-dimethylacetamide (DMAc) using American Viscose wet spinning technology. In 1960, the Federal Trade Commission defined acrylic fiber as fibers containing at least 85% acrylonitrile by weight (Babaogul et al., 2010; Lukens, 1960; U. S. Federal Trade Commission, 1960; Dalgıc, 2009). The most important feature of acrylic fiber is that it does not age under outdoor conditions and is very difficult to decompose. Today, acrylic yarn is widely used in the production of both hand-knitted and machine-knitted sweater garments and carpet production. Blending wool fibers is a common practice to improve some of the suitability properties of acrylic yarn. While the blending of wool fiber improves the comfort and suitability of acrylic yarn, it is known to negatively affect yarn breaking strength and elongation rate (Mengüç, 2016). This study was conducted to determine the effect of this change in yarn breaking strength on the basis of wool fiber ratio in the yarn composition. The data obtained as a result of the study showed that there was an inverse ratio between yarn breaking strength and wool fiber ratio, and that yarn breaking strength decreased linearly as the wool fiber ratio in the yarn composition increased.

Keywords: Acrylic, Wool, Fiber, Hand knitting yarn, Breaking strength.

Fe_3O_4 ile modifiye edilmiş karbon nanotüplerin poli (vinil klorür) özellikleri üzerine etkisi

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Özet: Grafit, elmas, fulerenler, grafen ve özellikle karbon nanotüp (CNT) gibi karbon dolgularının karakteristik özellikleri, nanoteknoloji için oldukça önemlidir. Ayrıca Polivinil klorür (PVC)'nin tıpta sıkça kullanılan bir malzeme olmasından dolayı PVC/CNT nanokompozitlerinin üretimi tıp uygulamaları için büyük önem taşımaktadır. Karbon nanotüplerin üstün mekanik özellikler göstermesi, polivinil klorürün biyoaktivite ve biyouyumluluk özellikleri, demir oksit nanoparçacıkların manyetik özelliklerinin polivinil klorürürün karakteristik özellikleri üzerindeki etkinliği, bu materyallerin nanotıp alanında çeşitli ihtiyaçların karşılanması için önemli perspektifler sunmaktadır. Çalışmada, bu materyallerin sentezi, karakterizasyonu ve performansları üzerindeki elde edilen sonuçlar ışığında, nanomateryallerin gelecekteki biyomedikal uygulamalardaki rolünün anlaşılmasına katkı sağlaması beklenmektedir. Araştırmanın amacı, Fe3O4 ile işlevselleştirilmiş nanotüplerin PVC'ye modifiye edilerek nanokompozitlerin üretilmesi ve bu nanodolguların PVC özellikleri üzerindeki etkisini belirlemektir. CNT'lerin işlevselleştirme etkinliği, FT-IR spektroskopisi ve termogravimetrik yöntem kullanılarak incelenmiş ve yoğunlukları belirlenmiştir. Sonrasında nanomalzemelerin PVC çözeltilerindeki dispersiyon stabilitesi araştırılmıştır. Ayrıca, elde edilen nanokompozitlerin termal özellikleri (Kongo kırmızısı testi ve termogravimetrik analiz ile), aseton şişme direnci, elektriksel özellikleri, gerilme etkisi altındaki esneme ve darbe dayanımı testi ile mekanik özellikleri incelenmiştir. Bu sonuçlara dayanarak, Fe3O4 ile modifiye edilmiş nanotüplerle PVC nanokompozitlerin özellikleri belirlenmiştir. Tıpta kullanılan biyouyumlu demir oksit nanoparçacıkların, karbon nanotüplerin yüzey modifikasyonuna uygulanması, polimerik nanokompozitlerin özelliklerini olumlu yönde etkilediği görülmüştür.

Anahtar Kelimeler: karbon nanotüp (CNT), demir oksit (Fe_3O_4) nanoparçacık, PVC (polivinil klorür), termogravimetrik analiz.

Özel Tematik Oturum Önerisi (İsteğe Bağlı): Nano teknoloji ve uygulamaları

The effect of Fe_3O_4 modified carbon nanotubes on the properties of poly (vinyl chloride)

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Abstracts: The characteristic properties of carbon fillers such as graphite, diamond, fullerenes, graphene and especially carbon nanotubes (CNTs) are very important for nanotechnology. Moreover, since polyvinyl chloride (PVC) is a widely used material in medicine, the production of PVC/CNT nanocomposites is of great importance for medical applications. The superior mechanical properties of carbon nanotubes, the bioactivity and biocompatibility properties of polyvinyl chloride, the effectiveness of the magnetic properties of iron oxide nanoparticles on the characteristic properties of polyvinyl chloride offer important perspectives for these materials to meet various needs in the field of nanomedicine. The study is expected to contribute to the understanding of the role of nanomaterials in future biomedical applications in the light of the results obtained on the synthesis, characterization and performance of these materials. The aim of the research is to produce nanocomposites by modifying Fe3O4 functionalized nanotubes into PVC and to determine the effect of these nanofillers on PVC properties. The functionalization efficiency of CNTs was investigated using FT-IR spectroscopy and thermogravimetric method and their densities were determined. Then, the dispersion stability of the nanomaterials in PVC solutions was investigated. Furthermore, the thermal properties of the obtained nanocomposites (by Congo red test and thermogravimetric analysis), acetone swelling resistance, electrical properties, mechanical properties by flexure under tensile stress and impact strength test were investigated. Based on these results, the properties of PVC nanocomposites with Fe3O4 modified nanotubes were determined. The application of biocompatible iron oxide nanoparticles used in medicine to the surface modification of carbon nanotubes was found to positively affect the properties of polymeric nanocomposites.

Keywords: carbon nanotube (CNT), iron oxide (Fe_3O_4) nanoparticle, PVC (polyvinyl chloride) , thermogravimetric analysis.

Synthesis and characterization of a new type of Cu-Ag/DT@TiO_2 nanocomposite via green synthesis method using tomato waste

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Abstract: Nanotechnology and green chemistry are two important fields that complement each other in developing environmentally friendly and sustainable solutions. The principles of green chemistry play a role in reducing environmental impact during the production and use of nanomaterials. Additionally, nanotechnology can be effectively utilized in green chemistry applications, such as pollution remediation and energy efficiency. The combination of these two fields has great potential to support a cleaner and more sustainable future.

Nanocomposite synthesis has been performed using a green synthesis method from tomato waste. Initially, Cu-Ag was synthesized. A hydrothermal system was used for the synthesis of another nanoparticle, TiO_2. The resulting materials led to the synthesis of Cu-Ag/DT@TiO_2, which has not been reported in the literature. The characterization of these synthesized materials was conducted using XRD, SEM, and Raman analyses.

Keywords: Green Chemistry, Nanoparticle, Nanocomposite.

İyonotropik jelasyon ile organik atıkların etkili kapsülasyonu

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Özet: Organik atıkların yönetimi, endüstriyel, tarımsal ve evsel faaliyetlerden kaynaklanan katı atıkların önemli bir bölümünü oluşturması nedeniyle giderek artan bir çevresel endişe haline gelmiştir. Bu atıkların, bitki üretimi, toprak iyileştirme ve gıda katkı maddeleri gibi uygulamalarda sürdürülebilir ve ekolojik yöntemlerle kullanılması, hem atıkların azaltılması hem de çevresel sürdürülebilirliğin teşvik edilmesi için geçerli bir çözüm olarak giderek daha fazla ilgi görmektedir. Bu bağlamda, endüstriyel patates işleme sırasında, ana ürünün yanı sıra büyük miktarlarda patates kabuğu yan ürünleri üretilmektedir. Bu kabuk atıklarının yanlış yönetimi ciddi çevresel sorunlara yol açabilir. Ancak, patates kabukları, yüksek fenolik bileşik içeriği nedeniyle besin kaynağı olarak potansiyele sahiptir. Fenolik bileşikler, antioksidan ve sağlık açısından faydalı özellikleriyle bilinen biyoaktif moleküllerdir. Bu fenolik bileşiklerin önemli bir kısmı patates kabuğunda yoğunlaşmıştır ve bu da kabukları değerli bir yan ürün haline getirmektedir. Bu bileşiklerin olumlu sağlık etkilerini gösterebilmesi için yeterli ve biyoyararlanılabilir şekilde tüketilmeleri önemlidir. Bu nedenle, patates kabuklarının değerini artırmaya ve bu fenolik bileşikleri fonksiyonel ürünlere entegre etmeye yönelik yenilikçi yaklaşımların geliştirilmesine artan bir ilgi vardır. Bu çalışmada, atık patates kabuklarından elde edilen fenolik bileşikler, alginat ve jelatin kullanılarak iyonotropik jelasyon yöntemi ile bir polimer karışımına enkapsüle edilmiştir. Bu teknik, fenolik bileşiklerin mikro boncuklar içinde etkili bir şekilde enkapsüle edilmesini sağlamış olup, yüzey morfolojisi ve yapısal bütünlük, taramalı elektron mikroskobu (SEM) ve stereo mikroskop kullanılarak incelenmiştir.

Anahtar Kelimeler: Enkapsülasyon, Yeşil kimya, Fenolik bileşen, İyonotropik jelasyon.

Investigation of multifunctional properties of TiO_2@CeO_2 nanocomposite materials

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Abstract: CeO_2@TiO_2 nanocomposite materials come in multifunctional varieties and have attracted significant attention due to their unique synergistic effects and potential applications in various fields. The combination of cerium oxide (CeO_2) and titanium dioxide (TiO_2) enhances not only the photocatalytic efficiency for decomposition reactions but also improves thermal stability and electrical conductivity. Characterization techniques such as X-ray diffraction (XRD) Field Emission (FESEM) reveal the structural integrity and morphology of the composites, which are crucial for their functionality. Furthermore, the addition of CeO_2 can enhance the electrical conductivity of TiO_2, making it suitable for applications in energy storage systems. Notably, a capacitance value of 186 F/g was obtained for the TiO_2@CeO_2 material.

Keywords: Electrochemistry, Supercapacitors, Nanocomposite.

Green synthesis of silver nanoparticle using tomato (*Solanum lycopersicum*) peel extract for colorimetric detection of heavy metals

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Abstract: Heavy metal pollution is a severe concern for both the environment and human health. Extensive release of heavy metals contaminates everything from air to soil and through the food chain it reaches humans to create severe health issues. Over the last decades, many researchers have focused on developing specific methods for detecting heavy metal ions, hence preventing their damage to people and the environment. Recent researches utilize the use of nanomaterials, especially metal nanoparticles, due to their unique properties and also creates portable methods to analyze real samples rapidly. Among various types of metal nanoparticles, gold, and silver nanoparticles are widely studied due to their optical capabilities to be used in colorimetric sensors. Here, we investigate the use of tomato peel extract for the synthesis of silver nanoparticles and exploit its use as a colorimetric sensor probe. The result showed that the synthesized particle is 30 nm in size and has a 422 nm LSPR band. Upon interaction of the particle with the metal ions, it has specifically interacted with Hg^{2+} to be used as a specific sensor system for this heavy metal. The analysis of real samples (drinking water, tap water, and wastewater) showed that the recoveries were for tap water 95.7 ± 2.4%, for drinking water 90.2 ± 0.8%, and for wastewater 102.4 ± 4.7% Overall, this system showed that it can be used as a colorimetric sensor platform for the detection Hg2+ ions from the water samples.

Keywords: Green synthesis, Silver nanoparticle, Heavy metals, Mercury, *Solanum Lycopersicum.*

Giyilebilir cihazlar için elektrospinning ile grafen-polimer nanokompozitlerden enerji eldesi

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Özet: Nanoteknolojinin gelişmesiyle birlikte grafen, sahip olduğu üstün özellikleri sayesinde nanoteknoloji uygulamalarının temelini oluşturan iki boyutlu bir nanomalzemedir. Polimer nanokompozitler, grafen dâhil karbon nano katkı malzemelerinin en önemli uygulamalarından biridir ve grafen katkısıyla gelişmiş mekanik, termal ve elektriksel özellikler sergilemektedir. Son yıllarda sürdürülebilir elektrik enerjisine artan ihtiyaçla beraber enerjiyi dönüştürebilen ya da depolayabilen malzemeler üzerine çalışmalar yapılmaktadır. Bu amaçla grafen-polimer nanokompozitler enerji elde etme, dönüştürme veya depolama uygulamalarında ilgi odağı haline gelmiştir. Özellikle mekanik enerjiyi elektrik enerjisine dönüştürebilen sistemlerin temelini piezoelektrik malzemeler oluşturduğundan polimer olarak piezoelektrik polimerler kendiliğinden enerji eldesi sistemlerde matris tabaka olarak kullanılmaktadır. Böylece bu polimerlere grafen nano katkı malzemelerinin katkılanmasıyla özellikleri geliştirilmiş nanokompozit yapılar ile sürdürülebilir enerji ihtiyacını ortadan kaldıracak çözümler geliştirilmesi hedeflenerek kendi kendine enerji üretebilen sistemlerin oluşturulması sağlanmaktadır. Çalışmamızda, biyomedikal uygulamalarda kullanılması adına hem biyouyumlu hem de en iyi piezoelektrik polimer olan Poliviniliden Diflorür (PVDF) polimeri tercih edilmiştir. PVDF polimer çözeltisine indirgenmiş grafen oksit (rGO) esnekliği ve elektriksel özelliği geliştirmek adına katkı malzemesi olarak kullanılmıştır. Piezoelektrik özelliği geliştirmek adına ise Baryum titanat ($BaTiO_3$) nanoparçacığı ikinci bir katkı malzemesi olarak kullanılarak nanokompozit yapı oluşturulmuştur. Oluşturulan nanokompozit yapı elektrospinning tekniği kullanılarak tekniğin sağladığı aynı anda mekanik gerdirme ve elektriksel kutuplama işlemlerinin bir arada gerçekleştirilmesiyle nanolif olarak elde edilmiştir. Piezoelektrik nanolif tabaka, iletken elektrot olarak iki adet Alüminyum tabaka arasına konularak bir piezoelektrik nanojeneratör (PENG) sensör tasarımı oluşturulmuştur. Elde edilen PENG tasarımı ile vücut iç ve dış hareketleri kullanılarak biyomedikal alanda giyilebilir elektronik cihazlara sürekli bir enerji sağlanmasıyla kısa ömürlü pillere alternatif bir çözüm üretilmesi hedeflenmiştir.

Anahtar Kelimeler: Nanolif, Grafen, Polimer, Piezoelektrik, Nanojeneratör.

Energy production from graphene-polymer nanocomposites by electrospinning for wearable devices

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Abstract: With the development of nanotechnology, graphene is a two-dimensional nanomaterial that forms the basis of nanotechnology applications thanks to its superior properties. Polymer nanocomposites are one of the most important applications of

carbon nano additives including graphene and exhibit improved mechanical, thermal and electrical properties with graphene additive. In recent years, with the increasing need for sustainable electrical energy, studies are being carried out on materials that can convert or store energy. For this purpose, graphene-polymer nanocomposites have become the focus of attention in energy acquisition, conversion or storage applications. Since piezoelectric materials form the basis of systems that can convert mechanical energy into electrical energy, piezoelectric polymers are used as matrix layers in self-generating systems as polymers. Thus, by adding graphene nano additives to these polymers, it is aimed to develop solutions that will eliminate the need for sustainable energy with improved nanocomposite structures and to create systems that can generate energy on their own. In our study, Polyvinylidene Difluoride (PVDF) polymer, which is both biocompatible and the best piezoelectric polymer, was preferred for use in biomedical applications. Graphene oxide (rGO) reduced to PVDF polymer solution was used as an additive material to improve flexibility and electrical properties. Barium titanate ($BaTiO_3$) nanoparticle was used as a second additive material to create a nanocomposite structure to improve piezoelectric properties. The nanocomposite structure was obtained as a nanofiber by performing the mechanical stretching and electrical polarization processes provided by the technique using electrospinning technique. A piezoelectric nanofiber layer was placed between two aluminum layers as a conductive electrode to create a piezoelectric nanogenerator (PENG) sensor design. With the obtained PENG design, it is aimed to produce an alternative solution to short-life batteries by providing continuous energy to wearable electronic devices in the biomedical field using internal and external body movements.

Keywords: Nanofiber, Graphene, Polymer, Piezoelectric, Nanogenerator.

Hibrit triazollerin sentezi ve kolinesteraz aktivitelerinin araştırılması

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Özet: Alzheimer hastalığı dünyada önde gelen ölüm nedenleri arasında en hızlı yükselen hastalıklardan biridir (Calabrò et al., 2021) ve hasta insanların sayının dünya genelinde 2030 yılında 82 milyona çıkacağını ve 2050 yılına kadar sayının 138 milyona kadar ulaşacağını tahmin edilmektedir (Huang et al., 2023). Birleşik Devletler Gıda ve İlaç İdaresi (USFDA) Takrin (1993), Denepezil (1996), Rivastigmin (2000),Galantamin (2001), Memantin (2003), Aducanumab (2021) gibi ilaçların Alzheimer hastalığının tedavisinde kullanımın onayladı (R. Ali et al., 2022). Şekil 1.17'de gösterilen ilaçlar kolinesteraz inhibitörü olarak kullanılır ve nöronal sinaplarda kolinerjik aktiviteyi artırarak semptomları azaltan ve hastaların bilişsel süreçlerinde kayda değer faydalar sağlayan ilaçlardır (R. Ali et al., 2022). Ancak bu bileşiklerin etkinliği sınırlıdır ve Alzheimer hastalığının geç evresinde olumsuz yan etkiler göstermektedir, bu nedenle Alzheimer hastalığının tedavisinde daha güçlü ve yüksek kolinesteraz inhbitörlerine ihtiyaç duyulmaktadır (Saeedi et al., 2021). İlginç bir bileşik grubu olan triazoller anti-Alzheimer aktivitesinde oksidatif stres ve inflamasyona karşı nöroprotektif etki, beta-sekretaz gibi inhibisyonu ve metal şelatlama gibi ilginç biyolojik aktiviteler göstermiştir (Costa et al., 2020). 1,2,3- triazol halkası astilkolinesteraz ve bütilkolinesteraz'in aktivitelerini inhibe ederek antikolinesteraz aktivitesini gösterir (S. A. Khan et al., 2023). Bu çalışmanın amacı bir dizi yeni 1,2,3-triazol hibrit türevini sentezlemek ve bunların asetilkolinesteraz (AChE) ve bütirilkolinesteraz (BuChE) inhibitörleri olarak potansiyellerini değerlendirmektir. 1,2,3-triazol temelli yeni hibrit yapılar sentezlenerek yapısal karakterizasyonları yaygın analitik metotlar kullanılarak yapıldı.

Anahtar Kelimeler: Alzheimer, Asetilkolinesteraz (AChE), Bütirilkolinesteraz (BuChE), Triazol.

Removal of heavy metal pollution in water by using filter coffee waste

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Abstract: In this study, filter coffee waste, an effective bio-adsorbent was subjected to removal of Pb (II), Cd (II), Co (II) and Ni (II) heavy metals in aqueous solutions. Firstly, filter coffee was brewed, its waste was collected, washed with organic solvent and distilled water, and dried at 40 °C for 24 hours. The surface morphology of the bio-adsorbent was determined by micrographic analysis. The optimization steps of the method were evaluated in terms of solution pH, bio-adsorbent amount, equilibrium time and effect of interfering ions. The concentrations of heavy metal ions were determined using flame atomic absorption spectroscopy (FAAS). Filter coffee waste bio-adsorbent showed up to 95 % removal performance for Pb (II), Cd (II), Co (II) and Ni (II) heavy metals under optimum conditions. The developed method was successfully applied in the removal of Pb (II), Cd (II), Co (II) and Ni (II) metal ions in aqueous media.

Keywords: Bio-adsorbent, Filter coffee waste, Heavy metals, Solid phase extraction, Adsorption.

Investigation of the phenolic components of damkorugu (P. Sediforme) by analytical methods and evaluation of its cytotoxic effect

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Abstract: Petrosedum sediforme (P. sediforme), a member of the Crassulaceae family, is one of the 33 sedum species growing in Turkey. This plant, which is known as “damkorugu” and grows in rocky areas, is also called golden herb because of its golden yellow flowers. The plant, which is preferred in traditional medicine for its anti-inflammatory, hemostatic and antifungal properties, is suggested to be used in nutritional supplements as a functional food ingredient. In the contemporary era, there is a gradual increase in health problems caused by increasing environmental problems and radiological exposure. In studies, it is stated that plants may have preventive properties against various diseases due to the antioxidant components they contain. In this study, ultrasonic-assisted extraction was carried out with two different solvent mixtures, glycerol-water (50% v/v) and methanol-water (50% v/v), using flowers, buds, leaves and stems of the damkorugu. Following extractions, the antioxidant capacity was determined using spectroscopic methods the ABTS, CUPRAC and FRAP and the total phenolic content was determined by Folin Ciocalteu method. High Performance Liquid Chromatography (HPLC-DAD) was used for the quantitative determination of phenolic compounds in each extract. The main phenolic components identified in the extracts were resveratrol, kaempferol 3-β-D-glucoside, quercitrin and hyperoside. The methanol-water extract of the damkorugu flower was determined as the extract with the highest antioxidant properties. The cytotoxic effect of this extract was determined on MCF-7 and MDA-MB-231 cell lines using Sulforhodamine B test. The extract significantly inhibited both cell lines depending on the concentration.

Keywords: Petrosedum sediforme, extraction, antioxidant, cytotoxicity, HPLC-DAD.

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Environmental stress cracking behaviour of polymers used in military communication systems

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Abstract: Polymers are widely used in military communication applications, especially device casings and electronic boards, due to their beneficial properties such as electrical insulation, lightweight, and durability. However, during their service life, these materials may be exposed to various chemical agents. In some instances, such exposure can result in unpredictable, sudden failures when the polymers are under stress, a phenomenon known as Environmental Stress Cracking (ESC). This study investigates the effects of different chemicals on various polymers used in military communication systems throughout their operational lifetime. The polymers used in this study include Polycarbonate (PC)-Siloxane Copolymer, Glass Fiber Reinforced Polycarbonate, Acrylonitrile Butadiene Styrene (ABS), and Polycarbonate/ABS (PC/ABS). Chemical agents such as detergent, tuna canning liquid, and camouflage paint were selected based on their potential interaction with military equipment. In the first step of the study, polymer specimens were produced via injection molding and subjected to varying levels of strain (0% and 1.5%). Chemical agents were applied to each specimen under the specified strain conditions and were allowed to remain on the specimens for one week. In the second step of the study, uniaxial tensile tests were conducted to observe the effects of ESC. In conclusion, tuna canning liquid can cause catastrophic polymer failure in a short time, while detergent and camouflage paint reduce the polymers ductility.

Keywords: Polycarbonate, Acrylonitrile Butadiene Styrene, Environmental Stress Cracking, Chemical Agent.

In situ synthesis, encapsulation in arabinoxylan and release kinetics of microcrystalline copper(II)-aspirinate

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Abstract: Microcrystalline copper(II)-aspirinate was synthesized in situ by allowing copper(II) acetate monohydrate and aspirin to react in pre-swollen arabinoxylan (AX) from ispaghula (Plantago ovata) huskin aqueous medium. The method resulted in formation of microcrystalline (< 40 mm) copper(II)-aspirinate dispersed in AX matrix. The product was characterized by microscopic FT-IR spectroscopy, pXRD,scanning electron microscopy and atomic force microscopy. The AX-encapsulated copper(II) aspirinate exhibited a smooth release profile of aspirin over 8 h following Korsmeyer-Peppas model for swellable polymer films in alkaline medium. The release was of Fickian type with n = 0.5. The release rate appeared to follow the order: alkaline pH > distilled water > acidic pH suggesting the pH-dependent release from AX. These profiles were highly sustained as compared with those of the naked drug. nanokompozitlerin özelliklerini olumlu yönde etkilediği görülmüştür.

Keywords: MIL-101(Cr), MIL-100(Fe), Metallophthalocyanine, Epoxidation.

Immobilization of feruloyl esterase enzyme on different supports

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Abstract: In this study, the recombinant feruloyl esterase (FAE) enzyme was covalently immobilized on 3-aminopropyl silica gel support (FAE-3Ap-Glu) via glutaraldehyde spacer arm, entapped in PVA (FAE-PVA), sol gel (FAE-sol gel), and iron nanoparticle silica composites (FAE-nano). The optimum pH and temperature, thermal and storage stability and kinetic parameters were determined for the free and immobilized FAEs. For immobilized FAEs, the reuse stability was determined in a batch reactor. The optimum pH for free FAE, FAE-3Ap-Glu, FAE-PVA, FAE-sol gel and FAE-nano was 6.5, 6.5, 7.0, 7.0, and 7.5, respectively. The optimum temperature for free FAE, FAE-3Ap-Glu, FAE-PVA was found to be 40 °C, and 60 °C and 70 °C for FAE-sol gel and FAE-nano, respectively. It was determined that the thermal and storage stability of all immobilized enzyme samples were considerably higher than the free enzymes. FAE-nano, which retained approximately 63% of its initial activity after 10 reuses in a batch reactor, was identified as the immobilized FAE with the highest reuse stability. The Km values of free FAE, FAE-3Ap-Glu, FAE-PVA, FAE-sol gel and FAE-nano were 2.94, 2.26, 2.69, 1.09, and 6.91 mM, respectively. The corresponding Vmax values were 0.23, 0.40, 0.16, 0.12, and 0.50 U/mg protein.

Keywords: Feruloyl esterase, Immobilization, PVA, Sol gel, Nanoparticle

The inhibitive performance of *punica granatum* fruit extract as an ecologically friendly corrosion inhibitor for iron in HCl environment

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Abstract: This study aimed to investigate the effect of an aqueous extract from *Punica granatum* fruits, collected from Kilis province of Türkiye in September 2023, on Fe electrode in room conditions and acidic solution as a green and new ecologically friendly inhibitor. The naturally occurring green inhibitor effect was examined using potentiodynamic polarization and alternative current impedance (EIS) methods. According to the findings, it was concluded that the aqueous extract of the immature pomegranate prevented the corrosion of iron in 1 M HCl with a strong inhibition of over 90%. This is a very strong protection for metals among all green inhibitors found. It has been determined that with both electrochemical methods, the corrosion inhibition performance of *Punica granatum* fruit extract in acidic solution enhances as the solution concentration increases. The EIS diagrams show that when immature pomegranate fruit extract is present, the polarization resistance of iron increases, and the current values derived from the potentiodynamic polarization curves drop. Finally, the surface morphologies of the iron electrodes in 1 M HCl solutions without and with *Punica granatum* fruit extract after 1 h exposure were analysed by field emission scanning electron microscope (FESEM), it was concluded that the iron surface containing immature pomegranate fruit extract had a smoother image than the uninhibited one.

Keywords: *Punica granatum*, Plant extract, Green inhibition, Iron corrosion.

Bil Eco-friendly synthesis of nanomaterials and their applications

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Abstract: Pulsed plasma in liquid is a simple, ecologically friendly, cost-efficient method based on electrical discharge between two metal electrodes submerged into a dielectric liquid. We synthesized carbon-encapsulated Fe (Fe@C) magnetic nanoparticles with low cytotoxicity using pulsed plasma in a liquid. Body-centered cubic Fe core nanoparticles showed good crystalline structures with an average size between 20 and 30 nm were encapsulated in onion-like carbon coatings with a thickness of 2–10 nm. Thermal gravimetric analysis showed a high stability of the as-synthesized samples under thermal treatment and oxidation. Cytotoxicity measurements showed higher cancer cell viability than samples synthesized by different methods. Carbon coated ZnO nanorods with about 20 nm thickness and 150 nm length were synthesized by this method using different surfactant materials such as cetyl trimethylammonium bromide (CTAB) and sodium dodecyl sulphate (SDS). Cu and Ag nanoparticles of about 10 nm in size were also synthesized by the pulsed plasma in aquatic solution of 0.2 % gelatine as surfactant material. These nanoparticles showed high antibacterial activity for Erwinia amylovora and Escherichia coli.

Barbunya kabuğu özütü kullanılarak kobalt ferrit nanoparçacıkların sentezi ve karakterizasyonu

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Özet: Nanoteknoloji araştırmaları ve kullanımı hayatın her alanında katlanarak artmaktadır. Bilim ve teknolojide nanomalzemeler için çevre dostu, basit ve tehlikeli kimyasal maddelerin kullanımını azaltan sentez yaklaşımları geliştirmek büyük önem taşımaktadır. Yeşil sentez yaklaşımları geleneksel kimyasal sentez yöntemlerine kıyasla toksik kimyasalların kullanımını minimize ederek çevre dostu ve sürdürülebilir bir yöntem sunar. Bu süreç, biyouyumluluk ve düşük enerji tüketimi avantajlarıyla dikkat çekmekte olup, bitki özütleri kullanılarak elde edilen manyetik nanoparçacıklar özellikle biyomedikal ve çevre uygulamaları için önemli bir potansiyel taşımaktadır. Bu çalışmada bir tarımsal atık olan barbunya kabuğu özütü kullanılarak kobalt ferrit ($CoFe_2O_4$) nanoparçacıkları elde edilmiştir. Elde edilen kobalt ferrit nanoparçacıkların karakterizasyonu FESEM-EDX, XRD ve FTIR ile yapılmıştır. FESEM-EDX analizi incelendiğinde sentezlenen nanomalzemenin boyutunun 18-23 nm aralığında olduğu anlaşılmaktadır.

Anahtar Kelimeler: Kobalt ferrit, Nanoparçacık, Yeşil sentez, Barbunya kabuğu.

Performance analysis of electrochemical discharge machining for precise micro-hole fabrication

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Abstract: Micromachining plays a vital role in a range of real-world engineering applications, particularly in fields such as medicine, space exploration, and electronics, where components are often made from non-conductive materials. Electrochemical Discharge Machining (ECDM) is widely used for producing micro-holes due to its ability to create precise shapes with minimal thermal damage, while ensuring tight tolerances and high dimensional accuracy. This study examines the impact of critical performance parameters, such as applied voltage, interelectrode gap, and feed rate, on the fabrication of micro-holes in quartz ceramics using the ECDM process. Experiments were performed on a custom-developed ECDM setup, employing pilot trials with a one-factor-at-a-time approach to achieve micro-holes with nearly damage-free edges. The results demonstrate the impact of these process parameters on the cutting rate and circularity of the micro-holes. Optimal levels for applied voltage, electrolyte concentration, and feed rate were identified, leading to improved responses in terms of material removal rate (MRR), width of cut (WOC), and circularity. Furthermore, surface morphology of the fabricated micro-holes was analyzed using scanning electron microscopy, optical microscopy, and Energy-dispersive X-ray spectroscopy.

Keywords: µ-ECDM, Micro-holes, MRR, WOC, Circularity.

Production of Poly(3HB-co-3HV) copolymers by halophilic halomonas meridiana using root soil as a carbon source

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Abstract: Microrganisms that make polyhydroxybutyrate (PHB) (Halomonas meridiana). Because polyhydroxyalkanoates degrade naturally, they offer a strong alternative to synthetic polymers.

The purpose of this study was to screen a sample of bacteria isolated from vegetable and Fruit root soil. Using phenotypic and genotypic techniques, two of the strains—one halophilic and the other non-halophilic—showed promising results. The 16S rRNA gene-based phylogenetic study revealed a relationship between Halomonas meridiana and the bacterial isolates IDSEQ01 that produce polyhydroxyalkanoate (PHA). These strains were grown under nutritionally ideal conditions, and the polymers recovered from them were identified by gravimetric analysis as producing 30% and 20% of cell dry weight in PHA. In conclusion, there is a great deal of interest in maximizing PHB production from low-cost industrial wastes and carbon sources in order to save expenses and achieve a high yield.

Keywords: Polyhydroxyalkanoates, Halophilic bacteria, Halomonas meridian, Fruit and vegetable’s soil.

Аксы районунун ж. орозалиев атындагы № 41 жалпы билим берүүчү орто мектебинин 6-классынын окуучуларын окутууда биология жана химия предметин аралык байланышын ишке ашыруу

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Аннотация. Табият таануу предметтерин мектеп окуучуларына окутууда, биология жана химия предметтеринин түшүнүктөрүн айкалыштырып сабак өтүүнүн учурдагы теориялык жана методикалык абалы Кыргызстандын педагог окумуштууларынын изилдөөлөрү менен коштолуп кайрадан талданды. 6-класстын “Биология” предметинин окуу китебинин мазмунуна жана календарлык планына карата колдонууга мүмкүн болгон химиялык түшүнктөр жана дидактикалык материалдар топтолуп, биринчи жолу ар бир сабакка карата сабактын планын биология жана химия предметтеринин айкалышында иштелип чыкты. Аксы районунун Ж.Орозалиев атындагы №41 жалпы билим берүүчү негизги мектебинин 6-классынын окуучуларын “Биология” предмети боюнча эксперименталдык топ катары окутууда “Биология” жана “Химия” предметтеринин айкалышындагы интеграциялык сабактар өтүлдү жана жыйынтыгы бааланды.

Негизги сөздөр: Предмет Аралык Байланыш, Интеграция, Химияны Окутуунун Методикасы, Биологияны Окутуунун Методикасы, Окутуунун Жыйынтыгы.

Realization of interdisciplinary links between biology and chemistry in the education of 6th grade ouoils at general secondary school no 41 named after J. orozaliyev of aksydistrict

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Annotation: The modern theoretical and methodological situation of teaching schoolchildren natural science subjects combining interdisciplinary links of biology and chemistry has been reanalyzed, the researches of scientists-pedagogues of Kyrgyzstan have been analyzed. Chemical concepts and didactic materials that can be used in relation to the content and calendar plan for the subject “Biology” of the 6th grade were collected, and for the first time a plan for each lesson in combining interdisciplinary links of biology and chemistry was developed. In teaching students of the 6th grade of general secondary school № 41 named after J.Orozaliev Aksyisky district as an experimental group in the subject “Biology”. Experimental pedagogical work - realization of interdisciplinary links of biology and chemistry was carried out and the results were evaluated.

Keywords: Interdisciplinary connection, Integration, Chemistry teaching methodology, Biology teaching methodology, Learning outcomes.

Ekstrem habitat olan kaya likeninden izole edilen funguslar ile kongo red ve malaşit green boyalarının renk gideriminin belirlenmesi

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Özet: Malaşit yeşili ve Kongo red gibi tekstil endüstrisinde kullanılan toksik boyaların degradasyonu doğamız ve canlılar için elzem hale gelmiştir. Bu boyaların degradasyonu için mikroorganizmalar kullanılmakta ve yeni türler aranmaktadır. Bu amaçla yeni fungal kaynaklar olarak liken endofiti fungusların bu çalışmada kullanılmıştır. Her iki boya için % 100 degrede eden türler bulunmuş ve en az %94 oranında parçalayabildikleri belirlenmiştir. Elde edilen sonuçlar ile liken endofiti fungusların malaşit ve Kongo boyalarının degradasyonunda kullanabileceği bulunmuştur.

Anahtar Kelimeler: Ekstremofil fungus, Kongo red, Malaşit green, Renk giderimi.

Bioactive compounds extraction from watermelon waste using ultrasound-assisted process

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Abstract: Food waste conversion is becoming increasingly common due to value-added products and an increasing demand for natural bioactive components. Food waste is a sustainable source for functional foods. Watermelon waste (rind, peel and seed) contains valuable bioactive compounds, and accordingly they have many biological activities. In this study, different solvents (water and 85% ethanol solution) on total phenolic content, antioxidant activity values and total chlorophyll content from watermelon rind+peel (WRP) and watermelon seed (WS) were investigated in ultrasound-assisted extraction. Total phenolic contents were between 407.88-1147.73 mg GAE/kg. DPPH and ABTS values were 17.6-24.68% and 8.18-13.21 mikromol Trolox/g for all extracts, respectively. The ethanol extract of WRP had 246.60±0.00 mg/kg of total chlorophyll content. As a result, bioactive compounds were successfully recovered from watermelon waste by ultrasound-assisted extraction. The obtained extracts have a high potential to be used in many industries such as food, nutraceuticals pharmaceuticals and others.

Keywords: Watermelon waste recovery, Rind, Peel, Seed, Ultrasound-assisted extraction, Bioactive compounds.

Gıda ambalajı uygulaması olarak *Lavandula spp. ve thymus spp.* ektratı içeren biyobozunur özellikte kitosan bazlı filmler

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Özet: Bu çalışmada, yeni bir gıda ambalajı üretim yöntemi olarak kitosan bazlı filmlere *Lavandula spp. ve Thymus spp.* ekstraktları eklenerek uygulanabilirliği incelenmiştir. Bu yaklaşımın çeşitli gıda ürünlerinin raf ömrünü uzatma ve çevreye olumlu etkileri araştırılmıştır. Ayrıca, *Lavandula spp. ve Thymus spp.* ekstraktlarının kitosan filmlerin fiziksel ve yapısal özellikleri üzerindeki etkileri değerlendirilmiştir.

Üretilen filmler Uv spektrometresi, FT-IR, SEM ile karakterize edilmiştir. Araştırma sonucunda elde edilen SEM görüntülerinde, uçucu yağ bileşenlerinin film içerisinde homojen bir şekilde dağıldığını gözlemlenmiştir. Kitosan zincirleri ve uçucu yağlar arasındaki olası etkileşimler Fourier-transform infrared spektroskopisi (FTIR) kullanılarak doğrulanmıştır. FTIR spektrum analizi, kitosan *ile Lavandula spp. ve Thymus spp.* esansiyel yağları arasındaki olası etkileşimler hakkında bilgiler sağlamıştır. Bu çalışma sonucunda, kitosan matrisine *Lavandula spp. ve thymus spp*. dahil edilerek aktif filmlerin geliştirilebileceği sonucuna ulaşılmıştır. Elde edilen filmler, potansiyel gıda teknolojisi uygulamalarında aktif ambalaj geliştirmek için ambalaj endüstrisine yeni formülasyon seçenekleri sunabilecek nitelikte olarak değerlendirilmiştir.

Anahtar Kelimeler: Kitosan, *Lavandula spp. ve Thymus spp*. ekstraktları, Gıda ambalajı.

Faz değiştiren maddelerin $CaCO_3$ ile mikrokapsüllenmesi

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Özet: Bu çalışmada, CaCO3 kabuklu heptadekan mikrokapsülleri sentezlenmiştir. Sentezlenen mikrokapsüllerin termal davranışlarını incelemek üzere DSC analizi yapılmış, ayrıca sızıntı olup olmadığı sızıntı testleriyle belirlenmiştir. Hazırlanan mikrokapsüllerin erime sıcaklığı 23,3 °C ve gizli ısı enerjisi depolama kapasitesi 144,7 J/g olarak belirlenmiştir. Kapsüllenme oranı %90 olarak hesaplanmıştır. Yapılan sızıntı testlerinde mikrokapsüllerde faz değiştirme malzemesi (FDM) sızıntısı gözlenmemiştir. Hazırlanan heptadekan/$CaCO_3$ mikrokapsülleri, tekstil, gıda endüstrisi ve bina yalıtımı gibi çeşitli alanlarda ısıtma ve soğutma yükünü azaltarak termal konforun sağlanması amacıyla termal enerji depolama sistemlerinde potansiyel bir kullanım alanına sahiptir.

Anahtar Kelimeler: Faz değiştiren madde, Termal enerji depolama, Heptadekan, Mikrokapsülleme.

Enerji depolama uygulamaları için oktadekan mikrokapsüllerinin geliştirilmesi ve karakterizasyonu

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Özet: Bu çalışmada, termal enerji depolama uygulamaları için oktadekan içeren gelatin-arap zamkı mikrokapsülleri hazırlanmıştır. Kapsülleme işlemi kompleks koaservasyon yöntemi ile yapılmıştır. Sentezlenen mikrokapsüllerin termal özellikleri DSC kullanılarak incelenmiştir. Mikrokapsüllerin erime sıcaklığı ve gizli ısı entalpileri 29.4 oC ve 147.5 J/g olarak belirlenmiştir. Yapılan sızıntı testleri sonucunda kapsüllerin FDM sızdırmadığı ve herhangi bir değişikliğe uğramadığı gözlenmiştir. Kapsüllenme oranı 59.7% olarak hesaplanmıştır. Termal analizler, bu çalışmada iyileştirilmiş termal özelliklere sahip MFDM'lerin başarılı bir şekilde sentezlendiğini gösterir.

Anahtar Kelimeler: Termal enerji depolama, Faz değiştiren madde, Oktadekan, Mikrokapsül.

Yeni 1,2,3-triazollerin sentezi, antibakteriyel özelliklerinin araştırılması, moleküler docking ve admet çalışmaları

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Özet: Enfeksiyon olarak bilinen hastalık etkenlerinin istilası, vücut organizmalarının küçük bir bölgesinde başlayabilir ve vücudun diğer bölgelerine yayılarak ölümcül sonuçlar doğurabilir. Mikroplar arasında bakteriler, virüsler, mayalar ve mantarlar bulunur. Bakteriyel enfeksiyon hastanelerde ve toplumda en sık görülen enfeksiyon türüdür ve dünya çapında çok yaygındır. Antibiyotikler, patojenlerin büyümesini engelleyerek bakteriyel enfeksiyonlara karşı etkili bir tedavi oluşturur. Ancak, antibiyotiklerin uzun süreli ve yanlış kullanımı nedeniyle mevcut antibiyotiklerin büyük bir kısmına karşı antibiyotik direnci ortaya çıkmıştır. Bu sorunun üstesinden gelmek için yüksek antimikrobiyal aktiviteye sahip yeni bileşiklerin geliştirilmesine acil ihtiyaç vardır. Azot atomu içeren heterosikliklerin incelenmesi, tıbbi kimyanın en önemli araştırma alanlarından biri haline gelmiştir. Üç azot atomu ve iki çift bağ içeren beş üyeli halka sistemi triazol olarak adlandırılır. Triazol iskeletine sahip bileşikler, çok çeşitli hastalıklara karşı (antidiyabetik, antimalaryal, antikanser, antibakteriyel, antifungal vb.) yüksek farmakolojik aktivite gösterdiklerinden özellikle tıbbi kimyada önemli bir yere sahiptir.

Bu çalışmada, bir dizi yeni 1,4-disübstitüe-1,2,3-triazol türevi sentezlenmiş, yaygın analitik metotlar kullanılarak yapısal karakterizasyonları yapılmış ve antimikrobiyal aktiviteleri araştırılmış, moleküler kenetlenme ve ADMET çalışmaları da gerçekleştirilmiştir.
Sentezlenen bileşikler (12.50 mg/mL) gram pozitif ve gram negatif mikroorganizmalara karşı 8-10 mm çapında inhibisyon zonları göstermiştir. Kontrol olarak kullanılan DMSO çözeltisinin suşlara karşı herhangi bir etkisi olmamıştır. Nitro grubu içeren bileşiğinin kullanılan mikroorganizmalara karşı en yüksek inhibisyon zonunu gösterdiği tespit edilmiştir.
Daha sonra, bileşiklerin 4EY7 proteini ile moleküler kenetlenme çalışmaları gerçekleştirilmiştir. Elde edilen bağlanma skorları -10.7 ile -11 arasında değişmekte olup yüksek bir bağlanma afinitesi sergilemektedir. Ayrıca sentezlenen bileşiklerin ADMET özellikleri incelenmiş ve ilaç benzeri maddeler için kriterleri karşıladıkları belirlenmiştir.

Anahtar kelimeler: Antibakteriyel, ADMET, Docking, Triazol.

Enhancing urease efficiency through immobilization on eggshell membranes: process optimization and characterization

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Abstract: Eggshell membrane (ESM), known for its porous structure, durability, permeability, biodegradability, non-toxicity, and large surface area, is a natural biopolymer frequently utilized in immobilization studies. Despite being considered a waste material, ESM, which consists of lysines, minerals, carbohydrates, collagens, and various proteins, has attracted significant attention in enzyme immobilization due to its amide, carboxyl, hydroxyl, amino, and thiol groups.

Ureases (urea amidohydrolases, EC 3.5.1.5) catalyze the breakdown of urea into ammonia and carbon dioxide, playing a crucial role in various practical applications. In the food industry, urease is used to eliminate urea from fruit juices and other products. It also speeds up urea hydrolysis in fertilizers, removes urea from blood in artificial kidney treatments, helps measure urea levels in biological fluids, and is used to remove urea from wastewater.

In this research, urease was immobilized onto ESM, an amorphous natural biomaterial characterized by a complex network of stable, water-insoluble fibers. Immobilization was performed using adsorption and crosslinking techniques. To optimize the process, key parameters such as ESM amount (12.5 mg), urease concentration (1 mg/mL), adsorption duration (60 min), and glutaraldehyde concentration (4%) were investigated. The prepared urease-immobilized ESM was analyzed in terms of its optimal temperature, pH, thermal and pH stability, kinetic properties, and reusability, and these were compared with the characteristics of free urease. The outcomes of this study are expected to contribute to the development of a low-cost, biodegradable, and biocompatible carrier for urease immobilization.

Keywords: Eggshell membrane, Urease, Immobilization.

Effects of compatibilizer addition on thermal and mechanical properties of white filler filled polypropylene

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Abstract: The main aim of this work was study and compare the thermal and mechanical properties of polypropylene composites filled with mineral fillers such as calcite and kaolin, also investigate the effects of maleic anhydride grafted polypropylene (Ma-g-PP) and maleic anhydride grafted ethylene propylene rubber (Ma-g-EPR) as compatibilizers. The fillers are examined in both coated and uncoated forms to assess their impact on composite properties. A series of formulations were developed, all using PP as the base polymer, and the resulting composites were subjected to mechanical and thermal testing. Tensile strength, Izod impact resistance, and thermogravimetric analysis (TGA) were performed to evaluate and compare the properties of these composites. The findings provide insights into the role of compatibilizers in enhancing the interfacial bonding between PP and the fillers, leading to improved thermal stability and mechanical performance. The study concludes that the addition of Ma-g-PP and Ma-g-EPR significantly influences the performance of white filler-filled PP composites, with notable differences observed between coated and uncoated filler formulations.

Keywords: Polyproylene, Minarel fillers, Composite, Compatibilizer.

Interaction in materials with Fe-Cr-C (graphite) systems investigation of diffusion

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Abstract: Chromium and iron are elements that are close to each other due to their atomic radius, they can form a continuous solid solution in each other. Chromium has the ability to dissolve in a solid, chromium has the ability to change the crystal lattice of α-iron in direct proportion [1]. Chromium, a solution in α-iron, increases the hardness, strength, heat tolerance of steels. Because, Chromium AS lowers the crisis temperature of, it increases the incubation time of the martensite conversion. The strength of the material causes the ferritin contained in the structu-re to change in volume and increase in tension concentration. When the chromium content in iron-based Alloys is 12.8%, A4 lowers the crisis temperature and narrows the γ-Fe.

Keywords: Powder, steel, drilling, pumping, valves, technology.

CIVIL ENGINEERING AND ARCHITECTURE

İgnimbirit Taş Ocağı Atığının Geopolimer Yapı Malzemesi Olarak Kullanımı

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Özet: Çalışmada, Niğde ili Aktaş Kasabası taş ocağında çevre sorunu oluşturan ocak atığını ürüne dönüştürerek inşaat sektöründe kullanılabilecek hale getirmek için geopolimer beton üretimi amaçlanmıştır. Karışımda, ağırlık esasına göre taş ocağı atığı ağırlığının %20, 30 ve 40 oranında Sodyum Hidroksit 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 ^{0}C'de 48 saat süre ile kürlenmiştir. Eğilme-çekme gerilmesi en düşük %20 aktivatörlü 150 ^{0}C'de kürlenen numunelerde 2 MPa, en yüksek %40 aktivatörlü 100 ^{0}C'de kürlenen numunelerde 8,4 MPa ölçülmüştür. Numunelerin eksenel basınç gerilme değerleri ise yine en düşük %20 aktivatörlü 150 ^{0}C'de kürlenen numunelerde 18 MPa, en yüksek %40 aktivatörlü 100 ^{0}C'de kürlenen numunelerde 30,25 MPa ölçülmüştür. Bu yöntem ile elde edilen sonuçlara göre, taş ocağı atıkları yapı endüstrisine kazandırılabilir. Özellikle konstrüktif amaçlı yapı malzemesi olarak kullanılabilir

Anahtar Kelimeler: Taş ocağı atığı, İgnimbirit, Sodyum Hidroksit, Geopolimer

6 Şubat 2023 Kahramanmaraş depremleri sonrası Osmaniye ilinde yapılan saha gözlemleri ve değerlendirmeler

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Özet: en fazla 250 keli6 Şubat 2023 tarihinde Kahramanmaraş merkezli iki yıkıcı deprem meydana gelmiştir. İlk deprem Pazarcıkta, 7,7 büyüklüğünde meydana gelirken, ikinci deprem aynı gün Elbistanda 7,6 büyüklüğünde meydana gelmiştir. Bu iki depremin tetiklemesi ile 20 Şubat 2023 tarihinde Yayladağı'nda büyüklüğü 6.4 olan üçüncü bir deprem daha meydana gelmiştir. Yaklaşık 108.812 km^2 alanı etkileyen depremler, aralarında Kahramanmaraş, Hatay, Adıyaman, Adana, Osmaniye, Kilis, Diyarbakır, Malatya, Şanlıurfa, Gaziantep ve Elazığ'ın da bulunduğu 11 ilde ağır yapısal hasarlara ve can kayıplarına neden olmuştur. Bu çalışmada, 6 Şubat merkezli depremler sonucunda Osmaniye'de oluşan yıkımın zemin açısından gözlemsel olarak değerlendirilmesi ile elde edilen sonuçlar tartışılmıştır. Osmaniye'de geçmiş yıllarda yaşanan depremler, zemin koşulları (zemin türü, yeraltı suyu, bölgenin aktif bir fay içermesi vb.) bölgenin araştırılmasının önemini arttırmaktadır. Yapılan araştırmalar sonucunda, bölgede sıvılaşmanın gerçekleştiğine yönelik bir iz görülmemiştir. Bölgede depremler sonrasında açılan temeller incelendiğinde taşıma gücü, oturma ve sıvılaşma gibi zemin kaynaklı herhangi bir sorun görülmemiştir.

Anahtar Kelimeler: Kahramanmaraş depremleri, Osmaniye, zemin araştırmaları, sıvılaşma.

Atık PET agregalı hafif betonun fiziko-mekanik özelliklerinin incelenmesi

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Özet: Bu çalışmada, ülkemizde ve dünyada giderek daha büyük bir sorun haline gelen plastik atıklar arasında oldukça fazla yer tutan atık PET şişe kırıklarının hafif beton üretiminde agrega olarak yeniden kullanımı konu alınmıştır. Atık PET agregalar çimento bağlayıcılı harç karışımlarında kullanılan doğal agrega ile hacimce %20,40,60,80,100 oranlarında yer değiştirilmiş ve kontrol numunesi ile birlikte toplam 6 farklı karışım üretilmiştir. Üretilen numuneler üzerinde gerçekleştirilen deneylerde atık PET agrega miktarının hafif betonun fiziksel ve mekanik özelliklerine etkisi araştırılmıştır. Laboratuvar çalışmaları kapsamında harç numunelerin birim hacim ağırlıkları, basınç dayanımları ve eğilmede çekme dayanımları, su emme ve boşluk oranları ölçülmüştür. Deneyler sonucunda atık PET agrega ilavesinin numunelerin birim ağırlık değerlerini azalttığı tespit edilmiştir. Bununla beraber atık PET agrega ilavesi numunelerin basınç dayanımı ve eğilmede çekme dayanımlarında düşmeye sebep olmuştur. PET agregalı numunelerin su emme ve boşluk oranları kontrol numunesine oranla artış göstermiştir. Tüm değerler göz önüne alındığında %60,80 ve 100 oranlarında atık PET agrega içeren numunelerin taşıyıcı hafif beton sınıfına girdiği tespit edilmiştir.

Anahtar Kelimeler: Atık PET, Geri dönüşüm, Hafif beton, Basınç dayanımı, Fiziko-mekanik özellikler.

Metakoalin, yüksek fırın cürufu ve uçucu kül katkısının beton hidratasyon sıcaklığına etkisi

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Özet: Bu çalışmada, metakoalin (MK), yüksek fırın cürufu (YFC) ve uçucu külün (UK) beton hidratasyon sıcaklığına etkisi araştırılmıştır. En fazla %20 metakoalin, %40 yüksek fırın cürufu ve %40 uçucu kül kullanılarak hazırlanan 13 farklı beton karışımının hidratasyon sıcaklığı, yarı adyabatik yöntemle ölçülmüştür. 144 saat boyunca her 15 dakikada bir sıcaklık değişimi ölçülerek kaydedilmiştir. Yapılan çalışma sonucunda metakoalinin hidratasyon sıcaklığını arttırdığı, yüksek fırın cürufu ve uçucu külün ise hidratasyon sıcaklığını düşürdüğü görülmüştür. Aynı zamanda, kullanılan mineral katkı malzemelerinin maksimum sıcaklığa ulaşma sürelerini uzattığı görülmüştür.

Anahtar Kelimeler: Hidratasyon sıcaklığı, sıcaklık yükselmesi, beton, mineral katkılar.

Afet Yönetiminde Sorumluluk Üzerine İrdeleme ve Depremler

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Özet: Afet Yönetiminin en önemli ayağının risk ve zarar azaltma çalışmaları olduğu artık hemen hemen afet yönetiminin bütün paydaşları tarafından kabullenilmiştir. Böylesi bir durumda risk ve zarar azaltma çalışmalarının kamunun ana politikası haline gelmesi beklenir. Ancak, bu politikaların hakim politikalar haline gelememesi de yüksek olasılıkla beklenebilir. Şöyleki, risk ve zarar azaltma çalışmalarının geri dönüşü çok uzun sürmekte ve büyük maliyetleri ortaya çıkmaktadır. Dolayısıyla bu yaklaşımın etkin hale gelebilmesi için afet yönetiminin paydaşlarının daha etkin rol oynaması gerekmektedir.

Deprem büyük afetlere neden olabilen bir doğa olayı olarak afet yönetimi açısından değerlendirildiğinde risk ve zarar azaltma çalışmalarının daha çok vurgulanması gereklidir. Depremler afet yönetimi açısından değerlendirildiğinde, risk yönetimi yatırımlarının çok büyük getirileri olabilir. Dolayısıyla, risk ve zarar azaltma çalışmalarının iyi irdelenmesi, derlenmesi ve afet yönetiminin paydaşları arasında iş ve fikir birliğinin oluşturulması önemlidir. Çalışmada da depremlerin afet yönetimi açısından irdelenmesi gerçekleştirilmiş ve bazı sorunlara çözümler sunulmuştur.

Anahtar Kelimeler: Afet, Afet yönetimi, Risk yönetimi, Depremler.

Çok katlı tünel kalıp binaların doğrusal olmayan analizi

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Özet: Türkiye'nin deprem açısından aktif bir bölgede olması, depreme dayanıklı yapıların inşasını zorunlu kılmaktadır. Son depremler bu ihtiyacı daha da vurgulamıştır. Tünel kalıp sistemlerle inşa edilen yapılarda, deprem etkisiyle oluşan yatay yükler betonarme perde duvarlarla karşılanmakta ve yapının deplasmanları azalmaktadır. Bu çalışmada, 26 katlı bir betonarme binanın doğrusal olmayan zaman tanım alanı analizi yapılmıştır. Model, TBDY 2018 esaslarına göre ETABS programında oluşturulmuş ve on bir farklı deprem ivme kaydıyla analiz edilmiştir. Sonuçlar, yer değiştirme, kat ötelemesi ve taban kesme kuvvetleri açısından karşılaştırılmıştır. Yapılan analizlerden elde edilen sonuçlar, binada oluşan yer değiştirmeler, göreli kat ötelemeleri ve taban kesme kuvvetleri açısından karşılaştırılmıştır.

Anahtar Kelimeler: Tünel kalıp, yüksek yapılar, doğrusal olmayan analiz, deprem

Production of synthetic wollastonite with a high aspect ratio

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Absract: In this study, the wollastonite mineral found in nature is examined, and research on its lab-scale producibility is compiled. Wollastonite is a meta-silicate represented by the chemical formula $CaSiO_3$, formed as a result of the chemical reaction between silica (SiO_2) and limestone ($CaCO_3$, calcite) within magma (due to high temperatures). Additionally, naturally occurring wollastonite can also be synthetically produced in the laboratory. Recently, synthetic wollastonite has been produced using a new manufacturing method. This method, which uses quartz and calcite minerals as raw materials, consists of a three-step wollastonite production process involving mechanochemical processing, hydrothermal processing, and solid-state reaction. The material produced using this new method has been confirmed to have a high aspect ratio of wollastonite through SEM, XRF, and XRD analyses.

Keywords: Synthetic wollastonite, mechanochemical processing, hydrothermal processing, solid-state reaction processing.

Yangına maruz kalan betonarme kolonların taşıma gücü

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Özet: Bu çalışmada yangına maruz kalan betonarme kolonların dayanımlarındaki değişim incelenmiştir. Seçilen kesit, malzeme, donatı düzeni ve yangın etkime yüzeyleri için excelde yazılan program yardımı ile taşıma kapasiteleri $N - M$ değerleri elde edilmiştir. Kesit küçük sonlu elemanlara ayrılarak kesit içindeki sıcaklık dağılımı sonlu farklar yöntemi ile elde edilmiş ve her bir parçada sıcaklığa bağlı olarak beton ve donatıdaki dayanım kayıpları Eurocode2'de verilen bağıntılar ile belirlenmiştir. Seçilen tarafsız eksen değerleri için kolonun eksenel kuvvet taşıma kapasitesi N ve kesit ortasına göre kolonun eğilme taşıma gücü M değerleri elde edilmiştir. Elde edilen sonuçların karşılaştırılması sonucu yangının etkime süresinin artmasının kesit içinde sıcaklığı artırdığı ve buna bağlı olarak beton ve donatıların dayanımlarında da azalmaların meydana geldiği görülmüştür. Malzemelerin dayanımlarının azalmasının da $N - M$ değerlerini olumsuz etkilediği de elde edilen sonuçlardan görülmüştür.

Anahtar Kelimeler: Betonarme kolon, Yangın, Eksenel kuvvet kapasitesi, Moment kapasitesi.

Estimating swelling potential of clays by a new modeling approach

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Absract: The prediction of swelling potential of expansive clays based on a new modeling approach is presented in this study. The index, compaction properties and swelling potentials of 73 soils from different regions of Türkiye were evaluated in the analysis. First, multivariate linear regression analyses were carried out by using the data set, to predict swelling potential. The results of multivariate linear regression analyses show that, the variables in the database are not linearly correlated. The values of mean absolute percentage errors (MAPE) for the best predictive models for determination of swell percent for the given dataset is 57.9% and R^2=0.79. The modeling capability, and the ability to learn from experience, have given artificial neural network (ANN)s superiority over most traditional modeling methods.The ANN analyses were carried out, and results compared with the multivariate linear regression analyses results. ANN analyses generate the better fitting models to the compiled database and the value of MAPE to determine the swell percent for the given dataset is 20.7% and R^2=0.99. ANN analyses estimates soil swelling potential better than the multivariate linear regression analyses for the given dataset.

Keywords: Artificial neural network, clay, multivariate linear regression, swelling potential.

Ötmə şərtinə görə görünüş məsafəsinin hərəkət təhlükəsizliyinə təsiri

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Xülasə: Nəqliyyat axınında hərəkət şəraitində nəqliyyat vasitələrinin sürücüsünün hər hansı yanlış qərarı nəticəsində yol-nəqliyyat hadisələrinin baş verməsi qaçınılmazdır. Sürücü hərəkət şəraitində dəqiq qərarların verilməsinə çalışmalıdır. Axında hərəkət zamanı təhlükəli sayılacaq və sürücüdən dəqiqlik tələb edən vəziyyətlərdən biri də ötmə əməliyyatının yerinə yetirilməsidir. Ötmə əməliyyatı zamanı sürücü həm idarə etdiyi nəqliyyat vasitəsinin, həm ötüb keçdiyi nəqliyyat vasitəsinin, həm də qarşıdan gələn nəqliyyat vasitəsinin hərəkət sürətinin qiymətləndirməyi bacarmalıdır. Ötmə şərtinə görə görünüş məsafəsinin hərəkət təhlükəsizliyinə təsirini hesablayarkən müəyyən sadələşmələr qəbul edilmişdir. Məqalədə ötüb keçən avtomobilin hərəkət sürətinin artması ilə ötmə şərtinə görə görünüş məsafəsinin qiymətləri hesablanmış və hərəkətin təhlükəsizliyinə təsiri müəyyən edilmişdir. Məlum olmuşdur ki, hərəkət sürətinin artmasına uyğun olaraq ötmə şərtinə görə görünüş məsafəsinin qiyməti azalır. Görünüş məsafəsinin qiymətinin azalması tempi sürətin arması ilə tədricən azalır.

Açar sözlər: ötmə şərti, görünüş məsafəsi, hərəkət sürəti, hərəkət intensivliyi, yol-nəqliyyat hadisələri.

A study on the effects of big five personality traits on micromobility use

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Abstract

The rapid growth of cities significantly increases the transportation needs of individuals. However, this leads to negative impacts such as traffic congestion and environmental pollution, especially in big cities. The use of private vehicles is one of the main causes of these problems. The transportation policies of developed countries have been shifting towards non-motorized transportation methods in recent years and micromobility has come to the forefront among sustainable and environmentally friendly transportation alternatives. Although various strategies have been developed to encourage people to use this mode of transportation, no study has examined the effects of personality traits on micromobility preferences. The aim of this study is to investigate the effects of personality dimensions known as the “big five personality traits”, namely Extraversion, Conscientiousness, Agreeableness, Neuroticism and Openness, on the intention to use micromobility. In this context, a questionnaire study was conducted with 114 participants consisting of Bursa Bicycle Community members. The questionnaire consists of three parts: sociodemographic characteristics, micromobility elements and 40-question personality traits. Structural equation modeling (SEM) was applied to analyze the survey results. The goodness-of-fit indicators of the model (GFI, CFI, RMSE, Chi-Square, etc.) supported the validity of the model. The findings of the study reveal that sociodemographic characteristics do not have a significant relationship with the intention to use micromobility, but personality traits have a significant effect on this intention. This research provides valuable guidance to transportation professionals on micromobility choices. In future studies, it is recommended to extend the research to include micromobility users in different geographical regions and to examine the effects of financial well-being on micromobility use preferences.

Keywords: Big-Five Personality Traits, Micromobility, Structural Equation Modeling (SEM)

Average boarding time analysis of school buses with mixed student groups using bootstrap method

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Abstract: In this study, we investigated the average boarding times in school buses serving both homogeneous age groups (primary, middle, and high school students) and mixed groups consisting of disabled high school students with primary and middle school students. The Bootstrap Method was employed for parameter estimation from small samples to the population. The average boarding times were estimated as 4.0 seconds/passenger for primary school students, 4.8 seconds/passenger for middle school students, 4.2 seconds/passenger for high school students, 11.9 seconds/passenger for disabled high school students, and 2.37 seconds/passenger for mixed primary-middle school students. The bootstrap analysis revealed that increasing the number of sub-samples had no significant effect on the estimation when the main sample size was small.

Keywords: School Transportation, Boarding Time Analysis, Bootstrap Method, Student Transportation, Disabled Student Access

Examining the possible effects of outdoor air quality on indoor air quality in buildings: a case study of niğde province

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Absract: This study investigates the impact of outdoor air pollutants on potential indoor air quality during natural ventilation in buildings located in Niğde, Türkiye. Due to increasing concerns about indoor air quality, especially post-COVID-19, the research analyzes in which months outdoor air pollutants, such as particulate matter ($PM_{2.5}$ and PM_{10}), SO_2, NO_2, and CO, enter buildings during natural ventilation. In this study, an examination was performed on data spanning from 2013 to 2023 to uncover seasonal variations in pollutant levels. The results indicate that outdoor pollutant concentrations reach their highest during winter months due to heating needs, leading to a negative impact on indoor air quality. Conversely, the reduced concentrations of pollutants in outdoor air during spring, summer, and autumn create ideal circumstances for implementing natural ventilation techniques in these seasons, thereby enhancing indoor air quality without depending on fossil fuels. The findings indicate that implementing natural ventilation techniques in areas with ideal outdoor air quality may reduce the reliance on mechanical ventilation systems, thereby encouraging sustainable building practices.

Keywords: Indoor Air Quality, Outdoor Air Quality, Natural Ventilation.

Hizmet düzeyi iyi durumda olan kilitli beton parke taş yol kaplamalarının sürüş konfor seviyelerinin incelenmesi

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Özet: Şehir içi yollarda geçmişte ve günümüzde kilitli beton parke yol kaplaması sıklıkla kullanılmaktadır. Kilitli beton parke yolların idaresinden sorumlu kurum ve kuruluşların bünyesindeki üstyapıların kullanım ömrünün uzun olabilmesi için bakım-onarım ve yenileme faaliyetlerini düzenli bir biçimde yapmaları gerekmektedir. Bu çalışmada kullanımda olan iyi durumdaki bir kilit beton parke yolda titreşim ölçüm veri seti içeren binek tipi bir otomobil ile şehir içi hızlarda (10, 20, 30, 40 ve 50 km/sa) sürüşler yapılarak yol yüzeyinden araç içine ve sürücüye etki eden titreşimlerden kaynaklı ISO 2631-1'e göre tüm vücut titreşim verileri elde edilmiştir. Ayrıca ASTM E2840-11 standardı kullanılarak 0-100 değer aralığında değerlendirme yapılmasını sağlayan bir üstyapı durumu indeksi (PCI) araştırması yapılmıştır. Kilitli beton parke yüzeyinde yer alan düzgünsüzlükler üzerinden elde edilen üstyapının PCI değerleri ile belirlenen hızlarda yapılan sürüşler esnasında araç ve sürücüye gelen düşey yönlü titreşimler arasında sıkı bir ilişki olduğu tespit edilmiştir.

Anahtar Kelimeler: Kilitli beton parke, Karayolu, Tüm vücut titreşimi, PCI, ISO 2631-1

Bitişik nizamlı yapılarda çarpışmanın ara bağlantı elemanları kullanılarak engellenmesinin deneysel olarak araştırılması

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Özet: Günümüzde şehir merkezlerindeki yapılaşmanın artması ile birlikte arazi arzının talebi karşılamamasından dolayı bitişik nizam yapıların oldukça fazla olduğu görülmektedir. Hali hazırda inşa edilmiş bitişik nizamlı yapıların çarpışması önlenerek olası mal ve can kayıplarının engellenmesi gerekmektedir. Bu çalışma kapsamında iki farklı dinamik parametrelere sahip bitişik nizamlı yapıların deprem etkisine en yakın olarak nitelendirilen harmonik yer hareketi etkisindeki davranışları incelenmiştir. Uygulanan harmonik yer hareketinde genlik 5 mm, çevrim sayısı 5 ve iki modelin rezonans frekansları 2.15 Hz ve 2.75 Hz olacak şekilde belirlenmiştir. Modeller serbest ve en üst katta rijit bağlantı elemanı kullanılarak bu harmonik yükler etkisinde sarsma tablası deneyleri gerçekleştirilmiştir. Serbest modeller ile rijit ara bağlantılı modellerden elde edilen bütün kat ivme ve katlar arasındaki rölatif deplasman değerleri karşılaştırılmıştır. Elde edilen verilerde en üst kata ara bağlantı elemanı monte edildiğinde bütün katlardaki ivme ve modeller arasındaki rölatif deplasman değerlerinde azalmalar olduğu görülmüştür. Ayrıca rezonans durumundaki modelin bağlantı elemanı sayesinde ivme ve rölatif deplasman değerlerinde daha fazla azalmalar olduğu görülmüştür. Böylece rijit ara bağlantı elemanının bitişik nizamlı yapıların çarpışmasını engellemede oldukça başarılı olduğu görülmüştür.

Anahtar Kelimeler: Bitişik nizamlı yapılar, Çarpışma, Harmonik yükler, Kat hizasında çarpışma, Sarsma tablası deneyleri.

İş verimine bağlı olarak inşaat süre ve maliyeti hesaplanması

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Özet: Zaman maliyet ödünleşim problemi inşaat mühendisliği yapım yönetimi alanının önemli bir çalışma konusudur. Bu çalışmada zaman maliyet ödünleşim probleminin hızlı, düşük maliyetli ve yüksek doğrulukta oluşturulabilmesi için excel tabanlı bir elektronik tablo oluşturulması amaçlanmıştır. Zaman maliyet ödünleşim probleminin oluşturulabilmesi için inşaat projesini oluşturan aktiviteler için farklı sürelerde tamamlanmasından oluşan yapım seçeneklerinin hazırlanması gerekmektedir. Bu durum proje hazırlık safhasında önemli bir iş yoğunluğu oluşturmakta ve genellikle ihmal edilmektedir. Belirtilen sorunu çözmek için bu çalışmada excel tabanlı bir hesap cetveli uygulaması üzerinde tünel kalıp sistemi ile inşa edilecek bir binanın tüm inşaat kalemlerinin metrajı hesaplanmış ve yapım tarifleri ile eşleştirilerek kaynak gereksinimleri belirlenmiştir. İşçi ve iş makinesi gereksinimleri dikkate alınarak farklı tamamlanma süreleri için ihtiyaç duyulan işçi miktarları belirlenmiştir. İşin gerçekleştirilmesi için oluşturulan ekiplerin kalabalıklaşması halinde iş veriminin azaldığı literatürde belirtilmektedir. Bu durumu dikkate almak için literatürde yer alan işçi sayısı ve iş verimi eğrilerinden yararlanılarak iş verimi hesaplanmış ve iş verimi göz önüne alınarak adam.saat değerleri güncellenerek tamamlanma süresi yinelemeli biçimde hesaplanmıştır. Tüm hesaplamalar excel tablosu üzerinde otomatikleştirilerek gerçekleştirilmiş ve tüm inşaat projelerinde kullanılabilecek bir yöntem ve hesaplama aracı oluşturulmuştur.

Anahtar Kelimeler: Kritik Yol Yöntemi, Metraj, Gantt, İş programı.

Verimli fiziki kayıp yönetiminde rapor edilmeyen sızıntı bileşenlerinin ahp yöntemi ile sıralanması

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Özet: Dünyada etkisini gösteren iklim değişikliği sonucu su kaynaklarının azalması ve şehirlerdeki artan nüfusun su ihtiyacının karşılanması için suyun korunması büyük önem taşımaktadır. Su dağıtım şebekelerinde meydana gelen kayıpları en aza indirmek ve suyun verimli kullanımını sağlayabilmek için Su İdareleri çalışmalar yürütmektedir. Rapor edilmeyen sızıntılar ekonomik, teknik, sosyal ve çevresel açıdan birçok olumsuz etkisi olan fiziksel su kayıplarının bir bileşenidir. Yüzeye çıkamayan bu sızıntıların tespit edilmesi zordur bu sebeple çok fazla kayba neden olabilmektedir. Bu çalışma kapsamında rapor edilmeyen sızıntı yönetiminde etkili bileşenler belirlenmiş ve bileşenlerin sızıntı oluşumundaki etki düzeyleri çoklu ölçütlü karar verme (ÇÖKV) yöntemlerinden Analitik Hiyerarşi Prosesi (AHP) yöntemi ile tanımlanarak önceliklendirilmesi sağlanmıştır. Sonuçlar 0.2857 katsayı ile sızıntı yönetiminde en etkili bileşenin İzole Ölçüm Bölgelerinin Oluşturulmaması (DMA) olduğunu göstermektedir. DMA'lar şebekenin daha küçük bölgelere ayrılması ile daha ölçülebilir, izlenebilir ve kontrol edilebilir şebekeler oluşturulmasına olanak tanıması sebebiyle sızıntı yönetiminde oldukça büyük rol üstlenmektedir. Bu bileşeni 0.1993 ve 0.1371 ile sırasıyla Sızıntı Hacminin Azaltılması için Basınç Yönetiminin Uygulanmaması/Yetersiz Olması (Lpm) ve Aktif Sızıntı Kontrolü Stratejisinin Uygulanmaması (Alc) bileşenlerinin takip ettiği gözlemlenmiştir. Çalışmanın Rapor edilemeyen sızıntıların yönetiminde en etkili bileşenleri sıralayarak sızıntı yönetiminde yol haritası oluşturmada katkı sunacağı düşünülmektedir.

Anahtar Kelimeler: Fiziki su kayıpları, Rapor edilmeyen sızıntı, Çoklu ölçütlü karar verme (ÇÖKV), Analitik Hiyerarşi Prosesi (AHP).

Bacterial concrete as a sustainable building material

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Absract: Concrete is the foremost building material broadly used in building construction, but cracks in Concrete are inevitable and are one of the inherent weaknesses of concrete. The major downside of Concrete is its low tensile strength due to which micro-crack occurs when the load applied is more Than its limit and this paves the way for the seepage of water and other salts. This initiates corrosion and makes the whole structure vulnerable and leads to the failure of the structure. Concrete is a composite and brittle material. Crack formation in concrete is a common thing. These cracks are harmful for concrete and the Reinforcement concrete also. Repairing the cracks is costly and it needs skilled labour too. In this Condition, bacterial concrete will be a good solution for It. Bacteria, which are mixed with the concrete, produce Calcium carbonate that will fill the cracks and heal the Cracks of concrete. Here, in this paper, we will discuss. About, types of bacteria, methodologies, advantages & Disadvantages, and will give an overview of Bacterial Concrete.

Keywords: Concrete, Bio Mineralization, Calcium Carbonate, Bacterial Concrete.

Design suggestions for public green spaces in terms of aesthetics and functionality

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Abstract: Green spaces have positive effects on people's psychology and health. With population growth, natural habitats are being fragmented, leaving only small-scale green spaces. One of today's environmental problems is the degradation of nature and quality of life. Green spaces, whether newly created or existing in urban areas and their surroundings, contribute to the improvement of environmental conditions. These areas play an important role in the functionality of residential spaces. The lack of sufficient green spaces around cities requires certain landscape techniques. Some areas serve to protect the space and its surroundings, such as those where institutions and organizations are located. This study aims to provide information about the characteristics sought in plant species selected during the landscape planning and design process for the green spaces surrounding public institutions. The study also offers recommendations regarding the significance of plant species in landscape design, considering the form and color characteristics of the suggested plant species. The plant species used or proposed for use in green spaces around public institutions have been evaluated in terms of their functional, aesthetic, and practical aspects. Vegetation has been classified into categories (deciduous trees, evergreen trees, deciduous shrubs, evergreen shrubs, tree forms, colors). In this way, the use of plant material will be assessed, and this will serve as a model study for landscape work around institutions and organizations, particularly in terms of plant selection.

Keywords: Institution, Organization, Plant Design, Landscape, Color, Form (or Shape)

The use of healing gardens in landscape design

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Abstract: Health gardens are specially designed areas located within or around healthcare facilities, such as hospitals, rehabilitation centers, and elderly care homes. These gardens include elements such as therapeutic plants, auditory and olfactory stimuli, relaxation areas, and calming landscape features. Historically, health gardens have been created to enhance individuals' quality of life and provide healing for both physical and psychological health issues. They can be categorized according to various health problems, allowing for more rapid and effective solutions to be developed. In this study, we examine the use of horticultural therapy gardens, Alzheimer's gardens, and stress reduction gardens in landscaping, focusing on several examples from Turkey and around the world.

Keywords: Alzheimer Garden, Horticultural Therapy, Health Gardens, Stress Reduction Gardens, Healing.

Orta sofalı plan tipolojisinin Anadolu'daki örneği: Niğde Sıtkı Karabulut Evi

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Özet: Türk evinde odaların bir araya gelmesinde büyük rol oynayan sofa, odaların sayısını ve yerlerini belirleyen ana mekân olarak görülmektedir. Sedat Hakkı Eldem, Türk evinde sofayı esas alarak plan tiplerini; sofasız plan tipi, dış sofalı plan tipi, iç sofalı plan tipi ve orta sofalı plan tipi olarak sınıflandırmıştır. Orta sofalı plan tipi daha büyük, gösterişli ve zengin yapılarda kullanılmaktadır. Sedat Hakkı Eldem'e göre orta sofalı plan tipi Türk Evi'nin son aşamasıdır. Bu tip Anadolu'da nadir olarak görülmektedir. Niğde kent merkezindeki orta sofalı plan tipine sahip Sıtkı Karabulut Evi de ender bir örnektir. Aşağı Kayabaşı mahallesinde yer alan, Polat ve Karabulut sokaklarına cephesi bulunan konut, orta sofası, gösterişli ahşap tavan süslemesi ve zengin taş işçiliği ile kentte önemli yapılardan biridir. Bu çalışmanın amacı Türk Evinin önemli plan gelişmesinin örneği olan Anadolu'nun farklı yerlerinde nadir bulunan, orta sofalı plan tipindeki geleneksel Niğde Sıtkı Karabulut Evi'nin mimari özelliklerinin incelenmesi, mekânsal kurgusunun ortaya konmasıdır. 1993 yılında tescillenen yapı, konut işlevini devam ettirdiği için bulunduğu mahalledeki kullanım dışı kalan harap geleneksel konutlara göre daha iyi durumdadır. Ender bulunan özellikleriyle Sıtkı Karabulut Evi'nin literatüre kazandırılması istenmektedir. Çalışmanın yönteminde Türk evi, orta sofa konusunda literatür araştırmaları yapılmış, alan çalışması gerçekleştirilmiş, yapının belgeleme çalışmalarında klasik ölçüm metodu kullanılmıştır. Sıtkı Karabulut evinin pahlı köşeli orta sofalı plan tipi ile nitelikli bir mekânsal organizasyona sahip olduğu ortaya konmuştur. Fazla oda sayısına sahip konutta orta sofa sayesinde mekânlar arasındaki etkileşim ve ulaşılabilirlik ustaca çözümlenmiştir. Yapının korunarak gelecek nesillere ulaştırılması adına bakım ve onarımının gerçekleştirilmesi ve kentin kültürel mirasına katkısı sağlanmalıdır.

Anahtar Kelimeler: Türk Evi, Orta Sofa, Niğde Sıtkı Karabulut Evi.

Özel Tematik Oturum Önerisi (İsteğe Bağlı): Mimarlık/Koruma

Endüstriyel atık (maden atığı) mineralli geopolimer harçların dayanıklılık özellikleri

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Özet: Beton üretiminde bağlayıcı olarak çimento kullanılmaktadır. Ancak çimento üretimi ciddi çevresel sorunlara ve enerji kayıplarına yol açmaktadır. Bu nedenle, daha çevre dostu ve sürdürülebilir bağlayıcılar geliştirmek için çalışmalar artmıştır. Bu bağlamda, geopolimer adı verilen çimentosuz beton, endüstriyel atıklardan elde edilen alimünosilikat içerikli malzemeler kullanılarak üretilmekte ve hem çevre sorunlarını azaltmak hem de atıkları ekonomiye kazandırmak amacıyla araştırılmaktadır. Bu çalışmada, endüstriyel atık mineralli geopolimer harçların dayanıklılık özellikleri araştırılmıştır. Çimento yerine kullanılan geopolimer bağlayıcılar, öğütülmüş yüksek fırın cürufu (ÖYFC) ve maden atığı (MA) ile üretilmiştir. MA'nın %0; %10; %20 ve %30 oranlarında kullanıldığı dört farklı harç grubu oluşturulmuş ve bu numuneler, alkali aktivasyon yöntemiyle hazırlanmıştır. Çalışmada, numuneler %5 ve %10 Na_2SO_4 çözeltilerine maruz bırakılarak sülfat etkisi altında incelenmiştir. Sonuçlar, MA ikame oranının ve kür süresinin geopolimer numunelerin sülfat direnci, kütle değişimi, eğilme ve basınç dayanımı üzerinde önemli bir etkisi olduğunu göstermiştir. MA90-10 numunesi, her iki sülfat ortamında da en yüksek dayanım kaybını sergilemiştir. Özellikle 15 döngü sonunda %12.82'ye kadar basınç dayanımı azalmıştır. Çalışma, geopolimer harçların çevresel sürdürülebilirlik ve dayanıklılık açısından çimentoya alternatif olarak kullanım potansiyelini ortaya koymaktadır.

Anahtar Kelimeler: Bağlayıcı, fiziksel ve mekaniksel özellikler, geopolimer harç, maden atığı, sülfat etkisi.

COMPUTER ENGINEERING

A Rain droplet removal method for enhancing image quality using autoencoder

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Abstract: The enhancement of image quality has significant impact on the performance of image analysis, object recognition and tracking systems. In this study, we propose an autoencoder-based method to remove rain droplets from drone-captured images, thereby improving the overall image quality. Images captured by drones in rainy conditions often suffer from significant degradation due to raindrops, which negatively affects the accuracy of automated image processing systems. The developed autoencoder model effectively detects and removes rain droplets from the input images, generating clearer and more detailed outputs.

The proposed method was evaluated against established convolutional neural network (CNN) approaches and demonstrated superior performance. The model demonstrated particular efficacy in preserving image details while reducing noise. Experimental results indicated that the autoencoder-based approach outperformed CNN models in terms of lower error rates and higher structural similarity index (SSIM), thereby proving its effectiveness in enhancing image quality under rainy conditions.

These findings indicate that autoencoder-based methods provide a robust solution for improving the quality of drone-captured images in adverse weather conditions, thereby enhancing the accuracy of automated image processing systems.

Keywords: Autoencoder, Image Enhancement, Rain Droplet Removal, Drone Images, Deep Learning

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Multi-Exposure image fusion based on illumination map clustering

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Abstract: Limited dynamic range is a significant challenge in digital photography, as cameras often struggle to capture both bright and dark details simultaneously. This paper presents a novel multi-exposure image fusion method that addresses this limitation by effectively combining multiple images captured at different exposures. The proposed method uses the Retinex theory to decompose input images into reflection and illumination layers. A clustering algorithm is then applied to the illumination layer to identify distinct illumination segments within the images. Contrast and well-exposedness metrics are employed to compute weight maps for each segment and pixel, enabling a more accurate fusion process. The fused image is reconstructed by combining the weighted reflectance and illumination layers. Experimental results demonstrate the effectiveness of the proposed method in enhancing the dynamic range and preserving image details.

Keywords: Multi-exposure fusion, dynamic range, Retinex theory, Clustering

ПОДДЕРЖКА КЫРГЫЗСКОГО ЯЗЫКА В ЦИФРОВОЙ СРЕДЕ: РАЗРАБОТКА ЧАТБОТА С ПРИМЕНЕНИЕМ LLM

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Abstract: Данная работа посвящена разработке чатбота на кыргызском языке с использованием большой языковой модели (Large Language Model, LLM) и технологии Mistral AI, что представляет собой значительный шаг в продвижении технологий искусственного интеллекта для менее распространённых языков. Создание чатбота на кыргызском языке имеет особую значимость, так как способствует расширению доступа к цифровым технологиям для носителей языка и поддерживает сохранение культурного наследия. В условиях глобальной цифровизации и растущей потребности в поддержке местных языков, такой чатбот открывает новые возможности для пользователей, позволяя им общаться на родном языке, решать повседневные задачи, получать информационную поддержку и взаимодействовать с современными технологиями на понятном языке.

Используемая в разработке LLM представляет собой высокопроизводительную языковую модель, обученную на больших массивах текстовых данных. Эта модель способна распознавать и генерировать текст на естественном языке, учитывая его грамматические, лексические и контекстные особенности. Она адаптируется к языковым тонкостям кыргызского языка, что обеспечивает точность и релевантность её ответов.

Технология Mistral AI, интегрированная в проект, дополняет возможности LLM и позволяет управлять обработкой запросов в режиме реального времени, оптимизируя процессы обработки и генерации текста. Она играет ключевую роль в повышении производительности и устойчивости работы чатбота, что особенно важно при увеличении нагрузки и масштабировании.

В результате был разработан чатбот, обладающий способностью понимать и обрабатывать текстовые запросы на кыргызском языке. Это делает его уникальным и значимым инструментом для поддержки и сохранения кыргызской языковой культуры в цифровом пространстве.

Keywords: кыргызский язык, чатбот, нейронная сеть, большая языковая модель

Credit scoring based on cash flow table using machine learning: An XGBoost approach

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Abstract: Machine learning methods have rapidly gained traction in the banking and finance sectors alongside modernization and globalization. As the variety of credit products offered by banks increases, the ability to distinguish between good and bad customers has become crucial. This capability not only enhances banks' profitability but also boosts their competitiveness in the market. In this context, banks subject companies to a credit assessment process before granting loans, with credit score analysis being a critical step. Given that credit risk is one of the main risks banks face, completing a balanced scorecard analysis accurately and efficiently during the credit evaluation process is essential. A company's status within a corporate group can influence its credit assessment, as low ratings of other companies can affect the consolidated rating. This study focuses on corporate groups, aiming to develop a scorecard model using consolidated cash flow tables. The research utilizes machine learning techniques, including Extreme Gradient Boosting (XGBoost), Gradient Boosting, and Artificial Neural Networks, implemented in Python. Among these methods, the Extreme Gradient Boosting approach emerged as the preferred model, achieving an accuracy rate of 80%.

Keywords: Machine Learning, Credit Scoring, XGBoost, Python, Artificial Neural Network

Кредитный скоринг на основе таблицы денежного потока с использованием машинного обучения: подход XGBoost.

Аннотация: Методы машинного обучения быстро набирают популярность в банковском и финансовом секторах. С увеличением разнообразия кредитных продуктов способность различать хороших и плохих клиентов стала критической. Это повышает прибыльность и конкурентоспособность банков. В этом контексте компании подвергаются кредитной оценке перед получением кредитов, где анализ кредитного рейтинга играет важную роль. Учитывая, что кредитный риск — один из основных рисков для банков, важно эффективно проводить анализ сбалансированной карты показателей. Статус компании в корпоративной группе может влиять на кредитную оценку. Данное исследование направлено на разработку модели кредитного рейтинга с использованием консолидированных таблиц денежного потока, применяя методы машинного обучения, такие как Extreme Gradient Boosting (XGBoost). Подход XGBoost оказался предпочтительным, достигнув уровня точности 80%.

Ключевые слова: Машинное обучение, Кредитный скоринг, XGBoost, Python, Искусственные нейронные сети.

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Özet: Günümüzde tarım alanları ve tarım ürünleri, gelişmiş ve gelişmekte olan ülkelerin ekonomilerinde önemli bir yere sahiptir. Tarım arazilerinde çalışan insan gücü ile en verimli şekilde üretimi sağlamak ve üretimdeki kayıpları en aza indirmek, ülkeler için sürdürülebilir bir tarım vizyonu sunmaktadır. Bu konuda, bitki yapraklarının yakalandığı hastalıklar tarım ürünlerine büyük zararlar vermektedir. Tarım işçileri, ülkeler tarafından uzman kişilerle bilgilendirilse de teknolojik gelişmeler sayesinde uzman kişilere duyulan ihtiyaç azalmaktadır. Yaprak hastalıklarının erken teşhisi ve hastalıkların yayılmasını önlemek, ürün kayıplarını azaltmak için önemlidir. Bu konuda görüntü işleme ve derin öğrenme yaklaşımları etkili bir rol almaya başlamıştır. Yapılan bu çalışmada karnabahar yapraklarında yaygın olarak görülen Acı Yaprak Lekesi (Alternaria Leaf Spot) ve Vasküler Bakteriyoz (Black Rot) hastalıklarının derin öğrenme ve görüntü işleme teknikleri kullanılarak sınıflandırılması hedeflenmiştir. Çalışmada kullanılan görüntüler, Mersin Silifke çay çiftliğinde bir karnabahar tarlasından elde edilen hastalıklı yapraklar ile oluşturulmuştur. Elde edilen veri setinde Acı Yaprak Lekesi hastalığından 79 görüntü, Vasküler Bakteriyoz hastalığından 69 görüntü bulunmaktadır. Toplanan veriseti içerisinde görüntü sayısının az olması nedeniyle farklı veri çoğullama yöntemleri araştırılmıştır. Çalışmada geometrik dönüşümler, renk dönüşümleri (HSV, LAB, HLS) ve rastgele silme (Random Erasing) veri çoğullama yöntemleri kullanılarak iki sınıf için de aynı oranda veri çoğullama gerçekleştirilmiştir. Bu yöntemler birbirinden izole bir şekilde kullanılmış ve 3 veri çoğullama yöntemi için de 352 eğitim verisine ulaşılmıştır. Arttırılmış eğitim verilerinin yanında, bu yöntemlerin gerçek verisetine katkı sağladığını ispatlamak için gerçek verilerle de eğitim yapılmıştır. İşlemlerin sonucunda oluşan, gerçek veri için 88, geometrik dönüşümler için 352, renk dönüşümleri için 352, rastgele silme için 352 adet görüntü ayrı ayrı eğitim adımları uygulanmış ve kıyaslanmıştır. Veri çoğullama yöntemlerinin uygunluğunu test etmek amacıyla 3 farklı derin öğrenme mimarisi üzerinde eğitim test aşamaları gerçekleştirilmiştir. MobileNet V3 Large, EfficientNet B3 ve ResNet50 derin öğrenme mimarilerinde aynı eğitim parametreleri kullanılarak yapılan deneyler sonucunda, geometrik dönüşümler yöntemi için EfficentNet B3 mimarisi, 93.33% ile en yüksek doğruluk oranına ulaşmıştır.

Anahtar Kelimeler: Karnabahar Yaprak Hastalığı, Derin Öğrenme, Veri Çoğullama, Tarım, Sınıflandırma.

Advantages of using artificial intelligence tools in education

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Abstract: The teaching profession requires ongoing self-improvement, professional development, and a continuous creative pursuit of knowledge. A competitive specialist who is committed to growth seeks ways to acquire new knowledge without neglecting their primary responsibilities.

This article aims to showcase the effectiveness of organizing extracurricular classes in Computer Science to highlight the potential of artificial intelligence in education. As a solution for teaching AI, it emphasizes the need for comprehensive training in the use of AI tools to equip educators and students alike.

The purpose of this study within the elective course, "Organization of Artificial Intelligence in the Python Programming Language," offered to 11th-grade students in general secondary school, is to introduce students to the capabilities of Python for artificial intelligence. The course addresses didactic tasks that help students master essential AI techniques. As a result, it enhances students' creative and critical thinking skills.

Keywords: Artificial intelligence, Education, Computer Science.

Water consumption estimation from historical data and correlation with population

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Abstract: Various factors, such as the continuous increase in the global population and the inefficient use of water resources, contribute to rising water consumption demand and a gradual depletion of clean water resources. The ability to forecast water consumption demand provides valuable opportunities for effective planning and the implementation of precautionary measures. This study aims to forecast future water demand using water consumption data by graphical analysis from Kayseri between 2000 and 2021. The Facebook Prophet model was employed as the forecasting method. Considering the population growth over the 21 years starting from 2000, a correlation analysis was conducted to assess the relationship between the water consumption trend and population growth. The results, evaluated against the existing data, demonstrated that the Facebook Prophet model offers consistent and reliable forecasts. This study employs unique data and provides an innovative evaluation of the relationship between population growth and water demand.

Keywords: Facebook Prophet, water consumption estimation, historical data.

Classical cueing algorithms simulation in matlab

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Abstract: Cueing algorithms utilize the natural limitations and tendencies of human perception to create an optimal sensation within the limited motion range of the Stewart platform. By deceiving the vestibular and proprioceptive senses, a near-realistic sensation is achieved without creating a complete copy of real movements. During this process, the algorithms continuously monitor the platform's limits to ensure efficient use of the simulator's motion capacity and maintain the continuity of the motion. These algorithms, responsible for generating these results, are referred to as Motion Cueing Algorithms. In our study, in addition to the application of the Classical Cueing Algorithm, improvements were made on control by applying filtering and optimization techniques. System tests were conducted on the model, and simulation results for different Stewart platforms with varying responses were compared.

Keywords: Motion Cueing Algorithm, Simulation, Classical Cueing Algorithm, Flight Simulator, Optimization.

A review on machine learning-based sentiment analysis in combating misinformation: Techniques, challenges, and applications

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Abstract: Misinformation is a widespread issue exacerbated by the rapid spread of unverified information online. Sentiment analysis, which determines the emotional tone of a text, is crucial in identifying and mitigating misinformation. This systematic review identifies and discusses the effectiveness and challenges of machine learning algorithms in conducting sentiment analysis.

The review used a thorough search approach to locate research in the English language that used machine learning to analyze sentiments in the context of disinformation, looking through databases such as PubMed and Scopus. Important results from 20 studies show that methods like neural networks and support vector machines (SVM) are especially useful however, there are still issues with data diversity and processing power. While acknowledging the promise of machine learning-based sentiment analysis, the paper also underlines the necessity of better algorithms and hybrid models to overcome current constraints and improve real-time processing of sentiment analysis.

Keywords: Misinformation, Sentiment Analysis, Machine Learning, Support Vector Machine, Neural Networks.

Digitalization as an integral part of the development of the east-west corridor

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Abstract: The object of the research of this work is the digitalization of cargo transportation between the People's Republic of China and the countries of the European Union along the middle corridor. The aim of the work is to analyze advanced information technologies and the relevance of their application in the task of developing the Middle Corridor. The relevance of this topic is related to the presence of obstacles to centralized development and ensuring integration between countries participating in the transportation process.

Result: The factors influencing the process of digitalization of freight transportation along the middle corridor were identified, research by international consulting companies was reviewed, and an assessment was made of the prospects for the development of digitalization of the corridor and recommendations were formulated on the need to create a single data exchange environment.

Practical significance: The obtained results of the study confirm the effectiveness of the use of digital technologies in the task of developing a digital corridor for all participating countries..

Keywords: Middle Corridor, Blockchain, IT, Big Data, AI

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Sosyal Medyada Siber Suç Farkındalık Ölçeği (CASM-S) Sosyal Medyada Siber Suç Farkındalığı (CASM-S)

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Özet: İnternet altyapısındaki hızlı gelişmelerle birlikte iletişim yöntemleri de önemli ölçüde değişmiş, sanal ortamlarda etkileşim daha yaygın hale gelmiştir. Bu değişimin önemli unsurlarından biri sosyal medya olup, bireyler ve gruplar arası iletişimin ana platformu haline gelmiştir. Sosyal medyanın bu hızlı yükselişi, beraberinde siber zorbalık gibi yeni suç türlerinin de artmasına neden olmuştur. Bu çalışma, Kırgızistan'da öğrenim gören üniversite öğrencilerinin sosyal medya kullanım alışkanlıklarını, sosyal ağlarda karşılaştıkları suçları ve bu suçlara verdikleri tepkileri analiz etmektedir.

Araştırma, Ocak 2023- Mayıs 2023 tarihleri arasında Kırgızistan'daki çeşitli üniversitelerde eğitim gören 435 öğrenciye uygulanmış anket verilerine dayanmaktadır. Anket çalışması, katılımcıların sosyal medya kullanım sıklıklarını, internet ortamındaki deneyimlerini ve karşılaştıkları suç mağduriyetlerini ölçen 39 bölümden oluşmaktadır. Veriler, SPSS programı ile tek yönlü ANOVA, iki yönlü ANOVA ve T-testi yöntemleri kullanılarak analiz edilmiştir. Araştırma bulguları, sosyal medya kullanımının öğrenciler arasında oldukça yaygın olduğunu, bu ortamlarda en sık karşılaşılan suç türünün ise siber zorbalık olduğunu göstermektedir.

Sonuçlar, sosyal medya kullanımının öğrenciler arasında artan suç mağduriyetine yol açabileceğini ortaya koymaktadır. Özellikle siber zorbalık, öğrencilerin sıkça karşılaştığı bir sorun olarak öne çıkmaktadır. Bu bağlamda, sosyal medya kullanımının hukuk ve adli bilimler perspektifinden daha fazla incelenmesi gerektiği vurgulanmaktadır. Araştırma, sosyal medya platformlarında suçlara karşı daha etkin yasal düzenlemelere ve önleyici politikalara ihtiyaç duyulduğunu ortaya koymaktadır.

Anahtar Kelimeler: Sosyal ağ, Suç, Siber zorlama, Siber mağduriyet, Sosyal medya, Siber zorbalık duyarlılığı.

Cybercrime Awareness Scale in Social Media (CASM-S)

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Abstract: With the rapid advancements in internet infrastructure, communication methods have undergone significant transformations, leading to a widespread increase in interactions within virtual environments. One of the key elements of this change is

social media, which has become the primary platform for communication between individuals and groups. The rapid rise of social media has also led to an increase in new types of crimes, such as cyberbullying. This study analyzes the social media usage habits of university students in Kyrgyzstan, the crimes they encounter on social networks, and their reactions to these crimes.

The research is based on survey data collected from 435 students studying at various universities in Kyrgyzstan between January 2023 and May 2023. The survey, consisting of 39 sections, measures the participants' frequency of social media use, their experiences in the online environment, and the crimes they have fallen victim to. The data were analyzed using one-way ANOVA, two-way ANOVA, and T-tests via the SPSS program. The findings of the study indicate that social media use is quite prevalent among students, with cyberbullying being the most frequently encountered crime in these environments.

The results suggest that social media use may lead to increased crime victimization among students. In particular, cyberbullying emerges as a frequent problem faced by students. In this context, it is emphasized that social media use should be examined more thoroughly from a legal and forensic science perspective. The study concludes that there is a need for more effective legal regulations and preventive policies against crimes on social media platforms.

Keywords: Social Networks, Crime, Cyberbullying, Cyber victimization, Social media, Cyberbullying awareness.

Introduction overview of tools and techniques for managing and analyzing big data

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Abstract: In the current digital age, the explosion of data generated from various sources—such as social media, IoT devices, and business transactions—has led to the emergence of big data as a crucial element in strategic decision-making across industries. Big data is typically characterized by the "three Vs": volume, variety, and velocity, with some frameworks adding veracity and value to this definition. Managing and analyzing big data requires a combination of tools and techniques that can efficiently store, process, and derive insights from these large and complex datasets.

Keywords: IoT, Big Data, HDFS, ETL, GDPR

Ana kart və istifadəçi təcrübəsi

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Abstract: The motherboard is the heart of the computer and also the most overlooked part of the hardware. The main purpose of the motherboard is to connect all the parts of the computer, for example: memory, processor, disks and other devices in a better and faster way. Unlike other hardware devices, the development of the motherboard is very unique and has a great impact on the market. Although other devices are developed independently of each other, it depends on the development of the motherboard that these devices will work together. The objectives of this study were to describe the most important parts of the motherboard and its development, starting with chipsets, memory, processor, one of the first parts selected during computer design, to the bus and other sockets

Keywords: Motherboard basics, CPU, motherboard models, chipset, memory type

Explore the latest cyber security threats and solutions in IOT networks

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Abstract: Physical and virtual items equipped with sensors, software, and other technologies are connected by the Internet of Things (IoT), which uses the Internet to exchange data. This technology makes it possible for billions of people and gadgets to interact, exchange data, and customize services to improve our quality of life. IoT has many advantages, but because of its lack of information security, it could potentially be a serious problem. IoT devices have become a target for several criminals that aim to steal confidential data and damage people's privacy because of their rapid global growth. Features including confidentiality, correctness, comprehensiveness, authentication, access control, availability, and privacy should be used to safeguard data and services in the context of the Internet of Things. By reviewing relevant publications and examining the common application-layer protocols used in IoT environments, along with their security risks and challenges, we also talked about the most popular security measures to control the IoT threats and mitigation techniques that can be used to mitigate these threats.

Keywords: Threats and security in IoT, blockchain for IOT security, edge computing, FOG computing, cyber-attacks, artificial intelligence, cybercrime research, cyber security, machine learning, Diffie-Hellman encryption technique

Data-Driven logistics: efficiency improvement in supply chains through digitalization

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Abstract: The integration of digital technologies such as big data analytics, the Internet of Things (IoT), and artificial intelligence (AI) has brought about significant changes in the logistics industry, resulting in enhanced efficiency and transparency in supply chains. These developments facilitate superior inventory management, route optimisation and demand forecasting through the utilisation of real-time data analysis. The digitisation of supply chains fosters greater collaboration among stakeholders, reduces information silos, and facilitates innovation and sustainability. The application of key technologies such as big data, the Internet of Things (IoT), and artificial intelligence (AI) facilitates enhanced decision-making and operational efficiency, conferring a competitive advantage upon logistics companies in the contemporary market. Notwithstanding the obstacles presented by integration costs and data security concerns, the advantages of digital tools in logistics include enhanced visibility, the capacity to respond proactively to disruptions, and the adoption of sustainable practices. In conclusion, it is imperative that organisations adopt a digital transformation strategy in order to ensure long-term success in the global market.

Keywords: logistics, data-driven, digitalization

Android malware analysis overview

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Abstract. The Android operating system is an open-source operating system based on the Linux kernel, provided by Google, and widely used in mobile devices, watches, televisions, cars, and Internet of Things applications. Its large market share and open-source nature make it more likely to be targeted by cybercriminals than other mobile operating systems. It is known that these malicious programs are aimed at violating the main components of information security, causing various material or moral damage to individuals or organizations. For these reasons, fast, efficient, and accurate malware detection in Android mobile device applications remains an essential topical issue in the academic, commercial, and industrial worlds.

Keywords: malware, Android, static analysis, dynamic analysis, hybrid analysis

Әлеуметтік желілерде депрессиялық және суицидтік мәтіндерді анықтайтын әдістерді зерттеу

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Аңдатпа. Әлеуметтік желілерді кеңінен қолдану адамдарға өз ойлары мен эмоцияларын еркін бөлісуге мүмкіндік беретін коммуникацияда төңкеріс жасады. Бұл көптеген артықшылықтарға ие болғанымен, әсіресе депрессия және суицидтік ойлар сияқты психикалық денсаулық мәселелерін анықтау және шешуде қиындықтар тудырады. Бұл проблемаларды ерте анықтау уақтылы араласу және қолдау үшін өте маңызды. Жасанды интеллекттің бір саласы болып табылатын терең оқыту әлеуметтік желілердегі депрессиялық және суицидтік мәтіндерді анықтауды автоматтандыруда үлкен әлеуетті көрсетіп, осы маңызды мәселенің ауқымды шешімін ұсынады.

Бұл мақалада әлеуметтік желілердегі депрессиялық және суицидтік мәтіндерді анықтауға арналған әдістерді зерттейді. Зерттеу тақырыбы негізінде әртүрлі ғылыми мақалалар мен әдебиеттерге шолу жасалды. Депрессия мен суицидке қатысты мәтіндерді автоматты түрде анықтау әдістері зерттелді. Ол дәстүрлі машиналық оқыту әдістеріне негізделген ерте әдістерді зерделеуден, психикалық денсаулықты дәл анықтау үшін қажетті күрделілікті анықтауда олардың шектеулерін көрсетуден басталады. Терең оқытудың пайда болуы мәтіндік деректерді түсіну және интерпретациялау мүмкіндігін айтарлықтай жақсартатын конволюционды нейрондық желілер (CNN), қайталанатын нейрондық желілер (RNN) және трансформаторлар сияқты әдістермен табиғи тілді өңдеуге (NLP) өзгерістер әкелді.

Кілт сөздер: әлеуметтік желі, депрессия, суицид, терең оқыту, нейрондық желілер.

Artificial intelligence-based DDOS attack detection and prevention system on software defined networks

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Abstract: Software Defined Networking (SDN) is a software-oriented network concept created by the separation of control and data planes. Furthermore, SDN is vulnerable to a variety of security threats, including distributed denial of service (DDoS) attacks. This article presents a flexible modular software architecture that enables the identification and mitigation of DDoS attacks. Normal traffic has been observed. Subsequently, a DDoS attack was executed and observed. This article also introduces a system that detects and prevents DDoS attacks in SDN using Machine Learning techniques. Numerous test cases were executed with varying scenarios using Mininet. The Decision Tree model has a 91 percent accuracy rate. The Decision Tree model outperformed others such as Artificial Neural Networks (ANN), which had a 78% accuracy rate, and Naive Bayes, with 68%. Consequently, there was a consensus that the most appropriate model for DDoS detection was the Decision Tree. Artificial intelligence models used in the system can be easily reintegrated based on the success rate of these models trained on Google Colaboratory. This feature is aimed at saving a significant amount of time during the training process. Real-time DDoS attacks have been detected. After the detection process, the computer/system affected by the attack was also secured by the controller to prevent further impact.

Keywords: DDoS, SDN, Artificial Intelligence, Machine Learning

Selection of candidates in the recruitment of banks in Azerbaijan with a fuzzy relational model

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Abstract: With the growth of Industry 4.0, there is a need for a new employee to handle the changing demands of the labor market and existing technology. Recruitment in banks is conducted on the basis of multi-criteria factors. From this point of view, it is necessary to use a fuzzy mathematical model to solve the issue of employment in banks, a fuzzy relational model was proposed referring to the methods of making decisions under conditions of uncertainty. The purpose of the research is to select the best among those who want to be employed, taking into account the mandatory, desirable and insignificance of the requirement put forward by the bank to the general indicators characterizing the applicant for employment in the bank. The determination of the function of relevance to the applicant's criterion depends on the distribution of the indicators characterizing it among the sets. In order to determine the relevance function of the applicants to the criterion indicators, the mathematical formalization of the input information of the extent to which the applicant corresponds to the relevant criterion indicator should be performed. On the basis of the proposed methodology, an algorithm for solving the issue of recruitment in the front-end and back-end areas of the bank has been developed.

Keywords: fuzzy, multicriteria, employment, bank, fuzzification.

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Абстракт: Учурда жашообуздун ар тармагында интернетти колдонобуз. Интернет колдонуучулардын саны күндөн күнгө өсүүдө. Эң көп колдонулган кызматтардын бири HTTP сервиси, б.а. HTTP сервери болуп эсептелет. World Wide Web (WWW) маалымат системи катары экспоненциалдуу түрдө өнүктү. Мисалы, электрондук коммерция (e-commerce), mobile commerce (m-commerce), e-government, e-service, digital libraries, e-education, distance learning, video-on-demand колдонмолордун баары веб инфраструктурага негизделип интернетти колдонуу менен чоң берилиштерди түзүүдө. Демек, веб-казуу (web mining) — бул интернеттен чогултулган чоң көлөмдөгү маалыматтарды чогултуу, иштеп чыгуу жана анализдөө процесси. Веб-казуу негигинен үчкө бөлүнөт. Алар: веб-мазмунду казуу (web content mining), веб-кызматтарды казуу (web usage mining) жана веб колдонууну казуу (web usage mining) болуп эсептелет. Ошондуктан веб казуу үчүн керектүү изилдөө куралдары боюнча талдоо жүргүзүлдү.

Ачкыч сөздөр: веб-казуу, веб-мазмунду казуу, веб-түзүмүн казуу, веб колдонууну казуу

ВЕБ КОЛДОНУУСУН КАЗУУ

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Абстракт: Интернет дүйнө жүзүндөгү коомду байланыштырган маанилүү тармак болуп саналат, ал ар кандай технологияларга, өзгөчө Бүткүл дүйнөлүк желеге (WWW) таянат. Веб-баракчалар маалымат бөлүшүүнү жеңилдетип, электрондук коммерциядан баштап, санарип китепкана жана дистанциялык окууга чейин ар түрдүү кызматтарды көрсөтөт. Интернет трафигинин көбү HTTP протоколуна негизделет. Веб-казуу — бул веб мазмунун, түзүмүн жана колдонулушун анализдөө ыкмасы. Бул изилдөөдө билим берүү мекемелеринде санарип кызматтардын сапатын баалоо үчүн окутууну башкаруу системасынын (LMS) каттоо журналдары вебди колдонуу казуу техникасы менен изилденет.

Ачкыч сөздөр: окутууну башкаруу системасы (LMS), каттоо журналынын файлы (log file), веб колдонууну казуу

Turkish text sentiment analysis based on transformer models and machine learning

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Abstract: Sentiment analysis is a problem that is studied in order to automatically determine the sentiment of a text, falls within the scope of natural language processing, and generally includes sentiment categories such as positive, negative and neutral. With the increasing use of the Internet and social media, we are in a situation where people have and share their opinions on different areas such as products, political identities and social issues. Knowing the opinions and feelings of users on these topics is a valuable source of information for companies, institutions, political authorities and researchers. Due to the high dimensionality of textual data and the complex semantics of natural language, sentiment analysis faces serious difficulties. In this study, an analysis based on transformer models and machine learning was performed on sentiment analysis of Turkish texts. The features extracted using three different transformer models were tested on a dataset consisting of 440 thousand Turkish text samples for the 3-class sentiment analysis problem using 10 different machine learning algorithms. Three different state-of-the-art transformer-based pre-trained models such as DistilBERT, BERTweet and XLM-Roberta-base were used for feature extraction. The best performance was achieved with the ensemble transformer model XLM-RoBERTa and the classifier XGBoosting with an accuracy of 93.6%. The Precision, Recall, F-score and AUC values were 93.3%, 93.6%, 93.4% and 0.97 respectively. The results showed that for sentiment analysis from Turkish texts, the transformer models have sufficient accuracy.

Keywords: Transformer models, sentiment analysis, Turkish, Machine Learning

ELECTRICAL ELECTRONICS ENGINEERING

Sabit internet erişiminde kullanılan iletim ortamları ve eve kadar fiber (FTTH) kavramı

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Özet: Bu çalışmanın amacı, bakır kablo ile uygulamaları başlayan internet erişiminin, optik fiberlerin erişim ağlarına uygulanması sonucu elde edilen avantajları açıklanmış, kıyaslama yapılarak fiber optik kablonun bakır kabloya üstünlükleri hakkında bilgi verilmiştir. Ayrıca yerleşim birimlerinin ihtiyaç duyduğu servis ve alt yapı için FTTH erişim modelinin nasıl ve ne şekilde olacağı belirtilmiştir. Önerilen çalışmanın deneysel çalışmaları Türk Telekomünikasyon A.Ş bünyesindeki alt yapılar incelenip bakır ve fiber kabloların müşteriye göre konumlandırılmasının nasıl olması gerektiğinden de bahsedilmiştir. Genellikle mevcut bakır şebekelerin yerine geçmeye başlayan optik iletişim ağlarında gelecekteki sistemlerin fiberin doğrudan son kullanıcıya ulaştığı sistemler olması istenmektedir. Bu sistemler en yaygın haliyle eve kadar fiber sistemler (FTTH) olarak adlandırılır. FTTH mimarileri ile yüksek hızlı internet (HSI), internet protokolü üzerinden ses iletimi (VoIP), isteğe bağlı video (VOD), internet protokolü (IP) üzerinden televizyon hizmeti (IPTV) gibi katma değerli hizmetler (VAS) kullanıcılara çok kolay bir şekilde sağlanabilmektedir.

Anahtar Kelimeler: Ftth, Gpon, Fiber, Bakır

Об одной схеме биометрической цифровой подписи на основе хеширования

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Аннотация: В этой статье представлен новый вариант схемы eXtended Merkle Signature Scheme (XMSS), которая включает в себя алгоритм криптографического хеширования TANBA, основанный на модифицированной конструкции Sponge. Стандартная хеш-функция в XMSS заменена на TANBA для повышения безопасности и эффективности. Кроме того, схема интегрирует генерацию ключей на основе биометрии, используя уникальные биометрические данные для создания криптографических ключей, обеспечивая дополнительную защиту от традиционных атак. Объединяя TANBA с генерацией ключей на основе биометрии, структура становится более устойчивой к новым угрозам, особенно в контексте постквантовой криптографии. Предлагаемое решение, постквантовая биометрическая цифровая подпись на основе XMSS и генерации ключей на основе глубокой нейронной сети, предлагает высокозащищенный и удобный для пользователя подход. Он объединяет квантово-устойчивые криптографические алгоритмы с биометрическими данными для обеспечения многоуровневой защиты. Кроме того, в статье рассматривается использование технологий штрихкодирования в биометрии лица для применения в судебной экспертизе, медицине и исследованиях. В статье предлагаются новые подходы к генерации цветных QR-кодов (BIO QR-кодов) из данных изображений лиц, включая антропометрические координаты, фенотип и пол. Эти QR-коды могут использоваться для идентификации, судебной экспертизы и медицинских целей. Кроме того, в статье рассматривается использование глубокого обучения, в частности сверточных нейронных сетей, для генерации криптографических ключей из биометрических изображений, подчеркивая их эффективность в задачах распознавания лиц.

Ключевые слова: Биометрия, QR-код, Постквантовая, Хеш-функция, Цифровая подпись.

On a biometrical hash-based digital signature scheme

Absract: This paper introduces a new variant of the eXtended Merkle Signature Scheme (XMSS) that incorporates the TANBA cryptographic hashing algorithm, which is based on a modified Sponge construction. The standard hash function in XMSS is replaced by TANBA to improve security and efficiency. Additionally, the scheme integrates biometry-based key generation, leveraging unique biometric data to create cryptographic keys, providing added protection against traditional attacks. By combining TANBA with biometric-based key generation, the framework becomes more

resilient to emerging threats, particularly in the context of post-quantum cryptography. The proposed solution, a post-quantum biometric digital signature based on XMSS and deep neural network-driven key generation, offers a highly secure and user-friendly approach. It pairs quantum-resistant cryptographic algorithms with biometric data to deliver multi-layered protection. Moreover, the paper examines the use of barcoding technologies in facial biometrics for applications in forensic science, medicine, and research. It proposes new approaches for generating color-based QR codes (BIO QR codes) from facial image data, including anthropometric coordinates, phenotype, and gender. These QR codes can be used for identification, forensics, and medical purposes. Additionally, the paper explores the use of deep learning, particularly convolutional neural networks, for generating cryptographic keys from biometric images, emphasizing their effectiveness in facial recognition tasks.

Keywords: Biometrics, QR-code, Post-Quantum, Hash function, Digital signature.

Design of a Fitzhugh-Nagumo neuron model based spiking neural network and its application for the XOR pattern recognition task

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Abstract: In these modern times, the topic of artificial intelligence and neural networks has gained significant interest due to their wide-ranging applications across diverse fields. However, the development of bio-inspired networks is crucial to further enhance neural network capabilities. Spiking Neural Networks (SNNs) offer a more biologically realistic approach to modeling neural activity, where information is processed through spikes or discrete events, similar to the brain. This enables SNNs to manage temporal data with ease and thus SNNs realize neuromorphic computation. In this study, a 2x2 SNN is constructed using the FitzHugh-Nagumo (FHN) neuron model, which captures essential spiking behavior. This proposed neural network is trained using the Spike-Timing-Dependent Plasticity (STDP) algorithm. This algorithm is a biologically plausible learning mechanism that adjusts synaptic weights based on the relative timing of spikes between neurons. In here, the network's capabilities are demonstrated by the unsupervised learning applications for the XOR pattern recognition task. This method allows the network to learn and classify patterns autonomously without external supervision.

Keywords: Spiking Neural Network (SNN), Fitzhugh-Nagumo Neuron Model (FHN), Spike Time Dependent Plasticity (STDP), Unsupervised Learning.

System-level optimization of predictive torque controlled induction motor drive using lightning search algorithm

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Abstract: The model predictive control (MPC) method is one of the high-performance control methods used in induction motor (IM) drives, and predictive torque control (PTC) is one of the most preferred MPC strategies for electric drives. However, the weighting factor associated with the stator flux error in the cost function must be appropriately adjusted to obtain high-performance control. In this paper, to increase the robustness and performance of the drive system, the lightning search algorithm (LSA) is used to optimize both the weighting factor of the cost function and the parameters of the proportional-integral (PI) controller used in the outer speed control loop. The LSA optimizes these parameters by utilizing a cost function based on speed errors. The optimized PTC-based IM drive system is verified in simulation with a comprehensive scenario. The average switching frequency, current harmonics, torque ripple, flux ripple, and mean square error values are also presented regarding the comprehensive test scenario. Simulation results prove the effectiveness of the optimized PTC-based IM drive.

Keywords: Predictive torque control, İnduction motor, Lightning search algorithm, Optimization.

Real-Time remote prediction of cable breaks in telecommunication systems

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Abstract: This project presents an innovative approach to real-time monitoring and break notification in optical fibre networks by leveraging the Rayleigh backscattering principle. Optical fibre networks serve as the backbone of modern communication systems, and ensuring their continuous operation is paramount. To address this critical need, we are developing a cutting-edge software solution that harnesses the intrinsic properties of Rayleigh backscattering for accurate and timely fault detection.
By analyzing the patterns and characteristics of Rayleigh backscattering signals, our software can effectively detect and pinpoint faults along the length of the fibre.
This project goes beyond traditional monitoring approaches by providing real-time capabilities. The software continuously collects and analyses Rayleigh backscattering data from optical fibre networks, enabling immediate detection of breaks or deteriorations. In the event of a fault, the system promptly sends notifications to network administrators, ensuring rapid response and minimizing downtime.
Furthermore, our software incorporates advanced visualization tools to offer a clear and intuitive representation of the optical fibre network's health. Users can visualize the location and extent of faults, enabling efficient troubleshooting and maintenance. This visualization enhances the overall management of optical fibre networks and facilitates proactive fault prevention.
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Keywords: Cable Break, Telecommunication Systems, Fibre Networks, Rayleigh Backscattering Principle, Networks.

Gürbüz çevirim içi sansürleme tabanlı kompleks-değerli adaptif filtreleme algoritması

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Özet: Bu çalışmada, gürbüz çevrim içi sansürleme tabanlı Hibrit (Robust online censoring based hybrid, ROC-Hibrit) algoritması türetilmiş olup, başarımı literatürde yer alan ROC tabanlı kompleks-değerli en ortalama küçük kurtosis (ROC based Complex-valued least mean kurtosis, ROC-ACLMK), ROC tabanlı artırılmış CLMK (ROC based augmented CLMK, ROC-ACLMK), OC-Hibrit ve klasik ROC-Hibrit algoritmaları ile bir büyük ölçekli sistem tanımlama problemi üzerinde test edilmiştir. Bu amaç doğrultusunda ilk olarak klasik kurtosis-tabanlı maliyet fonksiyonu tabanlı karıştırma parametresine ait stokastik güncelleme kuralı, ROC stratejisi dikkate alınarak yeniden tanımlanmış ve ardından ilgili maliyet fonksiyonu minimize edilerek ROC-Hibrit algoritması teorik olarak türetilmiştir. Önerilen ROC-Hibrit yapısı, hem bilgilendirici olmayan verileri hem de aykırı değerleri sansürleyerek dairesel verilerde CLMK, dairesel olmayan verilerde ise ACLMK algoritmalarını adaptif olarak baskın hale getirmiş ve böylece hesap yükünü azaltarak başarımı önemli ölçüde iyileştirmiştir. Benzetim çalışmaları, önerilen ROC-Hibrit algoritmasının bu üstün özelliklerini kanıtlamaktadır.

Anahtar Kelimeler: Çevrim İçi Sansürleme, Kompleks-değerli Veri, En Küçük Kurtosis Algoritması, Gürbüz Algoritma, Aykırı Değerler.

Simulation-based microwave ımaging of simplified human neck model using DAS algorithm

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Abstract: The application of the Delay and Sum (DAS) algorithm, a qualitative technique for electromagnetic wave-based microwave imaging, is analyzed for neck imaging simulation. The aim is to detect deformation in the cervical vertebra and evaluate the efficiency of the DAS algorithm in the neck region, which has a complex structure and high dielectric properties at microwave frequencies. Two neck configurations were designed using the 2nd cervical vertebra from Gustav voxel data in CST Microwave Studio (CST MWS), with four antipodal Vivaldi antennas used to convert electromagnetic waves into electrical signals. The results obtained by applying the DAS algorithm to these signals are presented. The DAS algorithm successfully approximated the shape of the spinal cord, and the deformation of the spinal cord, along with the neck structure, was clearly visible in the results.

Keywords: Microwave imaging, Delay and Sum (DAS) algorithm, Neck structure imaging

Research and analysis of the quality of functioning telecommunication systems using MIMO technology

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Abstract: The methods for improving the characteristics of transmission efficiency and noise immunity of reception in multiservice telecommunication networks using modern wireless communication technologies MIMO (Multiple Input Multiple Output) in the provision infocommunication services are analyzed. The problems of optimization of the indicators of telecommunication systems according to the criterion throughput and signal-to-noise ratio at the demodulator input are investigated. Based on the research, a new approach to the construction of methods for calculating the performance indicators of telecommunication systems using wireless cellular communication technology is proposed. On the basis of the calculation method, important analytical expressions are obtained that evaluate network characteristics such as the average signal-to-noise ratio for the total power of the transmitted signal, and the specific throughput telecommunication system and radio engineering complexes using MIMO technology. The presented modeling results confirm the results of the theoretical analysis.

Anahtar Kelimeler: Performance, Throughput, Signal-to-noise ratio, MIMO, Reception immunity to interference

The impact of 6G in the industry 5.0

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Abstract: The emergence of cyber-physical systems, digital twins, and artificial intelligence (AI) represent some of the anticipated innovations that will define the future of the industry, designated as Industry 5.0. These technologies can potentially revolutionize industrial operations, offering new avenues for enhanced efficiency, flexibility, and resilience. This paper aims to investigate the impact of these cutting-edge technologies on the development of the sixth generation of communication (6G), creating a digital twin cloud computer industrial network. By examining the convergence of these advancements, the study seeks to provide insights into the future trajectory of the Industrial Revolution and the transformative role that 6G technology will play in shaping the landscape of Industry 5.0 and beyond.

Keywords: 6G, Industry 5.0, Industrial Networks, AI, Digital Twins.

Research into the quality of functioning telecommunication systems using MIMO technology

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Absract: The methods for improving the characteristics of transmission efficiency and noise immunity of reception in multiservice telecommunication networks using modern wireless communication technologies MIMO (Multiple Input Multiple Output) in the provision infocommunication services are analyzed. The problems optimization of the indicators of telecommunication systems according to the criterion throughput and signal-to-noise ratio at the demodulator input are investigated. Based on the research, a new approach to the construction of methods for calculating the performance indicators of telecommunication systems using wireless cellular communication technology is proposed. On the basis of the calculation method, important analytical expressions are obtained that evaluate network characteristics such as the average signal-to-noise ratio for the total power of the transmitted signal, and the specific throughput telecommunication system and radio engineering complexes using MIMO technology.

Keywords: Performance, Throughput, Signal-to-noise ratio, MIMO, Reception immunity to interference.

Special Thematic Session Proposal (Optional): To determine the session title which the abstract may be included, session chairman and theme

The digital twin concept in the 6G Era: Transforming communication and beyond

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Abstract: As the global community prepares to embrace the advent of sixth-generation (6G) communication, it is evident that this forthcoming generation of communication will not only usher in revolutionary developments in the field of communication but will also have a profound impact on a multitude of industrial sectors, including health, agriculture, and automotive. It is beyond doubt that one of these technologies, the digital twin (DT) concept, will provide considerable convenience in matters such as analyzing and optimizing any system with real-time data analysis and predicting problems that may be encountered in the future. This research investigates the complex relationship between the DT concept, which provides a dynamic and real-time digital representation of physical systems and significantly affects how communication networks work, and the promising technologies of 6G communication. It also examines the requirements and potential uses of this technology.

Keywords: Digital Twin, 6G, Artificial intelligence, Machine Learning, Digital Twin Networks

Pattern optimization of MIMO radar antenna array with IDE algorithm

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Abstract: The differential evolution with an individual-dependent mechanism (IDE) is used to synthesize antenna array patterns with nulls for a T-shaped MIMO radar. The side-lobe suppression is also added into the cost function of the optimization process. IDE algorithm has a dynamic mechanism for determining the mutation and crossover parameters based on the differences in the fitness values of the population members categorized into the superiors and inferiors. By utilizing IDE, very good deep nulls and low side-lobe levels are achieved at the transmitter side of the MIMO radar.

Keywords: Differential evolution, İndividual-dependent mechanism, MIMO radar, null, Side-lobe suppression.

Modbus protokolüne dayalı bir endüstriyel giriş-çıkış kartının tasarımı ve test edilmesi

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Özet: Endüstriyel otomasyon sistemleri, artan verimlilik, düşük maliyet ve yüksek güvenlik gibi önemli avantajlar sunmaktadır. Bu sistemlerin temel bileşenlerinden biri olan Modbus, endüstriyel otomasyonda yaygın olarak kullanılan seri bir iletişim protokolüdür ve cihazlar arasında güvenilir, esnek veri iletimi sağlar. Bu çalışmada, Modbus protokolüne dayalı bir giriş-çıkış kartının tasarımı ve uygulaması kapsamlı bir şekilde ele alınmıştır. Çalışmada, veri iletişiminin ve protokolün genişletilebilir yapısının sunduğu kolaylıkları ayrıntılı olarak incelemektedir. Teorik temellerin belirlenmesiyle başlayan tasarım süreci, donanım tasarımı ve geliştirilen yazılım ile bağımlı cihaz (slave) olan endüstriyel amaçlı giriş-çıkış kartının uygulaması gerçekleştirilmiştir. Modbus seri haberleşme protokolünün endüstriyel sahada yaygın olarak kullanılan fonksiyon kodları ile uygulama yapılmış ve çıktıları değerlendirilmiştir. Elde edilen sonuçlar, tasarlanan kartın endüstriyel otomasyon sistemlerinde başarılı bir şekilde kullanılabileceğini ve özellikle süreç kontrol/yönetim amaçlı uygulamalarda özelleştirilmiş modül olarak kullanılabilecek yapıda olduğunu göstermektedir. Ayrıca bu çalışmada donanım tasarımı ve yazılım geliştirme süreçleri birlikte ele alınarak, bu süreçlerin gelecekteki çalışmalara ışık tutması hedeflenmektedir.

Anahtar Kelimeler: Modbus protokolü, dijital giriş-çıkış kartı, donanım tasarımı, yazılım tasarımı, Modbus RTU uygulaması.

Phase-Tuned rainbow trapping in low-symmetry coupled cavity waveguides

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Abstract: Rainbow trapping in coupled cavity waveguides (CCWs) offers a transformative approach to slow light manipulation, enabling the confinement, separation, and enhanced control of different wavelengths within a compact photonic crystal structure. By introducing phase shift mechanisms alongside asymmetries in the cavity design, we have achieved significant improvements in wavelength selectivity, precision control, and phase modulation, leading to highly efficient wavelength trapping and routing applications. Building upon our prior work, which showcased the superior slow light effects in low-symmetry coupled cavities, we now extend our research into a more advanced design, focusing on a multi-drop low-symmetry Coupled Resonator Optical Waveguide (CROW) rainbow trapping demultiplexer.

In this work, we exploit the unique phase shift properties induced by low rotational symmetry to finely adjust the resonant coupling frequencies within the CROW structure. Precise tuning of the defect cavity rod radius, between 0.270a and 0.290a, has enabled the creation of multiple drop channels, essential for effective wavelength separation and enhanced rainbow trapping coupling. The introduction of controlled phase shifts has further improved the selective routing and delay of trapped wavelengths, broadening the operational bandwidth of the system.

This advanced configuration has facilitated the successful implementation of several drop points, significantly boosting the performance of the demultiplexer. The cavity resonances have been optimized using Harminv, ensuring robust coupling with the targeted trapped wavelengths while minimizing losses. However, challenges such as residual crosstalk and back reflection persist, which we aim to address through further refinement of the phase shift and structural parameters.

This ongoing research marks a critical step toward the development of high-performance wavelength demultiplexers with precise phase and wavelength control over slow light phenomena. The potential to eliminate crosstalk and back reflection through enhanced phase tuning promises to further advance the capabilities of photonic crystal-based optical devices, contributing to cutting-edge solutions in optical communication systems.

Keywords: Photonic crystal, coupled cavity, phase shift, symmetry reduction, low symmetry, rainbow trapping

Acknowledgment: This work is supported by the YÖK 100/2000 Project (Council of Higher Education), PAÜ BAP-2021FEBE040 (Pamukkale University - Scientific Research Project Unit), and TUBİTAK 118E954 (The Scientific and Technological Research Council of Türkiye).

The effect of measured current usage in conventional sliding mode observer over induction motor speed estimation

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Abstract: Electric vehicles (EVs) have become a choice against others using internal combustion engines because of the tendency to reduce carbon emissions. Therefore, the high-performance control applications of electric motors have gained more importance. Since the induction motor (IM) is one of the electric motors used in EV applications, its sensorless high-performance control methods increasing the system's reliability and reducing the cost attract the attention of researchers. Moreover, sliding mode observer (SMO) is one of the model-based approaches utilized in sensorless IM drives. However, the conventional SMO methods lead to a chattering phenomenon in the estimated states/parameters. In this paper, to reduce the effect of the chattering in the rotor speed estimation, the measured current, already available for the conventional SMO, is utilized. Moreover, the estimation performance of the convention SMO using estimated and measured currents in the rotor speed estimation are compared in simulation studies with a comprehensive scenario. Since the measured currents do not include high-frequency chattering components, conventional SMO with measured currents presents a higher performance in estimated rotor speed. Therefore, the rotor speed estimation performance of the conventional SMO can be increased for a wide speed range of operation without any additional sensor usage and computational load.

Keywords: Induction motor, conventional sliding mode observers, rotor speed estimation.

Asenkron motorun elektriksel parametrelerinin yıldırım arama algoritması ile belirlenmesi

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Özet: Elektrik motorlarının parametrelerinin doğru belirlenmesi kontrol uygulamaları için büyük önem arz etmektedir. Bu nedenle, bu çalışma kapsamında yıldırım arama algoritması (lightning search algorithm, YAA) ile asenkron motorların (ASM'lerin) elektriksel parametrelerinin belirlenmesine yönelik bir çalışma gerçekleştirilmiştir. Gerçek değerli sayısal eniyileme problemlerinin çözümünde kullanılan YAA algoritması, etkili ve nispeten yeni bir meta sezgisel eniyileme yöntemidir. Bu çalışmada, ASM'nin elektriksel parametrelerin YAA ile belirlenmesi için sürekli hal eşdeğer devre modelinden yararlanılmıştır. Gerçekleştirilen eniyileme çalışmalarında maliyet fonksiyonunda, indüklenen, başlangıç ve devrilme momenti hataları ile birlikte güç faktörü hatasından faydalanılmıştır. Ayrıca, maliyet fonksiyonu içerisinde kullanılan her bir matematiksel ifadenin normalizasyon işlemi gerçekleştirilmiştir. Böylece, her bir hata ifadesinin maliyet fonksiyonundaki etkisinin eşitlenmesi amaçlanmıştır. YAA ile belirlenen sürekli hal devre parametrelerinin başarımının ortaya konulabilmesi için belirlenen parametrelere ilişkin yüzde hata değerleri de sunulmuştur. Elde edilen sonuçlar, YAA'nın ASM'nin sürekli hal eşdeğer devre parametrelerinin belirlenmesindeki başarımını açıkça ortaya koymaktadır.

Anahtar Kelimeler: Asenkron Motor, Yıldırım Arama Algoritması (YAA), Parametre Belirleme

Investigate the latest advancement in wireless power transfer technology for charging electrical vehicles

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Abstract: The shift towards electric vehicles (EVs) is driving innovation in various technological fields, with wireless power transfer (WPT) emerging as a crucial component in the development of convenient and efficient charging solutions. This paper reviews the latest advancements in WPT technology for EV charging, focusing on improvements in efficiency, charging speed, and practical implementations. Key topics include resonant inductive coupling, magnetic resonance coupling, and emerging technologies such as microwave and laser-based WPT systems. The paper also discusses the challenges and future directions of WPT technology in the context of the evolving EV market. Wireless charging, also known as wireless force motion, is a technological advancement that enables the source to send electromagnetic energy via an air hole to an electrical load without the need for connecting ropes. This innovation is drawing a wide range of applications, from high-power vehicles to low-force toothbrushes, due to its comfort and improved consumer experience. These days, this development is moving quickly from theories to the typical part of a commercial item, particularly in the event that sharp objects need to be used.

Many driving associations like Samsung, Apple, Huawei, began to release new period mobiles which are having in-created Wireless charging ability. Presently a-days is rapidly creating from theories towards the standard segment of a business thing especially if there ought to be an event of sharp contraptions. Many driving associations like Samsung, Apple, Huawei, began to release new period phones which are having in-manufactured Wireless charging ability. IMS investigate envisioned that Wireless charging things will be 4.5 billion market by 2016 and it crossed the most Wireless point they assessed. Pike ask about assessed that the cordless controlled things will be significantly increased by 2020 getting the chance to be 20 billion market.

Keywords: Wireless power transfer (WPT), Electric vehicles (EVs), Charging Solutions, Radio charging, Superconductors

Investigation of the fire process in fire resistant cables

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Abstract: As well as the production of electricity, the systems used in its distribution also play a very important role in the overall energy systems. Fire safety of cables and wires used in energy distribution is one of the most urgent issues. This is of great importance both for the efficiency of energy distribution and for human life. The article investigates the causes and characteristics of fires in cable systems, highlighting the critical importance of enhancing cable fire resistance. It emphasizes that fire-resistant cables are a more effective design choice for meeting low fire hazard requirements. The specific features of these cables are thoroughly reviewed.To analyze the underlying mechanisms, the study models the combustion process in polymer-based cable insulation. Findings reveal that during a fire, the polymer undergoes two distinct phases: condensation and gasification. The research explores how physico-chemical processes in these phases impact the fire behavior. The results offer valuable insights for the design and implementation of cables with minimized fire risks.

Key words: fire process in polymers, short circuit, fire resistant cables, model of combustion process, phases formed in the combustion process.

Analysis and optimization of the 110/27.5/10 kV goran railway traction substation

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Abstract: This paper investigates the malfunctions at the Goran 110/27.5/10 kV railway traction substation and proposes scientific and practical solutions to address them. The paper includes the assessment of the grounding system, laboratory analysis of transformers, measurements of harmonic components, and computations carried out using Python programming. The goal of this study is to improve system reliability, reduce energy losses, and prevent potential future malfunctions.

Keywords: Railway systems, Electric power supply, Harmonic components, Grounding system, Python

Research of signaling system in mobile communication networks using SIP protocols

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Absract: The efficiency multiservice telephone and mobile communication networks using signaling systems and protocols when establishing a connection and providing various services is analyzed. The efficiency of mobile networks is investigated and an analytical model of the signaling system using the session initiation protocol (SIP) protocol is proposed. Expressions are obtained that allow estimating the average connection establishment time using the SIP protocol for multimedia services. Based on numerical calculations, various graphical dependencies were constructed to clearly confirm the accuracy of the obtained results.

Keywords: Efficiency, Connection establishment time, Mobile network, SIP protocol.

The Role of passive radar drones in complex detection systems

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Absract: This article explores passive radar drones capable of detecting small and micro-scale unmanned aerial vehicles (mini and micro-UAVs) with low effective reflection (scattering) cross-sections (RCS). The study proposes integrating this type of drone into complex detection systems (CDS). Information on detection methods for mini and micro unmanned aerial vehicles (MMUAVs) functioning as sources of electromagnetic waves (EMW) across various frequency ranges will be provided. The article will also examine the coordination of complex detection application methods and analyse these integrations. Furthermore, it will clarify the principle of collecting and distributing data obtained by complex detection systems at a central control station.

Keywords: Detection of small MMUAVs, Complex detection, Effective reflection (scattering) cross-section area, Detection of aerial targets using passive and active radar location station (RLS), EMW generation by drones and control systems.

Preliminary study on detecting potato tuber disease using deep learning

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Abstract: Potatoes, grown as a global food crop, are prone to diseases such as potato scabs. Accurate disease detection in the sorting process is critical as they significantly affect their marketability. Developing a deep learning-based system for detecting disease symptoms on peels will serve the purpose of sorting potato tubers cost-effectively. This study presents preliminary study on the application of deep learning for detecting potato scabs in tubers. A total of 117 potato tuber samples (infected and healthy) were collected from various potato fields within the Niğde province of central Anatolia, during the harvest seasons in Türkiye. The assessment of these samples was conducted in accordance with the reported symptom type in the examined literature. Data augmentation was used to address the limitations of a small dataset. Four models such MobileNetV3, InceptionV3, Xception, and VGG19 were trained using obtained datasets. The models perform well in both healthy and scarb classes, with high specificity and low predicted positives. The study demonstrates that deep learning can effectively enhance disease detection, providing a cost-effective solution for potato producers to improve sorting and quality control.

Keywords: Potato scabs, Deep Learning, Diseases detection

Nesnelerin interneti (IoT) uygulamaları için gömülü sistem tabanlı esnek deney platformu tasarımı

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Özet: Nesnelerin İnterneti (IoT) teknolojisi ortamdan gerçek zamanlı bilgi sağlayarak kontrol görevlerinin otomatikleştirilmesiyle insan hayatının kolaylaştırılmasını hedefler. Pratikte gerçekleştirilen IoT uygulamalarında temel olarak elektronik devre bileşenleri, uygulamaya özel yazılım, ortama algılamaya yönelik sensörler ve veri alışverişi için haberleşme modülleri kullanılarak nesne olarak isimlendirilen akıllı cihazların internete bağlanması sağlanır. Bir cihazın akıllı olması bulunduğu ortamdan veri toplama, toplanan verileri otonom olarak işleyebilme, elde edilen çıkarımları depolayabilme ve gerektiğinde ilgili alıcılara iletebilme yeteneğine sahip olması ile ilişkilendirilir. Bu çalışmada imalat, tarım, enerji, sağlık ve otomotiv gibi farklı endüstrilerde gerçekleştirilebilecek IoT uygulamalarının deneysel çalışmalarında kullanım amacıyla geliştirilmiş esnek bir test platformu tanıtılmıştır. Bu platform sensör düğümleri, kontrol kartı ve bulut sunucu yazılımı üzere üç temel bileşenden oluşmaktadır. Geliştirilen test platformunun donanım ve yazılım bileşenleri kullanılarak gerçekleştirilen örnek bir IoT uygulamasına ilişkin detaylar çalışma kapsamında sunulmuştur. Bu uygulamada sahadan alınan sıcaklık ölçüm değerlerinin bulut sunucuda saklanması ve yine bulut bağlantılı kontrol kartı ile anlık verilerin değerlendirilmesi sonucu havalandırma fanlarının kontrolü sağlanmıştır. Gerçekleştirilen uygulama ile farklı amaçlar için yapılabilecek IoT tabanlı kontrol çalışmalarına temel teşkil edebilecek basit bir kablosuz sensör eyleyici ağı modeli gösterilmiştir.

Anahtar Kelimeler: IoT, Wi-Fi, LTE, ESP32, STM32.

On the application of Boolean functions in the optimization of electronic circuits.

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Abstract: This article discusses the significant role of logical functions in designing and optimizing electronic circuits. It explores the main optimization challenges that can be addressed through Boolean function differentiation, such as minimizing logic expressions and reducing the number of circuit components. The article presents examples of how Boolean functions have been successfully employed to reduce latency and power consumption in electronic devices. It also makes a transition from Boolean differential equations to neural networks. Finally, the article summarizes the findings and contributes to the future development of optimization techniques using Boolean functions in electronics.

Keywords: Boolean differential equations, optimization of electronic circuits, Boolean function, logical optimization, derivative of logical functions

Использование устройств когенерации распределенной энергии

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Аннотация. Малая распределённая генерация энергии – концепция развития энергетики, обеспечивающая возможности перехода от традиционной организации энергетических систем к новым методикам и практикам.
В настоящее время малая распределенная энергетика является единственным действенным инструментом снижения стоимости электроэнергии для предприятий малого и среднего бизнеса. Возможность работы оборудования малой распределённой генерации энергии разных видах топлива (в том числе возобновляемых источников энергии(ВИЭ)) позволяет устанавливать такие объекты на территориях с обширной географией.
Поскольку значительную долю новых локальных мощностей в мире составляет микрогенерация на основе возобновляемых источников энергии, либо более экологически эффективные мини-когенерационные установки, распределенная генерация энергии также является важным механизмом для сокращения выбросов парниковых газов и достижения мировых целей по борьбе с изменением климата. Потенциал этого механизма также может стать заметной частью усилий государств в рамках глобальной экологической кооперации, в том числе в рамках Парижских соглашений.

Ключевые слова. Биогаз, газотурбинный двигатель, региональная генерация, гибридная система, управление.

ENVIRONMENTAL ENGINEERING

Toprak yüzeyine poliakrilamid uygulamasının yüzeysel akışla azot ve fosfor taşınımına etkileri

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Özet: Yüzeysel akış ve erozyonla besin maddesi kayıpları toprak verimliliğini bozan ve çevre kalitesini olumsuz etkileyebilen olaylardandır. Toprak ve besin maddesi kayıplarını önlemede önerilen toprak koruma uygulamalarından biri de polimerik toprak düzenleyicileri kullanmaktır. Bu çalışmanın amacı, laboratuvar koşullarında toprak yüzeyine farklı dozlarda polimer uygulamanın yüzeysel akış suyuyla nitrat azotu, amonyum azotu, toplam azot, fosfat fosforu taşınımı üzerindeki etkilerini belirlemektir. Bu amaçla laboratuvar koşulları altında sedimanter anakaya üzerinde gelişmiş toprak örnekleri kullanılarak hazırlanan deneme parselleri üzerine sıvı poliakrilamid dört farklı dozda uygulanmıştır (kontrol: 0 mg/L, 1. Doz: 100 mg/L, 2. Doz: 500 mg/L ve 3. Doz: 1000 mg/L). Deneme parselleri % 9 eğimli tabla üzerine yerleştirilmiş ve 97 mm/s şiddette yapay yağış 1 saat süre ile uygulanmıştır. Uygulama sırasında oluşan yüzeysel akış suyu toplanmış ve süzüldükten sonra nitrat-azotu, amonyum-azotu, toplam azot ve fosfat-fosforu konsantrasyonları saptanmıştır. Çalışma sonuçları, yüzeysel akış suyuyla taşınan amonyum konsantrasyonunu azaltmada 2. Doz; nitrat ve fosfat konsantrasyonunu azaltmada ise 3. Doz uygulamalarının etkili olduğunu göstermiştir. Her üç uygulama dozu da kontrole göre toplam azot konsantrasyonunda artışa neden olmuştur. Bu çalışma sonuçları yüzeysel akışla oluşan besin maddesi kayıplarını azaltmada alternatif bir koruma önlemi olarak uygulanabileceğini göstermiştir. Ancak en etkili polimer çeşidi ve dozunu belirlemek için farklı koşullarda çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Yüzeysel akış, Yapay yağış, Besin maddesi, Poliakrilamid, Niğde

Çevre ve sürdürülebilirlik için matematiksel yaklaşım

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Özet: Çevre kirliliği ve kaynak kıtlığı -sürdürülebilir kalkınmayı sekteye uğratmakta olup- etkili stratejiler ve yönetim biçimleri gerektirmektedir. Matematik, karmaşık çevresel sistemleri analiz etmek ve etkin strateji geliştirmek için güçlü bir çerçeve sunar. Çeşitli matematiksel yöntemler kullanılarak, gerçek hayat senaryoları simüle edilebilir, gelecekteki eğilimler tahmin edilebilir, kaynaklar korunabilir ve kirlilik kontrol önlemleri optimize edilebilir. Bu çalışma, çevre ve matematik ilişkisini ortaya koymakta, çevresel sorunların çözümünde matematiksel yaklaşımı iki bölümde ele almaktadır: ilk bölüm sürdürülebilirlik için matematik ve büyük veri, ikinci bölüm ise çevre için matematiksel modellemedir. Matematiksel yaklaşımın çevresel karar verme süreçlerine entegrasyonu, sürdürülebilirliğe dair zorlukları giderme kapasitesini artırır, sorumlu kaynak yönetimini teşvik eder ve çevrenin gelecekteki nesiller için uzun vadeli korunmasına katkıda bulunur.

Anahtar Kelimeler: Büyük veri, Çevre, Matematik, Sürdürülebilirlik

Avrupa Birliği Mavi Mutabakatı: Su yönetimine yeni bir yaklaşım

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Özet: Son yıllarda nüfus artışı, çarpık kentleşme, küresel ısınma, iklim değişikliği, sanayileşme ve tarımsal kullanıma bağlı olarak su talebi artmakta ve bu durum temiz içme suyu kaynakları üzerinde baskı oluşturmaktadır. Birçok kurak ve yarı kurak alanda endüstriyel, tarımsal, rekreasyonel ve içme uygulamaları için gerekli olan büyük miktarda suyu sağlamak zordur. Bu bağlamda, su kaynaklarının akılcı ve sürdürülebilir kullanımı mekansal ve sektörler arası planlama ve karar verme süreçlerinin eşgüdümü ile sağlanabilmektedir. Su kaynaklarının yönetiminde, kullanılabilir su kaynaklarının etkin ve bütüncül bir politikayla korunması ve sürdürülebilir bir şekilde kullanılması gerekmektedir.

Bu çalışmada, iklim değişikliği sürecinde sürdürülebilir su yönetimi ve Avrupa Birliği'nin su yönetimi ve sürdürülebilirlik politikalarını geliştirmek için ortaya koyduğu yeni bir strateji olan AB mavi mutabakatı ele alınacaktır.

Anahtar Kelimeler: Avrupa Birliği Mavi Mutabakatı, İklim değişikliği, Su yönetimi, Sürdürülebilirlik.

Geopolymers for marine applications: a path to eco-friendly and resilient structures

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Absract: The development of materials for marine applications presents significant challenges due to the demanding conditions of the marine environment. Materials intended for such applications must exhibit superior physical and mechanical properties, extended durability, and long-term resistance to corrosion, as well as other performance characteristics specific to the application context. Additionally, they must ensure minimal environmental impact, preserving the health of marine ecosystems. This article aims to provide a comprehensive analysis of recent advancements in the development of geopolymers for marine environments, grounded in an extensive literature review. The review was designed around a defined literature base. The starting point for the search was the Scopus literature database. In the second step, the Google Scholar database was also used for analysis as well as a particular website connected with R&D projects in this area. The findings suggest that geopolymers are highly suitable for marine applications, largely due to their favorable physicochemical properties, including enhanced long-term stability and resistance to diverse environmental stressors. Despite these advantages, the materials are not sufficiently tested. Moreover, the works give some practical applications of usage geopolymers for marine structures, including offshore infrastructure and artificial reefs. The advantages and disadvantages of the presented solutions are discussed as well as challenges and further areas of development for geopolymer materials in marine environments.

Acknowledgment: This research was supported by the project titled “Development of geopolymer composites as a material for protection of hazardous wrecks and other critical underwater structures against corrosion” under the M-ERA.NET 3 program by the Polish National Centre for Research and Development, grant number M-ERA.NET3/2021/71/MAR-WRECK/2022, and co-financed with tax funds on the basis of the budget passed by the Saxon State Parliament (SAB).

Keywords: geopolymer; marine ınfrastructure; marine application; artificial reef, salt water.

Special Thematic Session Proposal (Optional): Natural and Applied Sciences or Engineering Theory and Applications

Reuse of organic waste: chestnut and acorn husks

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Abstract: Chestnut and acorn husks are among the rarely used organic wastes of plant origin that can be effectively recycled and used in various industries. These resources have unique properties and potential for creating environmentally friendly materials and products. They are suitable for the production of biofuels, organic fertilizers and feed additives, and can also serve as a raw material for the creation of bioplastics and composites. They can be used in the cosmetic and pharmaceutical industries due to their antioxidant and antibacterial properties.

The main objective of the study was to investigate the chemical properties of these wastes for their further rational utilization. Parameters such as moisture content, ash content, acidity, crude fat, and crude fiber content were analyzed according to the official methods of AOAC. In addition, the use of chestnut and acorn husks in the purification of aqueous suspensions containing heavy metals such as chromium by adsorption was studied. In conclusion, it should be noted that chestnut and acorn husks are valuable resources for further processing, which not only opens up opportunities for their reuse but also contributes to the development of circular economy principles, reducing the amount of organic waste and improving the ecological situation.

Keywords: Organic waste, Acorn husk, Chestnut husk, Reuse

Hydrogeochemistry and human health risk assessment of fluoridated groundwater in some parts of the Voltaian Supergroup, northern Ghana

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Absract: This study investigated the hydrogeochemistry, spatial distribution, and mechanisms behind high fluoride (F^-) concentrations in the study area. Thirty-one borehole water samples were collected from Mion District, Karaga District, and Gushegu Municipality. Petrographic and X-ray diffraction (XRD) analyses identified minerals such as quartz, albite, biotite, zeolite, illite, and opaque minerals in the reservoir rocks. Lithological evaluation of boreholes confirmed the reservoir rocks at depth. These minerals dissolve in groundwater, enriching it with various ions. The major cations in groundwater were found in the order: $K^+ > Ca^{2+} > Mg^{2+} > Na^+$, and the major anions in the order: $HCO_3^- > SO_4^{2-} > Cl^-$. The groundwater is alkaline, with K^+ - HCO_3^- as the common water type. Fluoride concentrations ranged from 0.23 to 19.5 mg/L, with an average of 4.71 mg/L, exceeding the World Health Organization's guideline value of 1.5 mg/L in about 87% of the boreholes around the northeastern fringe of the study area. The high F^- levels are primarily due to natural sources and are influenced by water-rock interaction, weathering, ion exchange, and mineral dissolution and precipitation. Health risks associated with fluoridated drinking water were assessed using the US Environmental Protection Agency Model and Monte Carlo Simulation, revealing non-carcinogenic risks such as dental and skeletal fluorosis, particularly affecting children, followed by adults, teenagers, and infants. Community-based health surveillance confirmed these findings. Due to high F^- levels, the people now use polluted surface water for drinking and domestic purposes, leading to severe gastrointestinal infections.

Keywords: Fluoride, Geogenic, Groundwater, Hydrogeochemistry, Community-based health surveillance, Fluorosis

Special Thematic Session Proposal: Natural and Applied Sciences

Monitoring of water quality in the rivers of the Talas Region, Kyrgyzstan

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Abstract: Kyrgyzstan is the only country in Central Asia where water resources are entirely formed within its territory and has significant water reserves, represented by river runoff, groundwater, and water accumulated in glaciers and lakes. The republic has more than 3,500 rivers and streams, belonging to seven main basins: the Syr Darya, Amu Darya, Chu, Talas, Ili, Tarim rivers, and Lake Issyk-Kul. The aim of this study was to determine the content of heavy metals in the surface waters of the Talas region of the Kyrgyz Republic, which is part of the monitoring system. The study analyzed the content of heavy metals Cu, Cd, Cr, Hg, Zn, Mo, Pb, Mn, and Ni in water samples collected from the Talas, Ken Suu, Ken Kol, and Besh Tash rivers. The concentrations of the aforementioned elements in all sampled water varied within the following ranges: Cu 4.13-7.16 µg/l, Cd 0.37-0.73 µg/l, Cr 1.11-6.71 µg/l, Zn 5.15-12.54 µg/l, Hg 0.32-0.43 µg/l, Mo 0.73-1.35 µg/l, Pb 0.09-1.19 µg/l, Ni 0.20-2.28 µg/l. Relative abundance of elements Cd, and Zn in Besh-Tash river was determined, Cd - 13.67 µg/l, Zn - 25.27 µg/l. Based on these results, it can be inferred that the origins of these elements in the Besh Tash river may partially have an mining, geological features and anthropogenic source. Overall, the concentrations in the other rivers were within normal limits and did not exceed the water quality standards (maximum permissible concentrations of regulated substances in water bodies used for fishery purposes in the Kyrgyz Republic).

Keywords: Water, Quality, Monitoring, Heavy metals

Investigation of size-fractionated aerosol particles in uranium mining area, North Kazakhstan

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Abstract: [Introduction] The North Kazakhstan Uranium Province is the second largest uranium (U) mining area in Kazakhstan. The Stepnogorsk Mining and Chemical Combine(SMCC), located in the North Kazakhstan Uranium Province, has been involved in uranium mining since the mid of the last century. It has been the subject of research in the field of radiation safety research since the uranium waste tailings were dumped near the SMCC. In this regard, monitoring of U and its progeny nuclides in inhabited areas near uranium facilities is important for radiation protection of the population [1]. 210Pb (T1/2 = 22.3 years), one of the progeny products in the 238U decay series, can cause a significant fraction of the internal radiation exposure of humans [2]. This study has been focused on the assessment of 210Pb air concentrations for their contribution to the population dose from internal irradiation in the North Kazakhstan Uranium Province.

[Materials and Methods] Size-fractionated aerosol samples (the cutoff diameters were 10.2, 4.2, 2.1, 1.3, 0.69, 0.39 μm) were obtained from Stepnogorsk city (52°20'43.1"N 71°52'21.5" E) located about 20 km from the SMCC and the tailings dump. Samples were collected every 2 weeks during 2020-2022, excluding the winter season (October to April). The 210Pb activity in each filter was measured using a high-purity Ge detector. Each filter was extracted with ultrapure water, gastric juice, and lung solution. Trace metals and elements in the extractants were measured by ICP-MS. Major cations and anions in ultrapure water extractant were also determined by ion chromatography.

[Results and discussion] Almost all samples were detected for 210Pb activity. The 210Pb activity concentrations in the aerosol filters ranged from 1.45 μBq/m3 to 2.05 mBq/m3 with an average value of 0.16 mBq/m3. The bulk 210Pb activity in the air increased with decreasing temperature. The 210Pb was mainly present as fine aerosol particles (smaller than 2.1 μm), and accounted for 95.26±2.33% of the bulk amount. The size distribution trend of 210Pb was correlated with that of anthropogenic elements such as stable Zn, Pb and so on. The results obtained here showed that although 210Pb is a naturally occurring radionuclide, the proportion released into the atmosphere due to anthropogenic activities cannot be ignored.

Keywords: Pb-210, Radon, Air samples, Filtures

Kahramanmaraş Sütçü İmam Üniversitesinde öğrencilerin yeşil ürün algısı

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Özet: 1960'lı yıllardan itibaren dünyada sanayileşmenin artmasıyla birlikte nüfus artışı ve teknolojik gelişmelerde artış yaşandığı görülmektedir. Tüm bunlarla birlikte üretimde yaşanan artış sebebiyle doğal kaynaklar sınırsızmış gibi kullanılmıştır. 1970'li yıllardan itibaren ise insanoğlunun çevreye verdiği zararın farkına varmasıyla birlikte çevreci davranışlar sergilenmeye başlanmıştır. Ortaya çıkan bu çevresel zararı en aza indirgemek ve doğal kaynakları bilinçsizce kullanmamak amacıyla çevreci ürünlerin üretimine verilen önem artmıştır. Yaşanan çevresel zararlara karşı üretilen yeşil ürün; Dünya'yı kirletmeyen, geri dönüşümü olan, üretimi esnasında doğaya zarar vermeyen, çevre atığına sebep olmayan özellikleri sayesinde çevreye verilen bu zararı azaltma konusunda atılan önemli bir adımdır.

Bu çalışmada yeşil ürüne olan tutum ve davranışları ortaya koymak amacıyla Kahramanmaraş Sütçü İmam Üniversitesi öğrencileri ile 424 anket çalışması yapılmıştır. Anketlerin sayısı oransal örnekleme yöntemi kullanılarak belirlenmiştir. Çalışmadan elde edilen veriler oranlar verilerek tartışılmıştır. Çalışma ile birlikte öğrencilerin sosyo-demografik özellikleri ve yeşil ürün tüketme eğilimleri arasındaki ilişkiyi ve yeşil ürüne karşı tutum ve davranışların belirlenmeye çalışılmıştır. Elde edilen analizler sonucunda ankete katılan öğrencilerin %48.8'inin yeşil ürün satın aldığı ve %78.7'sinin aldığı üründen memnun kaldığı tespit edilmiştir. Yeşil ürün satın alan ve memnun olanların yeşil ürün kullanmayan öğrencilere deneyimlerini aktarması, fakültelerde öğrencilere görsellerle desteklenmiş bilgilendirici afişlere yer verilmesi yeşil ürün kullanımının benimsenmesini kolaylaştıracaktır.

Anahtar Kelimeler: Yeşil ürün, Tüketim, Öğrenci, Çevre

Determining the thermal load of industrial treatment sludge for the incineration

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Abstract: In recent years, the disposal of increasing amounts of treatment sludge has become an important issue due to both the costs and the environmental risks it poses if not disposed of under appropriate conditions. In this study, thermal loads required for the incineration of treatment sludge generated at industrial wastewater treatment plants were calculated. For this purpose, two different scenarios were created. These scenarios were designed to determine whether additional fuel would be needed for the incineration of the sludge based on varying moisture and dry matter content. According to the results, it was found that treatment sludge with a dry matter content of 28.31% could be incinerated without the need for additional fuel.

Keywords: Treatment sludge, Thermal load, Incineration

Possibilities of integrating the experience of the European Union and Israel in sustainable water resources management in Azerbaijan

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Özet: Along with the growing demand for water resources, the importance of existing water resources from an economic, environmental and social point of view makes it urgent to rationally use and protect water resources in Azerbaijan, which is located in an arid zone and has limited water resources.

In order for water scarcity not to cause problems and conflicts in intersectoral water allocation, it will be more effective to apply an integrated, comprehensive approach to environmental parameters in water resources management. At this time, the principles of ecological restoration, improvement of water quality, meeting industrial, agricultural and natural water needs should be comprehensively considered, and new mechanisms for use should be developed with the participation of all stakeholders.

The purpose of this study is to study the current situation in the field of water resources management in Azerbaijan, identify problems and put forward proposals containing the main directions of effective and sustainable water resources management using international experience.

The study used a literature review and analytical methods. The WFD of the EU and Israeli water management models were studied, and information was collected substantiating the applicability of these practices in Azerbaijan. The study proposed an integrated water management model for effective water resources management. Israeli drip irrigation and water reuse technologies are cited as examples of effective water use in Azerbaijani agriculture and industry. In accordance with the WFD, it is proposed to apply the principles of water protection and river basin management in accordance with environmental requirements.

Keywords: Water Resources Management, İntegrated Water Resources Management Model, Water Security, SDG 6 - Clean Water And Sanitation, SDG 17 - Global Partnership For Sustainable Development.

Detoxification of toxic organic oils and gas phase carbon footprint assessment

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Abstract: It is well known that in industrial activities, economic entities utilize fuel resources with various carbon matrices (gaseous, liquid, solid) to produce different products. Accordingly, the total emissions of greenhouse gases, both direct and indirect, generated by an organization or product constitute its carbon footprint. Therefore, the assessment of the carbon footprint forms the basis of carbon reporting in the transition to carbon neutrality. This principle is driven by the need to account for CO_2 emissions at the national level, where countries are held responsible for greenhouse gas emissions resulting from economic activities within their territories, even if the emissions occur during the production of goods destined for export. In turn, the requirement to account for CO_2 emissions at the national level leads to the examination of anthropogenic CO_2 loads, first across industries and particularly at the level of individual processes. Given these considerations, this study examines the carbon footprint associated with the process of neutralizing used toxic sovtol from electrical transformers in a calcium oxide environment.

Keywords: Sovtol; Calcium oxide; Concentration distribution; Gas phase; Chlorine load; Carbon footprint.

Assessment of contamination and accumulation of heavy metals in sediments of Lake Issyk-Kul

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Absract: Issyk-Kul is one of the largest continental highland lakes known for its considerable depth and unique water homogeneity. Due to its rich history, favorable environmental conditions and unique geographical location, the lake is of significant value for Kyrgyzstan. The present study assessed the levels of heavy metal pollution and their accumulation processes in the bottom sediments of the lake. Sediment samples were collected from six locations around the lake: Balykchy, Chok-Tal, Cholpon-Ata, Bosteri, Tyup and Ottuk. The concentrations of 16 heavy metals were analysed using AAS. Pollution factor (CF), geoaccumulation index (I_geo), degree of pollution (Cd) and pollution index (PLI) were calculated from the data. The sediments in most points were moderately contaminated, but significant contamination was detected in the Tyup area. The sediments of Cholpon-Ata showed a low level of chromium contamination, otherwise they remained clean. Among the toxic elements, moderate contamination was found for vanadium (V) and chromium (Cr), while elements such as Co, Cu, Ni and Zn showed low levels of contamination. Although the geoaccumulation index (I_geo) values showed no significant contamination at most of the sampling points, the contamination index (PLI) showed the presence of general heavy metal contamination. ArcGIS mapping software was used for data visualisation and assessment of pollution levels, which allowed visual representation of pollutant distribution in different areas of the lake. The results of the study confirm the necessity of continuous monitoring of heavy metal concentrations in the bottom sediments of Lake Issyk-Kul and taking measures to prevent their accumulation.

Keywords: Bottom Sediments; Pollution Load Index; Geoaccumulation Index; Pollution Factor; Issyk-Kul Lake.

The impact of carbon emission on natural life in world

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Abstract: Carbon emissions are biggest worldwide issue in present days because of increasing human population and their industrial development. Transportation, industrial energy generation, commercial and residential buildings, agriculture land use and aforestation are main causes of these emissions. Burning fossil fuels like coal, natural gas, oil and emissions of greenhouse gases releases carbon dioxide into the atmosphere and causes destruction of natural life. Pollutants also include things like mold, soot, smoke, and pollen, but they also include greenhouse gases like carbon dioxide and methane. Carbon emissions divided into three categories include land, ocean, and human activity. These emissions also cause global warming and climate change which leads to rising sea levels, melting glaciers, frozen soils, changes in precipitation patterns, and an increase in the frequency of extreme weather events. Additionally the COVID-19 pandemic and lockdown measures had a significant impact on energy consumption and CO_2 emissions in addition to production activities and people's lives. To control this condition government should pass stringent laws against deforestation. Government also need to improve living circumstances for both urban and rural residents by establishing parks, green spaces, and improved sewage systems. This policy's effect will aid in the management of population-based health problems.

Keywords: Natural Life, Carbon Emission, World

Yeşil Sentez Yöntemiyle Antibiyotik Giderimi

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Özet: Dünya üzerindeki su miktarı sabittir ancak kullanılabilir su kaynaklarımız her geçen gün azalmakta ve kirlenmektedir. Küresel ısınma, iklim değişikliği, dünya nüfusunun hızla artması, plansız kentleşme, çölleşme ve pek çok unsur bunu hızlandırmaktadır. Hastalıkların tedavisinde kullanılan antibiyotikler toprağa, sedimentte yer altı ve yerüstü sularına bulaşmakta ve bu ortamlarda birikmektedir. Konvansiyonel arıtma yöntemleriyle arıtma tesislerinde arıtılamayan antibiyotikler için alternatif arıtma metodlarına ihtiyaç duyulmaktadır. Yeşil sentez antibiyotiklerin sulardan arıtılması için kolay, ucuz, kimyasal gerektirmeyen, sürdürülebilir, çevre dostu alternatif bir yöntem olarak karşımıza çıkmaktadır. Bu çalışmada yeşil sentez yöntemiyle sulardan antibiyotiklerin arıtılabilmesi konusu değerlendirilecektir.

Anahtar Kelimeler: Nanoteknoloji, Yeşil sentez, Antibiyotik

Effect of blended food waste and plastic biochar on tomato and potato growth

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Özet: Around 1.3 billion tons of food is wasted every year around the world. One of the major causes of food waste in developing countries is the shortage of proper packaging and transportation facilities. Besides, this world generates around 350 million tonnes of plastic waste each year, from which 1 to 2 million tonnes enter the oceans annually. Statistically, 0.5% of plastic waste ends up in the sea. Considering the importance of managing these two wastes, we conducted a preliminary investigation on the thermochemical conversion of blended food waste and plastics into biochar by pyrolysis to apply in agriculture production. After pyrolysis, biochar produced from food and plastic waste at 500 °C was blended at a 1:1 ratio. A small-scale pot experiment was conducted on the rooftop of a building to analyze the impact of biochar on tomato and potato plant growth by applying blended biochar of 0, 1, and 2 t/ha. The observations were recorded for one month and found in all the biochar loading rates, the potato and tomato plants significantly enhanced in biochar amended pots compared to the control pots. However, compared to the control. Potatoes' plant height and chlorophyll content are more in 1 t/ha biochar, while the number of leaves and root and shoot biomass is more in 2 t/ha. Whereas in tomato plants, overall plant growth is maximum in 2 t/ha biochar except number of leaves which is more in 1 t/ha biochar. This short-scale study demonstrates biochar has a good impact on plant growth and water loss by evapotranspiration for desert soil. It aids the opportunity for more research on different blending ratios biochar doses, and crop types for sustainable agricultural production.

Keywords: Waste management, Biochar, pyrolysis, Sustainable agriculture, Arid soil.

Investigation of hexavalent chromium removal by AO/G-Ca biocomposite using central composite design

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Abstract: The presence of elevated concentrations of heavy metals, particularly Cr(VI), in industrial waste materials represents a significant environmental and human health risk. The principal objective of this study was to examine the capacity of graphite and calcium alginate-based AO/G-Ca bio composites enriched with Aspergillus oryzae fungal mycelia to remove Cr(VI). The adsorption performance of bio composites is of great importance regarding sustainability and economic considerations. The optimal Cr(VI) removal efficiency was determined through the central composite design statistical model, which enabled a comprehensive investigation of the effects of variables such as graphite concentration, adsorption time and initial Cr(VI) concentration. The experimental findings indicate that the highest removal rate (63%) was achieved under the following conditions: graphite concentration of 0.50 g/L, adsorption time of 9 hours and Cr(VI) concentration of 27.50 mg/L. Furthermore, a removal efficiency of 59.12% was attained at a graphite concentration of 0.80 g/L, a time of 3.65 hours, and a Cr(VI) concentration of 14.12 mg/L. These findings suggest that the AO/G-Ca bio composite may offer a promising solution for the treatment of industrial wastewater. The advantages of the biosorption technique, including the requirement for fewer chemical substances compared to traditional heavy metal removal methods, operational convenience and reusability, reinforce the importance of this method in terms of environmental sustainability. The findings obtained provide a robust foundation for future research in heavy metal removal and facilitate the development of novel solutions.

Anahtar Kelimeler: Adsorption, Heavy metals removal, Fungal biocomposite

Farklı atıklardan piroliz ve hidrotermal karbonizasyon yöntemleri ile biyokömür ve hidrokömür üretimi: mevcut durum ve potansiyel uygulama alanları

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Özet: Günümüzde çevre kirliliği ve küresel ısınma, ekolojik dengeyi tehdit eden ciddi sorunlar olarak karşımıza çıkmaktadır. Bu krizle mücadelede, geleneksel petrokimyasallardan ve kömürden elde edilen karbonun üretimi, yüksek enerji tüketimi ve ciddi çevresel kirlilik yaratırken, biyokütleden elde edilen karbon ise daha sürdürülebilir ve çevre dostu bir alternatif olarak öne çıkmaktadır. Bu bağlamda, biyokömür üretiminde kullanılan geleneksel yavaş piroliz yöntemi ile daha yeni bir süreç olan ve hidrokömür üretiminde kullanılan hidrotermal karbonizasyon (HTC), dikkat çeken iki farklı teknik olarak öne çıkmaktadır. Her iki işlem sonucunda da katı karbon materyalleri üretilmekte, ancak bu ürünlerin fizikokimyasal özellikleri farklı olup, çeşitli uygulamalar için uygunluklarını belirlemektedir. Dolayısıyla bu çalışmada, piroliz ve HTC süreçlerinin temel prensiplerini ve reaksiyon mekanizmalarını incelenerek, her iki süreçteki mevcut araştırma boşlukları ve her iki yöntemle elde edilen biyokömür ve hidrokömürün farklı endüstriyel uygulamalardaki potansiyelleri kapsamlı bir şekilde ele alınmıştır. Genel olarak; biyokömür, geniş yüzey alanı, yüksek gözeneklilik ve kararlılığı ile toprak iyileştirme ve atık su arıtımı gibi çevre uygulamalarında önemli bir rol oynarken, hidrokömür, daha düşük metal içeriği ve enerji değeriyle enerji üretimi ve biyoyakıt alanında ön plana çıktığı görülmüştür. Özellikle HTC süreci, hidrokömürün daha düşük alkali ve ağır metal içeriğine sahip olması ve aynı işlem sıcaklığında biyokömüre göre daha yüksek ısıl değer sunması gibi avantajlar sağlamaktadır. Bununla birlikte, hidrokömürün etkin kullanımına yönelik daha fazla deneysel araştırma ve geliştirme gerektiği belirlenmiştir. Sonuç olarak, biyoatıkların sürdürülebilir ve çevre dostu bir süreçle karbon malzemelerine dönüştürülmesi, döngüsel bir biyoekonomi yaratmak için büyük potansiyel sunmaktadır. Bu alandaki teknolojik gelişmeler ve yeni araştırmalar, karbonizasyon süreçlerinin verimliliğini artırarak biyokömür ve hidrokömürün daha geniş bir endüstriyel kullanım alanına sahip olmasını sağlayacaktır.

Anahtar Kelimeler: Biyokömür, Hidrotermal Karbonizasyon, Piroliz, Sürdürülebilir Karbon Üretimi, Döngüsel Biyoekonomi

Treatment of MBR effluents of a solid waste landfill leachate treatment plant by electrooxidation

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Abstract: In this study, the electrooxidation(EO) in a batch reactor equipped with boron-doped diamond (BDD) electrodes was applied to MBR effluent from a municipal landfill leachate treatment plant (located in Kocaeli-Turkey) using MBR as a treatment process. The removal kinetics of COD, TOC, and ammonia nitrogen from effluents taken from ultrafiltration (UF) effluent were investigated. The influence of current density (j = 60-360 A/m2 and initial pH (pH = 3.5-10.0) on the COD, TOC, and NH3-N removal were studied. The optimum pH was found to be 7.89, respectively. The COD, TOC, and NH3-N removal efficiency at optimum current density (j = 360 A/m2) were 94.84%, 90.56%, and 95.18%, respectively. Kinetic analysis performed showed that ammonia nitrogen (NH3-N) removal mainly due to an indirect oxidation mechanism was described by a model which showed an exponential fitting of the logarithm of the ratio of ammonia concentration at time t to the initial ammonia concentration with the square of EO time, the regression factor was found >96% for law current densities and <89% for high current densities for which this model couldn't be satisfied. The values of the kinetic constants for the EO at optimum conditions were obtained as $k_{1,COD} = 9.61 \times 10^3\ min^{-1}$ and $k_{1,TOC} = 8.63 \times 10^3\ min^{-1}$.

Keywords: Landfill leachate, Electrooxidation, Treatment, MBR effluent.

Energy recovery from conventional electrodialysis cell for seawater desalination through hydrogen gas production

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Abstract: The increase in water demand due to population growth and climate change has accelerated studies on the use of alternative water sources. In particular, the use of seawater after treatment has gained importance in arid and hot regions where freshwater resources are scarce. Among seawater desalination methods, distillation and membrane filtration, which are known for their high energy consumption, are commonly used. Research is ongoing to explore different processes that can reduce energy consumption. Electrodialysis has emerged as an alternative desalination method to processes like reverse osmosis and distillation. However, as salt concentration in water increases, the energy consumption of the electrodialysis process also rises, making it impractical for seawater treatment. At this point, the study suggests that if energy recovery is implemented in the electrodialysis process, its use for seawater treatment could become more widespread. In this study, seawater desalination was performed using a conventional electrodialysis process, and the hydrogen gas produced in the cathode compartment during treatment was collected to reduce the system's energy consumption through energy recovery. The effect of the applied potential on the process was also monitored. As a result, a salt removal efficiency of 94.3% was achieved with an energy consumption of 4.69 kWh/m³. Hydrogen recovery was calculated at 20.84 mol/m³, and the energy recovery was 1.39 kWh/m³. When the recovery rate increased to 98%, energy consumption rose to 7.73 kWh/m³, while energy recovery from hydrogen reached 1.63 kWh/m³, resulting in a net energy consumption of 6.1 kWh/m³.

Keywords: Seawater, Desalination, Electrodialysis, Hydrogen, Recovery

Zero Energy Buildings and Towns

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Abstract: Today, construction has achieved significant success in comparison with the achievements of the last century. This was mainly due to the development of the engineering science of "construction thermal physics". The result was an increase in the thermal characteristics of external enclosing structures (walls, fillings of light openings, etc.). Although modern residential buildings are more economical than previous ones, this does not mean that they have a positive impact on the environment. In order for a building to be more economical, it is necessary to completely revise the energy approach to it. Let's consider this approach using the example of buildings with zero energy consumption.

Keywords: Zero Energy

Integrating ESG criteria in Greek wastewater treatment plants: challenges, opportunities, and the path forward

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Abstract: This article provides a comprehensive review of Environmental, Social, and Governance (ESG) reporting, focusing on its evolution, regulatory landscape and the specific challenges and opportunities it presents for wastewater treatment plants (WWTPs) in Greece. Beginning with an overview, the study traces ESG reporting's development from its origins in corporate social responsibility in the 1970s to its formalization by the United Nations in the early 2000s and subsequent integration into mainstream business practices. A review of international and Greek national legislation follows, highlighting key regulatory frameworks such as the European Union's Corporate Sustainability Reporting Directive (CSRD) and Greece's adaptation of the Non-Financial Reporting Directive (NFRD). These legislative initiatives underscore the growing importance of transparent, standardized ESG reporting for compliance and corporate accountability. The implementation of ESG criteria in Greek WWTPs are examined, identifying specific environmental, social and governance challenges - such as high energy consumption, stakeholder engagement and regulatory compliance - that impact the sector's sustainability performance. By exploring data limitations, technological advancements, and soft skills training, the review provides actionable recommendations to enhance ESG reporting capabilities within the wastewater sector. The findings aim to assist WWTPs in aligning with Greece's environmental and sustainability goals while meeting broader EU circular economy targets.

Keywords: Wastewater Treatment Plants (WWTPs), ESG Reporting, Circular Economy, Sustainability

FOOD ENGINEERING

Regularities of gel formation of khainak milkin the presence of carrot and pumpkin puree

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Abstract: The aim of the present study was to develop an optimised formulation of sour drink of khainak (yak-cow hybrid) milk with vegetable fillers and to study the effect of fillers on sensory and rheological properties end-products. The doses of fillers providing 25-50% of the daily requirement of vitamin A were: 25% carrot puree, 25% pumpkin puree on the weight of milk. Streptococcus thermophilus, Lactobacillus delbrueckii subsp. bulgaricus and Lactobacillus acidophilus were used as starter microflora to give probiotic properties to the product. The khainak milk with carrot puree started to gel at 130 min and with pumpkin puree at 140 min, which was 10-20 min earlier (pH = 5.6) than the milk without filler (150 min, pH = 6.1). The fermented khainak milk in the presence of vegetable filler had a soft texture and the value of elastic modulus reached a maximum value of 390 Pa at the end of fermentation, which was lower than that of khainak milk without filler (550 Pa). The use of vegetable fillers had a positive effect on the organoleptic, rheological and functional properties of the product.

Keywords: Curd, Fermentation, Khainak milk, Lactobacillus, Rheology.

Atık bulgur unu tozlarının Tarhana üretiminde mikrobiyal gelişim üzerine etkisi

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Özet: Endüstride üretimi gerçekleştirilen temel ürün ile birlikte çeşitli atık ve artıklar da ortaya çıkmaktadır. Bunlar üretimde kullanılan hammaddeler ve ürünün işlenme şartlarına bağlı olmakla birlikte önemli ve değerli bileşenlere sahiptir. Türkiye'ye özgü olmakla beraber son yıllarda Türklerin yoğun olarak yaşadığı çeşitli ülkelerde de tüketilmeye başlanan şalgam içeceğinin üretiminde kullanılan, hammaddelerden bulgur unu (setik) fermantasyon sonunda atık olarak kalmaktadır. Bu çalışmada atık fermente bulgur unu'nun katma değeri yüksek bir ürüne dönüştürülmesi amaçlanmıştır. Bu amaçla, fermantasyondan sonra atık haldeki bulgur unu kurutulduktan sonra öğütülerek toz haline getirilmiş ve geleneksel tarhana üretim prosesinde buğday unu'nun yerine farklı miktarlarda kullanılarak fermantasyonda etkili olan mikroorganizmaların gelişimi üzerine etkisi araştırılmıştır. Üretimde tarhana hamuruna 50, 100, 150 ve 200 g/kg olacak şekilde atık bulgur unu tozu buğday unu yerine ikame olarak kullanılmış ve hamurlar kapalı kaplara konularak, 30ºC'de fermantasyona bırakılmıştır. Fermantasyon süresince toplam mezofil aerobik bakteri, toplam maya-küf sayımı ve toplam laktik asit bakteri sayımları gerçekleştirilmiştir.

Anahtar Kelimeler: Atık ürün, Laktik asit bakterileri, Setik, Şalgam içeceği, Tarhana.

Effect of waste bulgur flour powder on microbial growth in Tarhana production

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Abstract: Along with the basic product produced in the industry, various wastes and residues also arise. These have important and valuable components, depending on the raw materials used in production and the processing conditions of the product. Although it is specific to Turkey, it has recently started to be consumed in various countries where Turks live densely. The raw material used in the production of shalgam beverage is bulgur flour (setik), which remains as waste at the end of fermentation. In this study, it was aimed to transform waste fermented bulgur flour into a high value-added product. For this purpose, after fermentation, the waste bulgur flour was dried and ground into powder and used in different amounts instead of wheat flour in the traditional tarhana production process to investigate its effect on the development of microorganisms effective in fermentation. In the production, 50, 100, 150 and 200 g/kg of waste bulgur flour powder was used as a substitute for wheat flour in tarhana dough, and the dough was placed in closed containers and left to ferment at 30ºC. Total mesophilic aerobic bacteria, total yeast-mold counts and total lactic acid bacteria counts were performed during fermentation.

Keywords: Laktic acid bacteria, Setik, Shalgam beverage, Tarhana, Waste product.

Mikrodalga vakum evaporasyon yöntemi kullanılarak üretilen keçiboynuzu pekmezinin kalite özelliklerinin incelenmesi

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Özet: Bu çalışmada keçiboynuzu bitkisinden soğuk ekstraksiyon metodu ile elde edilen şıraya mikrodalga vakum evaporasyon, açık kazan kaynatma ve vakum altında kaynatma uygulanarak pekmez elde edilmiştir. Ayrıca ev tipi keçiboynuzu pekmezi de temin edilerek incelenmiştir. Farklı uygulamalar ile üretilen pekmezlerin pH, briks, renk, titrasyon asitliği, hidroksimetil furfural (HMF), toplam şeker, invert şeker miktarı, toplam fenolik madde ve antioksidan aktivite değerlerinin belirlenmesi ve üretilen pekmezler için sonuçların karşılaştırılması amaçlanmıştır. Analizler sonucunda, keçiboynuzu pekmezlerinde mikrodalga vakum evaporasyon, açık kazan kaynatma, vakum altında kaynatma ve ev tipi keçiboynuzu pekmezinin, toplam fenolik bileşik değerleri sırasıyla 1038,77, 943,49, 931,82 ve 1541,65 mg (GAE) /100g ve hidroksimetil furfural (HMF) değerleri ise sırasıyla, 16,20, 27,54, 5,35 ve 66,74 mg/kg olarak tespit edilmiştir. Ev tipi keçiboynuzu pekmez örneğinin HMF miktarının, standartta belirlenen değerden yüksek olması kontrolsüz sıcaklık uygulanmasından kaynaklanmaktadır. Bu çalışmada elde edilen sonuçlar incelendiğinde, mikrodalga vakum evaporasyon ile keçiboynuzu pekmezi üretiminin geleneksel pekmeze kıyasla daha kaliteli ürün üretiminde kullanılabileceği gözlemlenmiştir.

Anahtar Kelimeler: HMF, Keçiboynuzu pekmezi, Mikrodalga vakum evaporasyon, Toplam fenolik madde.

İğde ekstraksiyonunda askorbik asit ve renk değerlerinin incelenmesi

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Özet: Bu çalışmada, ultrases destekli ekstraksiyon yönteminin askorbik asit (C vitamini) ve renk parametreleri üzerindeki etkileri incelenmiştir. En yüksek askorbik asit miktarı, 60°C sıcaklık, %60 genlik ve 10 dakika sürede elde edilmiş olup, 39,79 mg/100 g olarak belirlenmiştir. Yanıt yüzey optimizasyonu, optimal koşulları 15 dakika, 60°C sıcaklık ve %60 genlik olarak saptamıştır. Renk analizi sonucunda, en yüksek L* değeri 50°C, %60 genlik ve 5 dakika sürede, a* değeri ise 60°C'de %80 genlik ve 15 dakika sürede elde edilmiştir. En yüksek b* değeri ise 40°C'de %100 genlikte ve 10 dakika sürede ölçülmüştür. Elde edilen sonuçlar, süre, sıcaklık ve genlik gibi bağımsız değişkenlerin ekstraksiyon üzerindeki anlamlı etkisini göstermiştir.

Anahtar Kelimeler: Optimizasyon, Parametre, Renk, Ultrases.

The effects of edible films enriched with green apple peel extract on the color quality of carp burgers

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Abstract : Today, biopolymers and natural additives are increasingly gaining significance in daily life and industry to extend the shelf-life of food and perishable foods. This study aimed to evaluate the effects of edible gelatin and chitosan films incorporated with a 6% concentration of green apple peel extract on the color quality of carp burgers during frozen storage for 120 days. The results showed that the mean value of L* did not significantly change in any groups until the 60th day. The redness (a*) parameter significantly decreased during storage time. All treatment groups, except the control, demonstrated good stability regarding the L*, a*, and b*value during storage, ensuring products remained bright and red for 120 days. Despite the promising effects of green apple peel extract, chitosan, and gelatin as color-preserving agents, a significant research gap exists in understanding their combined or individual long-term effects on the color parameters.

Keywords: Apple peel, Burger, Edible film.

Effect of gelatin films supplemented with citrus peel extract on the color quality of chicken burgers

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Abstract: This study aims to examine the effect of gelatin films combined with three types of citrus peel extract (grapefruit, orange, and lemon) by 4% concentration on the color of chicken burgers during frozen storage at -18°C for 147 days. The study highlights the effectiveness of gelatin films and citrus peel extract on the stability of chicken burgers' color (L*, a*, and b*). The L* (brightness/darkness) value of all samples decreased significantly ($p < 0.05$) during storage time. All burgers remained red till at the end of the storage. However, the b* value showed of samples decrease throughout the storage period. The results showed that all burgers were bright and red, while control burgers fell off to darkness during storage. Therefore, the study proved the effectiveness of citrus peel extracts combined with gelatin films on the color stability of chicken burgers during storage.

Keywords: Chicken burger, Citrus peel, Gelatin film.

Comparison of the drying methods and their effect on quality of dried forest berries

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Abstract: Wild berries are usually considered underutilised crops in the walnut-fruit forest in Kyrgyzstan. The local population usually collects the nuts for sale, and these berries are often neglected. Active research into rosehips and sea buckthorn has recently contributed to increased plantings of these species, especially in Fergana Valley. These berries are an excellent source of vitamins and bioactive compounds, but their high moisture content significantly limits their shelf life. The drying process reduces biochemical and microbiological spoilage, thereby extending the shelf life of the berries.The aim of this study was to compare the effects of hot air and freeze-drying (FD) on the quality of wild berries. The quality of the dried berries was evaluated through the analysis of several parameters, including vitamin C content, total polyphenol content (TPC), antioxidant activity, and physical properties such as shrinkage, colour, and rehydration potential. It was determined that convective air drying resulted in a reduction in vitamin C and TPC levels, as well as notable alterations in colour. In contrast, FD showed high retention of vitamin C and TPC. After FD, the retention of vitamin C was 82.57% in sea buckthorn, 80.66% in barberry and 61.37% in rosehip. The retention of TPC followed a similar pattern. However, antioxidant activity, shrinkage and hydration rates did not differ significantly between the dried samples. Hot air dried berries retained also a significant amount of vitamin C and antioxidant activity and recommended to include them in the daily diet as a source of vitamin C and antioxidants.

Keywords: antioxidant activity, barberry, sea buckthorn, polyphenol, rosehip.

Arduino mikrokontrolör tabanlı çalışan sensörler ve makine öğrenimi ile hamsi kalitesinin hızlı belirleneceği tazelik belirleme kutusu geliştirilmesi

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Özet: Bu çalışmada, hamsi balıklarının oda sıcaklığında 12 saat boyunca sensörler kullanılarak koku parametrelerindeki değişimler incelenmiştir. Çeşitli gazların tespiti için kullanılan sensörler, bozulma sürecindeki kimyasal değişiklikleri izlemek için etkili bir araç sağlamıştır. Çalışmada kullanılan sensörlerden alınan verilerin tamamına yakını depolama süresine bağlı olarak balık etinde meydana gelen koku artışı ile paralel olarak yükselmiştir. Alkol gazı (MQ3) ve amonyak (MQ137) hassasiyeti yüksek olan sensörlere ait değerlerin önemli ölçüde artması, balığın mikrobiyal bozulmasının ilerlediğini göstermiştir. Ayrıca, metan (MQ4) ve hidrojen (MQ9) gibi gazların artışı, anaerobik mikrobiyal faaliyetlerin balık bozulmasındaki rolünü ortaya koymuştur. Lipid oksidasyonu sırasında açığa çıkan izobütan ve propan (MQ5) seviyelerindeki artış, yağlı balıklarda bozulmanın önemli bir göstergesi olmuştur. Karbon monoksit (MQ131) ve organik uçucular (MQ138) gibi gazların artışı da oksijensiz ortamda gerçekleşen kimyasal tepkimelerin ve bozulmanın ilerleyen aşamalarının bir sonucu olarak gözlemlenmiştir. Bu veriler, sensörlerin balık tazeliğinin belirlenmesinde ve bozulma sürecinin izlenmesinde kullanılabileceğini göstermiştir.

Anahtar Kelimeler: Hamsi, Lipid, Oksidasyon, Sensör.

Textural and physical properties of biscuits made from wheat-susame composite dough

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Abstract: The aim of this study is to reveal the effect of sesame flour addition on the physical and textural profile of cookies. For this purpose, physical parameters (diameter, thickness, spreading rate) and textural properties (hardness, fracturability) of cookies containing sesame flour at different concentrations (1%, 3% and 6%) were evaluated. Considering our data, it was observed that there was a decrease in L* values as the sesame flour concentration in the samples increased. When a* values were examined, it was determined that there was an increase in sesame flour added samples compared to control samples. Cookies enriched with sesame flour showed significantly ($p<0.05$) smaller diameter values compared to control cookies (6% sesame flour added). Differences were also observed in thickness and spreading rates. When their hardness and brittleness were evaluated, it was observed that there was no difference in cookies as the sesame flour concentration increased ($p>0.05$). The findings support that sesame flour can be used at a concentration level of up to 6% for the production of cookies.

Keywords: Cookie, Physical parameters, Sesame, Textural properties.

Antioxidant capacity, total polyphenol and vitamin C content of dried apricots from Kyrgyzstan

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Abstract: The fruit processing industry is one of the priority and export-oriented industries in the agro-industrial sector of the economy of the Kyrgyz Republic. Apricots are second in importance after apples, an important fruit in the country. According to Tridge, the production volume of fresh apricots in Kyrgyzstan has fluctuated between 20,000 and 30,000 tonnes over the past decade, ranking 30th in the world. However, apricots are seasonal fruits and are not available year-round. Drying is one of the oldest methods of fruit preservation, which significantly extends the shelf life of the fruit and its availability to consumers. Therefore, most apricots are dried after harvest. Dried apricots are highly valued by consumers as a better snack choice, being both nutritious and rich in fiber. In the presented study, three types of dried apricots from Kyrgyzstan were examined: Suhany, Kandek, and Kurmaiy. Due to the gap in the literature on antioxidant capacity, polyphenol and vitamin C contents of dried apricot varieties in Kyrgyzstan, the study aimed to assess the quality of sulfated and unsulfated, sun-dried and freeze-dried apricot samples using antioxidant capacity measurement method (DPPH), total polyphenol measurement method (Folin-Ciocalteu), and HPLC method for vitamin C content determination. Total polyphenol concentration in the studied dried apricot samples varied from 111.65 to 251.99 mg GAE/100 g DM and dried sulphated apricots exhibited significantly higher TPC values. The value of vitamin C in different varieties of apricots ranges from 2 to 37.78 mg/100 g of fruit, freeze-dried samples have the highest value. Antioxidant capacity correlated well with the content of vitamin C ($r = 0.57$). However, the antioxidant capacity and vitamin C content of apricots do not exceed the antioxidant capacity and vitamin C content of wild fruits such as rosehip and barberry but were on the same level as dried plum.

Keywords: Apricots, Antioxidant activity, Polyphenol content, Vitamin C.

Edible ınsects: processing technologies for powder production

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Abstract: Entomophagy, the consumption of insects by humans, has been practiced globally for centuries, particularly in regions like sub-Saharan Africa, Southeast Asia, and Latin America, where insects are part of traditional diets. Edible insects are rich in protein, essential amino acids, healthy fats (including omega-3 and omega-6 fatty acids), vitamins, and minerals, often comparable to or exceeding conventional meat. The nutritional profile of insects varies based on the species, their life stage, and diet. Edible insects offer a sustainable alternative to conventional livestock, requiring significantly fewer resources and emitting fewer greenhouse gases. However, factors like cultural barriers, psychological factors such as disgust, lack of awareness, safety concerns hinder wider acceptance, particularly in Western societies. Processing insects into powders can help overcome some of these obstacles by making them less recognizable and easier to incorporate into familiar foods, promoting their broader adoption in the food industry. Powder processing of edible insects can be done using both wet and dry processing methods. Both processes begin with devitalizing the insects through methods such as blanching or steaming. Dry processing, which involves drying, defatting, and milling, is a straightforward approach but may require significant energy input for drying, particularly for large-scale operations. Wet processing incorporates liquids during milling, leading to smoother textures and improved fat separation, but it may require specialized equipment, which can increase initial capital costs and maintenance. Each method presents distinct advantages and challenges, influencing the nutritional profile and quality of the final product. The choice depends on the desired product characteristics and economic considerations.

Keywords: Dry processing, Edible insect, Powder production, Wet processing.

Biological evaluation of the drenica river based on the structure

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Abstract: The increase in human activity such as the construction of urban infrastructure, agricultural development, and industrial activities poses serious risks to the biodiversity of the Drenica River. The study was conducted in 2023 and 2024 at eight monitoring points along the Drenica River, focusing on the structure of macroinvertebrates and evaluating the ecological status based on the Biological Monitoring Working Party (BMWP), Ephemeroptera, Plecoptera, and Trichoptera (EPT), average score per taxon (ASPT) and Stroud Water Research Center (SWRC) indices. Based on the results of the biotic indices of the biological assessment of waters, based on the indices, the side streams that feed the main branch of the Drenica river have a high ecological status, while the monitoring points in the mainstream of the Drenica river have a poor ecological status as a whole this comes as a result of the discharge of sewage, industrial, agricultural and urban development.

Keywords: monitoring, bioindicator, water quality, biotic index

Piliç salamın tekstürel özellikleri üzerine ölçüm parametrelerinin etkisi

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Özet: Tekstürel özellikler, et ürünlerinin tercih edilmesi ve satın alınmasında en önemli kalite parametrelerinin başında gelmektedir. Bu çalışmada, piliç salamın tekstürel özellikleri üzerine dilim kalınlığı (15, 20 ve 25 mm), baskı oranı (%30, 40 ve 50) ve test hızının (1, 2 ve 3 mm/s) etkisi incelenmiştir. Salam örneklerinin tekstürel özellikleri (sertlik, elastikiyet yüzey yapışkanlığı, iç yapışkanlık ve çiğnenebilirlik) P/50R probu ile kombine edilmiş TA. XT. Plus Texture Analyser cihazı kullanılarak ölçülmüştür. Dört farklı marka salam örneğinden elde edilen veriler SPSS istatistik paket programı kullanılarak Varyans Analizine tabi tutulmuş ve ortalamalar arasındaki farklar Duncan'ın Çoklu Karşılaştırma testi kullanılarak karşılaştırılmıştır. Dilim kalınlığının artması, sertlik ve yüzey yapışkanlığını artırmış ve en yüksek sertlik değeri 149.51 N ile 25 mm dilim kalınlığındaki salamlarda belirlenmiştir ($p<0.05$). Buna karşılık örneklerin iç yapışkanlık değerleri 0.79-0.82 arasında değişmiş ve dilim kalınlığının artması, iç yapışkanlığı azaltmıştır ($p<0.05$). Test hızının ölçülen tüm tekstürel parametreler üzerine etkisi önemli olmuş ($p<0.05$) ve iç yapışkanlık hariç, genelde 3 mm/s test hızında daha yüksek değerler gözlemlenmiştir. Baskı oranının artması, sertlik, yüzey yapışkanlığı ve çiğnenebilirliği artırmış ve en yüksek değerler sırasıyla 197.71 N, 7.21 N.s ve 147.24 ile %50 baskı oranında belirlenmiştir ($p<0.05$). Örneklerin iç yapışkanlık değerleri ise baskı oranının artması ile azalmış ve %50 baskı oranında 0.76 olarak ölçülmüştür ($p<0.05$). Ayrıca, dilim kalınlığı x baskı oranı interaksiyonunun yüzey yapışkanlığı üzerine, test hızı x baskı oranı interaksiyonunun da çiğnenebilirlik ve elastikiyet üzerine etkisi belirlenmiştir ($p<0.05$). Bu sonuçlar, ölçüm parametrelerinin ve bunların interaksiyonlarının tekstürel özellikleri etkilediğini, test edilen üç parametreden baskı oranının diğerlerine göre daha etkili olduğunu ve ölçüm koşullarının standardize edilmesinin gerekliliğini ortaya koymaktadır.

Anahtar Kelimeler: Baskı oranı, Dilim kalınlığı, Piliç salam, Tekstür, Test hızı.

Effect of Measurement Parameters on Textural Properties of Chicken Salami

Abstract: Textural properties are one of the most important quality parameters in the preference and purchase of meat products. In this study, the effects of slice thickness (15, 20, and 25 mm), compression ratio (30, 40, and 50%), and testing speed (1, 2, and 3 mm/s) on the textural properties of chicken salami were investigated. Textural properties of salami samples (hardness, springiness, adhesiveness, cohesiveness, and chewiness) were measured using the TA. XT. Plus Texture Analyzer with the P/50R probe. The data obtained from four different brand salami samples were subjected to Variance Analysis using the SPSS statistical package program, and the differences among the means were compared using Duncan's Multiple Range test. As slice thickness increased, hardness and adhesiveness increased, and the highest hardness value was determined in 25 mm slice thickness salami with 149.51 N ($p<0.05$). On the other hand, the cohesiveness values of the samples varied between 0.79-0.82, and as

the slice thickness increased, cohesiveness decreased ($p<0.05$). The effect of test speed on all textural parameters was significant ($p<0.05$), and except for cohesiveness, generally higher values were observed at 3 mm/s test speed. As the compression ratio increased, hardness, adhesiveness, and chewiness increased, and the highest values were determined at 50% compression ratio with 197.71 N, 7.21 N.s, and 147.24, respectively ($p<0.05$). The cohesiveness values of the samples decreased with increasing compression ratio and were measured as 0.76 at 50% compression ratio ($p<0.05$). In addition, the effect of slice thickness x compression ratio interaction on adhesiveness and test speed x compression ratio interaction on chewiness and springiness were significant ($p<0.05$). These results show that measurement parameters and their interactions affect textural properties, that the compression ratio is more effective than the others among the three tested parameters, and that standardization of measurement conditions is necessary.

Keywords: Chicken salami, Compression ratio, Slice thickness, Test speed, Texture.

Enriching yeast-free bread with germinated mung beans

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Absract: Bread is a valuable product that provides numerous essential substances for the human body. It holds a significant position in our diet, particularly in countries, where the tradition of bread production is both deep-rooted and longstanding. The quality of bread is greatly influenced by its ingredients, making the enhancement of bread quality an area of particular interest. Currently, there is a growing demand for the production of bread that is free from baker's yeast, often referred to as yeast-free bread, due to its numerous health benefits. This research examined the physicochemical, functional, and sensory properties of sourdough bread enriched with sprouted mung bean flour at levels of 10%, 15%, and 20%, comparing it to a control group without enrichment. Water absorption capacity, oil absorption capacity, foam capacity, foam stability, and protein content were measured for both sprouted and non-sprouted mung bean flour, as well as for wheat flour. For the dough samples, titratable acidity, pH and bulk fermentation ability was evaluated in terms of volume increase. The bread samples were analyzed for moisture, protein, and ash content, as well as amino acid composition, color properties, sensory characteristics, acidity, and crumb porosity. The bread sample containing 15% sprouted mung bean flour demonstrated improved crumb porosity and received higher sensory scores. The addition of sprouted mung bean flour is a good source of protein with increased amino acid composition, indicating its suitability as a promising ingredient for designing and formulating nutritionally enriched sourdough bread.

Keywords: Sourdough bread, sprouted mung bean, nutritional enrichment.

İğdenin biyoaktif bileşiklerinin çevre dostu ekstraksiyon yöntemi ile belirlenmesi

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Özet: İğde tozunun ultrases destekli ekstraksiyon çalışmalarında, toplam fenolik madde ve antioksidan aktivite üzerinde etkili parametreler incelenmiştir. Toplam fenolik madde miktarı en yüksek 60°C'de, %80 genlikte ve 5 dakika süren ekstraksiyonla 568 mg GAE/100 g olarak bulunmuştur. Sıcaklığın fenolik madde ekstraksiyonuna istatistiksel olarak etkili olduğu görülmüştür. Yanıt yüzey yöntemiyle optimize edilen koşullar ise 5 dakika, 60°C ve %93,93 genlik olarak belirlenmiş ve doğrulama analizlerinde 596±0,3 mg GAE/100 g elde edilmiştir. Antioksidan aktivite açısından, EC50 değeri 338,90 mg/L ile 50°C'de, %60 genlikte ve 5 dakika süren ekstraksiyon sonucunda tespit edilmiştir. Süre, sıcaklık ve genlik parametrelerinin antioksidan aktivite üzerine etkisinin istatistiksel olarak anlamlı olmadığı gözlemlenmiştir. Optimize edilmiş koşullar ise 6,9 dakika, 40°C ve %60 genlik olup, bu şartlarda en düşük EC50 değeri 243,4 mg/L olarak hesaplanmıştır.

Anahtar Kelimeler: Antioksidan, Fenolik, İğde, Ultrases.

Glutensiz besin: Chia tohumu

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Özet: Çölyak hastaları tarafından bir tahıl proteini olan gluten tolere edilemediğinden, bazı tahıllar veya bu tahılların ürünlerini tüketemezler ve bu nedenle yaşamları boyunca glutensiz bir beslenme planıyla yaşamak durumunda kalırlar. Bu durum ise çölyak hastalarının diyetlerinden gluten içeren bu tahılları uzaklaştırmalarına neden olur. Dolayısıyla çölyak hastaları için glütensiz diyetle beslenmek durumundadır. Bu bakımdan glüten içermeyen ürün yelpazesinin geliştirilmesi büyük önem taşımaktadır. Salvia hispanica olarak bilinen Chia tohumu omega 3 yağ asitleri, diyet lifi, protein, vitamin ve mineral bakımından zengin olup, gluten içermeyen bir besin olarak kan şekerinin düzeyini azaltmada, kalp sağlığını koruyarak kan basıncını düşürmede ve sindirim sistemini olumlu etkilemede rol oynar. Glutensiz diyet uygulamalarında özellikle çölyak hastaları için alternatif bir besin kaynağıdır. İçeriğinde bulunan yüksek seviyede omega-3 ve ayrıca serbest radikallerin potansiyel zararlı etkilerinden koruyucu özellikleri nedeniyle birçok kronik rahatsızlığın önlenmesi ve çeşitli kanser hastalıklarından korunmada etkili bir maddedir. Chia tohumu sahip olduğu bu olumlu özelliklerinden dolayı endüstride fırıncılık sektörü ve et ürünleri sektörü başta olmak üzere çoğu gıda sektöründe kullanım alanı bulmaktadır. Bu derleme, Chia tohumunun genel karakteristik özellikleri ve sağlık üzerine etkileri konusunda ele alınmıştır.

Anahtar Kelimeler: Chia tohumu, Gluten, Çölyak, Salvia hispanica

Gluten-free food: Chia seeds

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Abstract: Since celiac patients cannot tolerate gluten, a grain protein, they cannot consume certain grains or their products and therefore must live on a gluten-free diet throughout their lives. This causes celiac patients to remove these grains containing gluten from their diets. Therefore, celiac patients have to eat a gluten-free diet. In this respect, the development of a gluten-free product range is of great importance. Chia seed, known as Salvia hispanica, is rich in omega-3 fatty acids, fiber, protein, vitamins and minerals, and plays a role in reducing blood sugar levels, protecting heart health and lowering blood pressure, and positively affecting the digestive system as a gluten-free food. It is an alternative food source especially for celiac patients in gluten-free diet applications. Due to the high level of omega-3 it contains and its protective properties against the potentially harmful effects of free radicals, it is an effective substance in preventing many chronic diseases and protecting against various cancer diseases. Due to these positive properties it possesses, chia seed is used in many food sectors, especially in the bakery sector and meat products sector. This review addresses the general characteristics of Chia seeds and their effects on health.

Keywords: Chia seed, Gluten, Celiac/Coeliac, Salvia hispanica

The effect of brewing process on the aroma compounds and sensory properties of camellia sinensis

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Abstract: *Camellia sinensis* tea is renowned for its diverse sensory properties, particularly its complex flavor, which is largely influenced by a combination of volatile and non-volatile compounds. These compounds, critical to the tea's overall aroma, are shaped by various factors including the methods of tea processing, brewing temperature, brewing time, and water quality. This study delves into how specific brewing conditions influence the release and composition of key aroma compounds in tea. It systematically examines the impact of varying brewing temperatures (from low to high), steeping durations, and different water compositions (mineral content, pH levels) on the volatile profile of tea. Higher brewing temperatures and prolonged steeping times lead to increased release of specific volatile compounds, notably aldehydes, ketones, esters, and alcohols, which are integral to the aroma profile of tea. Moreover, variations in water composition were shown to either enhance or inhibit the extraction of these aromatic compounds, underscoring the critical role of water quality in tea preparation. The findings emphasize the need for optimization of brewing parameters to achieve the desired balance of aroma and flavor, offering valuable insights for tea consumers and producers alike to maximize the sensory experience of tea drinking. These results pave the way for future studies exploring the interaction between brewing conditions and tea chemistry, with potential implications for the development of tailored brewing techniques for various tea types.

Keywords: *Camellia sinensis*, aroma compounds, sensory properties, brewing, volatile profile

Volatile alcohol profile of melons (*Cucumis melo* L.) as affected by fruit size

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Abstract: This study examines the impact of different fruit sizes on the aroma profile focused on volatile alcohols of Kirkagac melons. Melons were categorized into large, medium, and small sizes, and their aroma compounds were extracted using liquid-liquid extraction and analyzed with Gas Chromatography-Mass Spectrometry (GC-MS). The analysis revealed that juices from larger melons contained the lowest alcohol composition, in contrast, smaller melons had higher concentrations of alcohols which contribute to greenish aromas. These findings suggest that melon size plays a crucial role in determining the quality parameters, with larger melons offering superior sensory and nutritional characteristics.

Keywords: Aroma compounds, Fruit size, Melon, GC-MS, Sensory analysis

How marination with different seasoning recipes may influence the PAHs level in Pan fried chicken?

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Abstract: Pan-frying is a common and flexible cooking technique where food is cooked in a small amount of fat over medium to high heat. However, this method can lead to the formation of carcinogenic organic compounds, such as polycyclic aromatic hydrocarbons (PAHs). The present study aimed to assess the effect of different marinades on PAH contamination in pan-fried chicken. In addition to measuring PAH levels using the GC-MS method, the study also analyzed meat weight loss during cooking and compared the color of raw and grilled samples. Statistical analysis revealed that samples prepared without any marinade had the highest levels of PAH contamination, while the lowest levels were found in samples marinated with Spicy and Herbaceous Marinades (such as garlic, ginger, chili, rosemary, and thyme). The total PAH4 content in chicken samples in this experiment was reduced between %41 and %72. Marination of chicken demonstrated that both universal and chicken-specific marinades can act as barriers against PAH formation. In accordance with the limits set by Commission Regulation (EU) No. 915/2023, none of the analyzed samples exceeded the maximum permissible level for B[a]P (5.0 µg/kg), nor the total of the four marker heavy PAHs (30.0 µg/kg). Therefore, marinating chicken with ingredients rich in phenolic compounds prior to cooking can enhance food safety and significantly reduce PAH contamination in grilled chicken.

Keyword: Pan fried chicken, PAH, Marination, Inhibition, Natural antioxidants

The chemical composition of Giresun quality hazelnut skin and its potential applications

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Abstract: Hazelnut skin, is the thin, brown outer layer that completely encases the hazelnut, often discarded as a byproduct during hazelnut roasting process. It has been found to contain significant bioactive compounds, including dietary fiber, polyphenols, flavonoids, vitamins, and minerals, exhibits significant antioxidant activity. The chemical composition and nutritional value of hazelnuts and their skins can vary depending on the hazelnut variety and the region of cultivation; **moreover,** the increasing interest in sustainable resources and natural antioxidants highlights the potential of hazelnut skin as a valuable byproduct with various health-promoting applications. In this research, we studied the chemical composition and antioxidant activity of hazelnut skin from Giresun, located in the Black Sea Region of Türkiye, and revealing its potential as a functional food component. Hazelnut skin samples extracted using different solvents mixtures—acetone/methanol and ethanol/methanol—yielded different amounts of total phenolic compounds. Specifically, the total phenolic content was 437.45 GAE mg/g sample for the acetone/methanol extraction, and 307.38 GAEq mg/g sample for the ethanol/methanol extraction. Furthermore, the total antioxidant capacity of the samples was measured at 3.38 ± 0.2 mmol TE/g for acetone/methanol extraction and 2.67 ± 0.1 mmol TE/g for the ethanol/methanol extract. The fat content of the hazelnut skin was measured to be 35.1% on a dry matter basis, while its dietary fiber content was found to be 53.5%. Hazelnut skin (HS) was used as functional food ingredient to enrich the cake and sensory analysis of this product was conducted as well.

Keywords: Hazelnut skin, Giresun, Antioxidant activity, Total phenolics

Changes in antioxidant enzymes and essential oil production of peppermint (mentha × piperita l.) under different water restrictions

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Abstract: Peppermint (Mentha × piperita L.) is a valuable crop that is affected by many environmental factors such as climate, soil and irrigation and is grown for its essential oils. Drought stress, which is one of the most important environmental stresses, increases oxidative stress in the cell, causes excessive production of reactive oxygen species and damages cellular structures, negatively affecting plant growth and oil yield. Plants try to clean ROS with antioxidant enzymes such as superoxide dismutase, catalase, ascorbate peroxidase, glutathione reductase, peroxidase and cell wall peroxidase. Studies show that drought stress can also stimulate secondary metabolite production, including essential oils in peppermint. However, the specific effects of changing water stress on oil yield and antioxidant mechanisms are not well understood. This study examined the response of pepermint plants to different irrigation levels (I25, I50, I75, I100, I125) and measured oil yield, lipid peroxidation, hydrogen peroxide, NADPH oxidase and antioxidant enzyme activities. As a result, increasing the duration and severity of stress triggered the antioxidant mechanism.

Keywords: Antioxidant enzymes, Drought stress, Essentioal Oil, Peppermint, ROS

Bioactive properties of *Pistacia lentiscus* L. leaves from Turkish Republic of Northern Cyprus

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Abstract: In this study, traditional extraction and ultrasonic extraction methods at different durations (30, 40, and 60 minutes) were applied to the leaves of the shrub form of the mastic tree (*P. lentiscus* L.). The total phenolic compounds and antioxidant activity of the obtained extracts were investigated. The extract obtained with the 40-minute ultrasonic extraction method determined the highest antioxidant capacity and total phenolic compounds. In conclusion, it was determined that the different extraction methods and durations applied significantly affected the bioactive properties of the mastic tree leaves.

Keywords: *Pistacia lentiscus,* mastic tree, total phenolic compounds, antioxidant

Разработка технологий для производства хлебобулочных изделий с добавлением ореховых выжимок из кыргызской республики для улучшения пищевой ценности.

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Аннотация: В данной статье представлены результаты исследования по разработке технологии производства пшеничного хлеба из муки 1-го сорта, включающего добавление выжимок из диких и культивированных грецких орехов, являющихся побочным продуктом при производстве орехового масла в Кыргызской Республике. В процессе исследования выжимки вводились в тесто в количестве 6, 8, 10, 12 и 14% взамен пшеничной муки 1-го сорта. Оценивались реологические свойства теста, изменения в содержании и качестве клейковины, а также влияние на вкус, текстуру и физико-химические показатели готового хлеба. Полученные результаты позволяют оценить потенциал использования растительных добавок для улучшения пищевой ценности и органолептических характеристик пшеничного хлеба.

Ключевые слова: хлебобулочные изделия, ореховые выжимки, реология теста, качество клейковины, пищевая ценность.

Koronavirüsü (Covid-19) ve gıda tüketimi

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Özet: Çin'in Wuhan kentinde 2019 yılının Aralık ayında ortaya çıkan ve tüm dünyayı etkileyen SARS-CoV-2 (Covid-19), Dünya Sağlık Örgütü tarafından Pandemi olarak ilan edilmiştir. Bütün dünyayı etkisi altına alan virüs, sadece bir sağlık sorunu olmaktan çıkmış aynı zamanda toplumların ekonomik, kültürel ve siyasal güvenliği açısından da büyük bir sorun haline gelmiştir. Virüsün temel yayılma yolu, enfekte olan kişilerin solunum yolu ile enfekte olmayan kişilere damlacık bulaştırması sonucunda meydana gelmiştir. Bu durum sonucunda yapılan seyahatler ve büyük kalabalıklar hastalığın dünya genelinde hızla yayılmasına neden olmuştur. Bu nedenle birçok ülkede maske kullanımı ve sosyal mesafe kuralı uygulanmış, sınırlar kapatılarak, toplu taşıma sınırlandırılmış ve karantina tedbirleri uygulanmaya başlanmıştır. Bu tedbirler bireylerin tüketim alışkanlıklarının değişmesine ve özellikle un, makarna, bakliyat, konserve gıdalar gibi uzun ömürlü ürünlere olan talebin artmasına neden olmuştur. Bunun yanı sıra bireyler bağışıklık sistemlerini güçlendirmek amacıyla takviye gıda tüketimine de başlamışlardır. Bu çalışmada tüm dünyayı tehdit eden Koronavirüsün (Covid-19) Kahramanmaraş ilinde yaşayan bireylerin gıda tüketim alışkanlıklarına etkilerini araştırmak amaçlanmıştır. Bu amaçla Kahramanmaraş ilinde 386 tüketici ile yüz yüze anket çalışması yapılmıştır. Elde edilen veriler frekans ve yüzdelerle değerlendirilmiştir. Araştırma sonuçlarına göre tüketiciler ortalama 38,99 yaşında, %74,60'ı evli, %50,80'i üniversite mezunu, hanehalkı birey sayısı ortalama 4,05'tir. Tüketicilerin %54,90'ında pandemi döneminde gıda harcaması artmış, %37,30'unun gelirlerinde azalma meydana gelmiş, %43'ünün sağlıklı yaşama önem verdiği tespit edilmiştir. Bununla birlikte bireylerin %58'inin pandemi dönemine uyum sağlayamadığı, %24,40'ının Koronavirüsüne yakalandığı, Koronavirüsüne yakalanan bireylerin %24,70'inin hastalık sürecini ağır olarak atlattığı ve %54,10'unda beslenme alışkanlıklarının değiştiğini ifade etmişlerdir.

Anahtar Kelimeler: Yeni Koronavirüs (Covid-19), Gıda Tüketimi, Ekonomi, Beslenme Alışkanlıkları, Tüketim

GEOLOGICAL, GEOTECHNICAL AND MINING ENGINEERING

Lithological and mineralogical characteristics of graphite ore from the Kambale graphite deposit in the Wa-Lawra belt, Ghana: implications from petrography and scanning electron microscopic studies

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Abstract: This study investigated the lithological and mineralogical characteristics of graphite ore from the Kambale graphite deposit in the Wa-Lawra greenstone belt of Ghana using petrography and scanning electron microscopy (SEM) techniques. The petrographic analysis involved microscopic examination of thin and polished sections of the ore samples, enabling the identification and classification of the host rocks and mineral assemblages associated with the deposit. Petrographic observations revealed the presence of mineral assemblages including quartz, plagioclase, muscovite, biotite, sericite, epidote, chlorite, garnet, and graphite within the gneisses and schist lithologies. The SEM analysis offered high-resolution imaging and elemental analysis of the graphite samples. It was employed to investigate the fine-scale morphology and microstructure of the graphite ore. From the SEM analysis, the graphite is observed as disseminated flaky graphite in silica-rich schists, which exist as distorted clusters of flaky plates/flakes within 0.1 μm. Graphite flakes exhibit close association with gangue minerals even at a minute scale (~10 μm). Based on the results of the lithological and mineralogical studies, the gangue minerals associated with the Kambale graphite are common minerals of the host rock, particularly quartz, muscovite, biotite, sericite, hornblende, plagioclase, orthoclase, chlorite, epidote, and garnet. With the exception of the micas, most of the impurities can be easily separated because graphite is the easiest to float using froth flotation. The findings have implications for the processing of graphite resources and potential industrial uses of graphite in the Wa-Lawra Belt and similar geological settings and thus, promoting the sustainable utilization of this valuable mineral.
Keywords: Graphite, Greenstone belt, Petrography, Scanning Electron Microscopy.

Hasaköy Kilisesinde Malzeme Bozunmaları

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Özet: Birçok şehirde olduğu gibi Islahat Fermanı sonrasında Niğde'de de birbirine benzer tipte ve malzemeler ile inşa edilmiş kiliseler bulunmaktadır. Mübadele öncesi bölgedeki toplumun kendi din ve sosyo-kültürel özelliklerine göre inşa edilen kilise yapılarının bir kısmı camiye çevrilmiş, bir kısmı depo vb. olarak kullanılmış, bir bölümü de maalesef kaderine terkedilmiştir. Niğde ve yakın yerleşimlerde 1800'lü yılardan itibaren genelde sağlam andezit kayaları kullanılarak inşa edilen yapıların büyük bir kısmı bakımsızlık ve terk nedeniyle doğal süreçler ve insani etkilerle yıpranmaya uğramıştır. Araştırmaya konu olan yapı Hasaköy Kilisesi olarak bilinmektedir. Mübadele sonrası 1970'li yıllara kadar cami olarak kullanılmıştır. Sonrasında kaderine terk edilen yapı gün geçtikçe bozunma süreçlerine daha yoğun olarak maruz kalmaktadır. Bu yapıda kullanılan andezit ve ignimbiritlerden örnekler alınarak kayaçların jeo-mekanik özellikleri tanımlanmış, yapıda gözlenen bozunmalar da gözlemsel incelemelerle ortaya konulmuştur. Söz konusu yapının mimari özelliklerinin korunması ile gelecek nesillere aktarılması konusunda zaman geçmeden koruma ve iyileştirme önerilerinin yapılması gerekmektedir.

Anahtar Kelimeler: Hasaköy Kilisesi, Bozunma, Andezit, Jeo-mekanik özellikler

Yüksek Basınç Dayanımına Sahip Bazı Kayaçların Dokusal Özellikleri ile Aşındırıcılıkları Arasındaki İlişkilerin Araştırılması

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Özet: Kayaçların Aşındırıcılıkları özellikle mekanize kazı yöntemlerinin kullanıldığı maden ve inşaat projelerinde, proje maliyet ve başarısını etkileyen önemli parametrelerden birisidir. Özellikle yüksek dayanımlı kayaçların kazısı sırasında mekanize kazıcılarda meydana gelen aşınma oranları çok fazla olabilmektedir. Bu yüzden proje başlamadan önce kayaçların aşındırıcılık özelliklerinin belirlenmesi oldukça önemlidir. Kayaçların aşındırıcılıkları, mineralojik, petrografik ve mekanik özellikleri gibi farklı özelliklerine bağlıdır. Bu çalışmada yüksek basınç dayanımına sahip bazı kayaçların mineralojik özeliklerinin aşındırıcılıkları üzerindeki etkileri araştırılmıştır. Bu kapsamda kayaçların aşındırıcılıkları Cerchar Aşındırıcılık İndeks deneyi yardımıyla belirlenmiştir. Numunelerin mineralojik özellikleri kapsamından mineral şekil özellikleri ve doku katsayısı değerleri belirlenmiştir. Belirlenen mineral şekil özellikleri ile kayaçların CAI değerleri arasındaki ilişkiler istatistiksel olarak analiz edilmiştir.
Anahtar Kelimeler: Cerchar aşındırıcılık değeri, Doku katsayısı, Mineral şekil özellikleri.

Investigating the relationship between textural characteristics and the abrasivity of some rocks with high compressive strength

Abstract: The abrasivity of rocks is one of the critical parameters affecting the project cost and success, especially in mining and construction projects where mechanized excavation methods are used. Especially during the excavation of high-strength rocks, the wear rates in mechanized excavators can be very high. Therefore, determining the abrasivity of rocks before the project starts is very important. The abrasivity of rocks depends on different properties such as mineralogical, petrographic, and mechanical properties. This study investigated the effects of the mineralogical properties of some rocks with high compressive strength on their abrasiveness. In this context, the abrasivity of rocks was determined with the help of the Cerchar Abrasiveness Index test. Mineral shape properties and texture coefficient values were defined within the scope of the mineralogical properties of the samples. Relationships between determined mineral shape properties and CAI values of rocks were analyzed statistically.
Keywords: Cerchar abrasivity test, Texture coefficient, Mineral shape properties.

Alkali ortamda NaCl ile Çinko-Kurşun kazanımının araştırılması

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Özet: Bu çalışma, flotasyon atıkları (şlam) ve yan ürün (filtre) olarak elde edilen içeriklerden sodyum hidroksitli ortamda sodyum klorürün çinko-kurşun kazanımına etkisinin araştırılması amacıyla gerçekleştirilmiştir. Flotasyon işlemi ile kurşun çinko cevherlerinden değerli içerikli metallerin kazanımlarının ardından geri kalan içerikler atık ya da filtre olarak ayrılmaktadır. Bu içeriklerin değerlendirilmesine yönelik olarak gerçekleştirilen çalışma da farklı sürelerde farklı cevher içeriğine sahip numuneler üzerinde %Zn ve Pb kazanımları incelenmiştir. Numunelerden yaklaşık olarak %86-96 aralığında çinko ve %80-96 kurşun kazanıldığı çalışmada alkali ortamda klorun (Cl^-) etkin olduğu sonucuna ulaşılmıştır. Dolayısıyla bu cevherlerden söz konusu çinkonun geri kazanımına yönelik gerek ekonomik gerek uygulanabilir bir proses olarak alkali tuz liçi değerlendirilebilecektir.

Anahtar Kelimeler: Flotasyon Atığı, Şlam, Filtre, Çinko, Kurşun

Titreşimli Değirmende Besleme Boyutunun Öğütmeye Etkisi

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Özet: Cevher hazırlama ve mikronize öğütme tesislerinde hammaddelerin ince/çok ince boyutlara öğütülmesi amacı ile farklı değirmen tipleri kullanılmaktadır. Bunlar aktarılan ortam sistemiyle çalışan (bilyeli-çubuklu-otojen) değirmenler ve karıştırmalı değirmenlerdir. Bu değirmenlere ek olarak titreşimli değirmenlerde sanayide özellikle ince öğütme proseslerinde kendisine yer bulmaktadır. Bu çalışmada; çubuklu titreşimli değirmende besleme malı tane iriliğinin öğütmeye etkisi araştırılmıştır.
Anahtar Kelimeler: Cevher hazırlama, Zeolit, Kuvars, Mikronize öğütme, Çubuklu titreşimli değirmen, Besleme boyutu

Alçi, Alçipan İmalati ve Kullanılan Katkı Maddeleri

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ÖZET: Alçı, yapının çok çeşitli kısımlarında yaygın olarak kullanılan bioklimatik bir malzemedir ve alçı taşının (jips) nispeten düşük sıcaklıkta pişirilip öğütülmesiyle elde edilir. Alçı levhalar ise alçının iki dayanıklı karton levha arasına dökülerek dondurulması ile üretilir. Sıva yerine duvar ve tavan kaplaması olarak alçıpan (alçı levha, alçıpanel) uygulamaları oldukça yaygındır. Özellikle son yıllarda alçıpan yapımındaki eğilimler daha hafif ve daha güçlü panel yapımı üzerinde yoğunlaşmaktadır. Bu sayede; suyu buharlaştırmak için daha az enerji maliyeti, kurulum esnasında taşıma kolaylığı ve azalan nakliye giderleri mümkün olabilmektedir. Bu derlemede; alçıtaşı, alçı ve alçıpan üretim süreçleri ayrıntılı olarak açıklanmakta ve türleri, hammadde ve katkı maddeleri ile kalite kontrol parametreleri ele alınmaktadır.

Anahtar Kelimeler: Alçı, Alçıpan, Hammaddeler, Kimyasal Katkılar, Kalite Kontrol

Gypsum And Gypsum Board Manufacturıng

Abstract: Gypsum is a bioclimatic material widely used in various parts of the building and is obtained by firing and grinding gypsum (gypsum) at a relatively low temperature. Gypsum boards, on the other hand, are produced by freezing gypsum by pouring it between two durable cardboard sheets. Plasterboard (gypsum board) applications are quite common as wall and ceiling coverings instead of plaster. Especially in recent years, the trends in drywall construction have focused on making lighter and stronger panels. In this way; less energy costs to evaporate water, ease of transportation during installation and reduced transportation costs are possible. In this review; gypsum, gypsum and plasterboard production processes are discussed in detail and their types, raw materials and additives and quality control parameters are discussed.

Keywords: Gypsum, Gypsum Board, Raw Materials, Chemical Additives, Quality Control

Hydrogeochemical appraisal of the co-occurrence of fluoride and nitrate in groundwater of Gushegu Municipality in the Northen Region, Ghana: implication for human health risk assessment

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Absract: The study investigates the hydrogeochemical characteristics and health risks of fluoride (F^-) and nitrate (NO_3^-) in groundwater in the Gushegu Municipality of northern Ghana. Major rock types in the area include sandstone, mudstone, quartzose, and tuff. The aquifer is within the weathered zones of the sandstone and mudstone lithologies. By analyzing 15 groundwater samples, the study found that 93.33% had high F^- levels, while 40% had high NO_3^- levels, exceeding safety thresholds. Fluoride concentrations had a range of 0.00 to 19.50 mg/L, and a mean of 6.38 mg/L, exposing the inhabitants to adverse risk of fluorosis. The NO_3^- concentrations ranged from 2.50 to 92.50 mg/L, averaging 38.11 mg/L. Mg^{2+}, K^+, and HCO_3^- are the dominant ions resulting in Mg-K-HCO_3 water type as the main hydrochemical facies. Rock weathering, mineral dissolution, and fertilizer leaching were identified as key factors influencing the high F^- and NO_3^- levels. The study assessed health risks using the Human Health Risk Assessment (HHRA) model and Monte Carlo Simulation (MCS), revealing that the central and northern parts of the study area have high concentrations of F^- and NO_3^-, posing significant health risks to inhabitants. Infants were identified as the most vulnerable group, with ingestion being the primary contamination pathway. The MCS confirmed these findings, showing that infants are at the highest risk, followed by children and adults. The study recommends seeking alternative water sources for domestic and irrigation purposes.
Keywords: Hydrogeochemistry, Fluoride, Nitrate, Human Health Risks

Special Thematic Session Proposal: Natural and Applied Sciences

Hydrogeochemical characterization and quality assessment of groundwater in the Nkwanta District of the Oti Region, Ghana

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Absract: This study evaluates the groundwater quality in Nkwanta District, crucial for local drinking and irrigation needs. It assesses hydrogeochemical characteristics and suitability for domestic and agricultural use, emphasizing the district's hydrogeology's role in ion mobility. Graphical techniques (Piper, Gibbs plot, box and whisker plots, bivariate plots) and multivariate statistical methods (Principal Component Analysis, Factor Analysis, Hierarchical Cluster Analysis) were used to analyze groundwater chemistry from recharge to discharge points. Forty water samples were analyzed for seventeen parameters, including temperature, pH, turbidity, conductivity, bicarbonate, total dissolved solids, colour, total alkalinity, chlorine, fluoride, calcium, sulfate, nitrate, magnesium, sodium, potassium, and carbonate. Results showed most parameters within permissible drinking water standards, with dominant cations and anions being $Na^+ > Ca^{2+} > Mg^{2+}$ and $HCO_3^- > Cl^- > SO_4^{2-}$. Major water types identified were Na-Mg-HCO_3 and Na-HCO_3, with various mixed types. The primary source of groundwater chemical evolution was intensive water-rock interaction, with ion exchange reactions and mineral dissolution also influencing groundwater chemistry. Anthropogenic impacts were minimal. The groundwater is suitable for drinking and irrigation, with sodium adsorption ratio (SAR) values ranging from 0.003 to 2.170 (mean = 0.762), magnesium ratios from 31 to 100 (mean = 82), and sodium percentage from 4.23 to 54.11% (mean = 0.74%). However, high magnesium ratios could deteriorate soil structure by reducing infiltration rates and hydraulic conductivity, leading to poor water movement and root penetration. Adding calcium-rich amendments like gypsum is recommended to balance magnesium levels and improve soil structure.

Keywords: Hydrogeochemistry, Groundwater Quality, Chemometric Analysis, Source Apportionment

Special Thematic Session Proposal: Natural and Applied Sciences

Niğde Bölgesine Ait Kalsitlerin Jeolojik Özelliklerine Göre Plastik Endüstrisinde Kullanımı ve Performans Değerlendirilmesi

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Özet: Kristalleşmiş kalsiyum karbonat ($CaCO_3$) olan Kalsit, Genellikle karbonatlı sedimanter kayaçların ve mermerlerin ana bileşenidir. Farklı bir çok şekillerde kristallenen ve genelde saydam, beyaz, sarı renklerde olan Kalsit; sertliği Moh's skalasına göre 3, yoğunluğu ise 2,6-2,7 g/cm^3 civarında olan önemli bir endüstriyel mineraldir. Kalsit, özellikle mikronize boyutlarda öğütüldükten sonra boya, kâğıt, plastik vb. birçok endüstriyel alanda kullanımı ile önemli bir endüstriyel hammadde olmuştur. Gelişen teknolojiyle birlikte artan maliyetler, ucuz hammaddeye talebi artırmıştır. Neredeyse her türlü sanayi kolunda sıkça karşımıza çıkan kalsitin bu anlamda hem yüksek rezervlere sahip olması ve hem de kolay ulaşılabilir olması nedeniyle önemi artmaktadır. Ülkemizin jeolojik yapısı gereği hemen hemen her bölgede kireçtaşlarına rastlamak mümkündür. Kireçtaşının kimyasal yapısı gereği kalsiyum karbonat ($CaCO_3$) açısından zengin bir kayaç türüdür. Bu çalışmada Niğde bölgesinde çıkarılan kalsitin mineralojik–petrografik ve jeokimyasal özellikleri incelenerek, plastik sektöründe kullanımına ilişkin değerlendirmeler yapılmıştır. Bu nedenle Optik Mikroskop incelemeleri, Renk Analizleri, X-Işını Difraksiyon Analizi, Partikül Boyut Analizi, Yüzey Alan Ölçüm (BET) ve Zeta Potansiyeli Analizleri yapılmıştır. Sonuç olarak bu çalışmada bölge kalsitini dolgu malzemesi olarak kullanan plastik sektörü işletmelerinin kazanımları ve şikâyetleri üzerinde durarak, sebeplerini araştırmak ve plastik endüstrisine katkı sağlayacak bir referans çalışma olması amaçlanmıştır.
Anahtar Kelimeler: Niğde, Mikronize kalsit, Mineraloji, Petrografi, Plastik.

Utilization and Performance Evaluation of Calcite from Nigde Regions in Plastic Industry According to Geological Properties

Abstract: Calcite, which is crystallized calcium carbonate (CaCO3), is usually the main component of carbonate sedimentary rocks and marbles. Calcite, which crystallizes in many different shapes and is generally transparent, white and yellow in color, is an important industrial mineral with a hardness of 3 according to Moh's scale and a density of 2.6-2.7 g/cm^3. Calcite has become an important industrial raw material with its use in many industrial fields such as paint, paper, plastic, etc., especially after being ground to micronized sizes. Increasing costs with the developing technology have increased the demand for cheap raw materials. In this sense, the importance of calcite, which is frequently encountered in almost every industrial branch, is increasing due to its high reserves and easy accessibility. Due to the geological structure of our country, it is possible to find limestones in almost every region. Due to the chemical structure of limestone, it is a rock type rich in calcium carbonate (CaCO3). In this study, mineralogical-petrographic and geochemical properties of calcite extracted in Niğde region were examined and evaluations were made regarding its use in the plastics industry. For this reason, Optical Microscope examinations, Color Analysis, X-Ray Diffraction Analysis, Particle Size Analysis, Surface Area Measurement (BET) and Zeta

Potential Analysis were performed. As a result, in this study, it is aimed to investigate the reasons and to be a reference study that will contribute to the plastics industry by focusing on the gains and complaints of the plastic sector enterprises that use regional calcite as filler material.

Keywords: Nigde, Micronized calcite, Mineralogy, Petrography, Plastic.

Analysis of the properties of welds fabricated using the robotic system

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Absract: Robotisation of processes has greatly accelerated in recent years. Industrial robots are used in various processes and often replace humans, who cannot perform as precise movements as a machine. In addition, robots can perform work in hazardous conditions, where the risk of loss of health or even life is high. It is worth remembering that industrial robots do not reduce the danger but only move it away from humans. With the development of robotic welding systems, new welding technologies have been developed, such as CMT, CMT Twin, Pulse, PMC, and PMC Twin. The development of new welding technologies and the analysis of existing methods allow for the improvement and discovery of new methods. Current research into new technologies focuses on increasing welding productivity while reducing the amount of energy delivered to the joint. This makes it possible to complete the weld faster while minimising the harmful effects of material overheating during the process. This paper focuses on the evaluation of the microstructure and quality of a welded joint made with a robotic arm in CMT, PMC and PULSE technologies, the study was carried out on three joints from which samples were cut to examine the microstructure, measure hardness, carry out a static tensile test and then analyse the structure of the resulting breakthrough. The analysis of the quality and microstructure of welded joints provided valuable information that makes it reasonable to study further the influence of welding parameters on the quality and microstructure of the joint.

Keywords: Welding, Robotic welding, CMT, Pulse, PMC.

CHARACTERISTICS, PROPERTIES AND APPLICATION OF CERAMIC RAW MATERIALS IN SOUTHERN KYRGYZSTAN

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Abstract: An urgent problem in modern technology is the creation of new multifunctional and structural composite materials using local minerals classified as non-metallic and resource-saving raw materials with valuable properties.

This paper considers the characteristics, structure, and properties of ceramic raw materials from southern Kyrgyzstan and determines the prospects for their application in ceramic production.

Interest in these types of raw materials for ceramic material production is driven by their unique technological, technical, operational, physical, and chemical properties. According to our geological studies, Uchkurt porcelain stone mainly consists of fine-grained quartz and sericite. The firing temperature of ceramic masses made from porcelain stone and clay depends on the iron content in the raw material. The optimal firing temperature for ceramic masses enriched with porcelain from the Uchkurt deposit is 1200°C.

Our research has established that the clays from the belt section of the Tash-Kumur deposit can be used for the production of household porcelain and earthenware, as all the parameters of the ingredients in its composition meet the requirements of the state standard.

Kara-Korum wollastonite can be used in many branches of modern production. X-ray phase analysis showed that pseudowollastonite modification lines appeared only in samples fired at 1200°C, indicating the beginning of polymorphic transformation and its irreversibility. The effect of wollastonite on the structure and mechanical properties of porcelain was evaluated by varying the weight percentage of porcelain with wollastonite in amounts of 5-20%.

Anahtar Kelimeler: Ceramics, Porcelain Stone, Clay, Wollastonite, Properties

The Role of Google Earth Engine and Remote Sensing Techniques in Determining Forest Fire Severity: The Case of 2021 Bodrum and Milas Fire in Turkey

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Abstract: Forest fires have become a major environmental problem in Turkey due to climate change and increased human activities. Effective monitoring and analysis of fires is critical for post-fire rehabilitation and forest management. Here, Remote Sensing (RS) and Geographic Information Systems (GIS) technologies provide powerful tools to quickly and with high accuracy determine fire damage over large areas. In this study, large-scale forest fires that occurred in Milas and Bodrum districts of Muğla in 2021 were analyzed using the Google Earth Engine (GEE) platform. Sentinel-2A satellite images were used to calculate Normalized Difference Vegetation Index (NDVI) and Normalized Burned Ratio (NBR) indices before and after the fires. Then, the Differenced Normalized Burned Ratio (dNBR) and Normalized Difference Vegetation Index (dNDVI) were calculated with the help of difference images, and fire severity was rated. The results, visualized in the ArcGIS environment, enabled the identification of high and moderate fire areas in 7 different classes. In addition, the findings obtained with GWIS (Global Wildfire Information System) data were compared, and their accuracy was evaluated. GWIS data revealed that a total area of 17,205.37 ha was burned, indicating that a larger area was affected by the fire compared to dNDVI and dNBR analyses. The results show that dNDVI and dNBR assess the local severity of the fire in more detail, while GWIS determines the overall spread of the fire by providing more extensive fire monitoring.

Anahtar Kelimeler: Google Earth Engine, Dnbr, Dndvi, Remote Sensing, Fire Severity

MATHEMATICS

Investigation and mathematical modeling of dada arcs on the brain in male

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Abstract: The present study aimed to investigate the structural and functional properties of Dada arcs in the brains of male rats, as well as to analyse their relationship with food finding time and hand preference. The rats were divided into three groups based on their handedness: right-handed, left-handed, and ambidextrous. The study then evaluated the asymmetries in brain structure observed in each group and their potential relationship with motor skills. The findings revealed a higher density of glial cells in the opposite hemispheres in the right-handed and left-handed groups, and a relationship between the Genius area and food finding time. In the ambidextrous group, the Genius area was smaller than in the other groups, which positively affected the food finding time of this group, decreasing the food finding time and contributing to positive motor performance outcomes.

Keywords: Laterality, Food Finding Time, Brain Thinking Speed, Corpus Callosum, Brachystochron Curve, Mathematical Modeling

Special Thematic Session Proposal (Optional): Natural and Applied sciences

Improving artificial neural networks with wavelets

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Abstract: Artificial neural networks are computer systems created to create, discover and retain new information through learning, which is a characteristic of the human brain. In addition to the known standard solutions of differential equation solutions and error minimization used in the functioning of these systems, it was aimed to conduct a study on activation functions with the idea that increasing the number of activation functions would help to improve the solutions of artificial neural networks. When increasing the number of activation functions, new activation functions should be selected that can be useful in training neural networks. It is important that the activation functions selected should be differentiable. In our study, wavelet was chosen as the first activation function. By processing the obtained outputs with one of the known standard activation functions, it is aimed to calculate the net output and minimize the error. The reason for using two activation functions is to save time or number of steps in the solution of artificial neural networks.

Keywords: Artificial Intelligence, Artificial Neural Networks, Wavelet, Activation Function

Fractional order plant-herbivore dynamics: from stability to chaos control

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Abstract: This work aims to analyze the dynamic behaviors of a model that represents the interaction between a plant and a herbivore, using a fractional order approach. The model can be discretized by using a procedure that involves using piecewise constant arguments. The jury conditions are utilized to derive the necessary and sufficient conditions for the asymptotic stability of the positive equilibrium point in the new system. We additionally examine the presence and direction of the Neimark-Sacker bifurcation at the positive equilibrium point of this system. Conversely, we apply a hybrid control method on the discrete system in order to regulate bifurcation. Furthermore, numerical simulations are used to assess the precision of the theoretical findings.

Keywords: plant-herbivore model, conformable fractional derivative, discretization, stability, Neimark-Sacker bifurcation, chaos control

Special thematic session proposal (Optional): Natural and Applied sciences

Topology of soft partial metric spaces

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Abstract: In the paper [1] by Altıntaş et al., the concept of soft partial metric space is introduced through soft elements and Babach's fixed point theorem is extended in soft partial metric space. In this paper, we examine topological properties of soft partial metric spaces. In this context, we are interested in concepts such as soft open ball, soft interior, soft open set and their some properties in soft partial metric spaces, and prove that every soft partial metric space under some condition is an ε – soft (elementary soft) topological space according to ε – operations on soft sets. We also examine the concepts such a soft closed set, soft closure, soft derived and separation axioms in the ε – soft partial metric topological space.

Keywords: ε – soft topology, soft partial metric, soft open set, soft closed set, soft closure, soft derived set, separation axiom.

Special Thematic Session Proposal (Optional): Natural and Applied sciences

Asymptotic solutions of singularly perturbed hyperbolic equations

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Abstract: Among the singularly excited hyperbolic equations, we turn to the telegraph equation. The telegraph equation is a basic mathematical device that describes the propagation of waves in any physical medium. The use of the telegraph equation helps us to take into account the real obstacles in the medium under consideration and to accurately characterize the waves generated by those obstacles.
Telegraph equations containing these or those features are widely used in practice, and the derivation of such equations requires the use of complex devices. For this reason, the solution of such equations is the need of the hour. It has a singularity when $\varepsilon = 0$ and a boundary layer appears here.
Let's study the following problem:

$$\varepsilon^2(\partial_t^2 u - a(x,t)\partial_x^2 u) + b(x,t)u = f(x,t), \qquad (x,t) \in \Omega,$$

$$u(x,t,\varepsilon)|_{t=0} = 0, \;\; u_t(x,t,\varepsilon)|_{t=0} = 0.$$

where $\varepsilon > 0$ is a small parameter, $\Omega = \{(x,t): x \in (0,1), t \in (0,T]\}, u = (u_1, u_2, \dots, u_n)$, The functions $a(x,t), b(x,t), f(x,t)$ are known functions. The asymptotics of the output of the problem containing two functions describing the boundary layers along $x = 0$ and $x = 1$ are established.
We introduce regularizing variables to obtain a regular equation based on the Lomov method

$$\xi = \frac{\varphi(x,t)}{\varepsilon}, \qquad \eta = \frac{\psi(x,t)}{\varepsilon}.$$

$u(x,t) \equiv \tilde{u}(M,\varepsilon), M = (x,t,\xi,\eta)$ taking the derivatives of the extended function and substituting the problem, we get the regular problem. We define the output of the extended problem in the form of the following series:

$$\tilde{u}(M,\varepsilon) = \sum_{k=0}^{\infty} \varepsilon^{\frac{k}{2}} u_k(M) \; .$$

Keywords: Telegraph equation, hyperbolic equations, singularly perturbed problems, Lomov method.

Special Thematic Session Proposal (Optional): Natural and Applied sciences

Combining regularization and numerical techniques in solving cauchy problems for first-order linear differential equations

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Abstract: This study explores the application of S.A. Lomov's method [1] for regularizing singularly perturbed Cauchy problems, specifically focusing on a scalar first-order ordinary differential equation of the form $L_\varepsilon u(x,\varepsilon) \equiv \varepsilon u' + a(x)u = f(x)$, with the goal of transforming the singularly perturbed problem into a regular one as $\varepsilon \to 0$. By introducing a regularizing variable and employing a partial discretization approach, we derive a finite difference scheme that facilitates the computation of solutions to the extended problem. In the context of the numerical solution for the regularized first-order linear differential equation, we define the approximation $u_i(\xi)$ as follows: $u_i(\xi) = v_{1,i} + v_{2,i} + c_i \; exp \; exp \; (-\xi)$, for the components we get problems:

$$a_i v_{1,i} = f_i, \quad i = 1,2,\dots,n+1,$$

$$\frac{v_{2,i+1} - v_{2,i}}{\rho} + a_i v_{2,i+1} = \frac{1}{\rho} g_i, \qquad v_{2,1} = 0,$$

$$\frac{c_{i+1} - c_i}{\rho} = 0\,, \qquad c_1 = u^0 - v_{1,1},$$

$$g_i = -v_{1,i+1} + v_{1,i}, \qquad \rho = \frac{h}{\varepsilon}.$$

These equations form the basis for solving the discrete version of the original problem. By solving above equations, we can derive the numerical solution to the regularized differential equation.

Keywords: Regularization, Lomov method, numerical solution.

An iterative method for solving non-linear Volterra integral equations and fractional differential equations

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Abstract: In this paper, we study designing a simple structure and effective iterative method for numerical solution of nonlinear Volterra integral equations containing those with smooth and weakly singular kernels, and a class of nonlinear fractional differential equations. We use Lagrange interpolation to simplify the weakly singular integrals in the equation throughout successive approximations. The existence, uniqueness and the regularity of a local solution are discussed, and a convergence theorem is proved for the proposed method. Several examples of linear and nonlinear cases of both equations are presented to illustrate theoretical results. The accuracy of our numerical results is compared with other existing numerical results in literature.

Keywords: Nonlinear Volterra integral equations; Iterative methods; Fractional differential equations

A soft computing radial basis procedure for the numerical solutions of the prey-preadtor model

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Abstract: The motive of current work is to design a trustworthy stochastic soft computing platform to solve the nonlinear historical model, which is based on the predator and prey dynamics. The mathematical predator and prey model is divided into two groups, while the numerical performances have been derived through the reliable Bayesian regularization neural network method. An explicit Runge-Kutta is applied to achieve the dataset in order to reduce the mean square error. The division of the data is taken for the training is 70%, while 15% for both authorization and testing. Twenty number of neurons, an activation log-sigmoid function, and feed-forward neural network is proposed to solve the predator and prey model. By comparing the generated outputs with the reference (Runge-Kutta), one can determine the validity of the proposed neural computing Bayesian regularization scheme. Furthermore, the precision of neural computing Bayesian regularization neural network is judged by applying different performances based on the error histogram, mean square error, state transition, and correlation.

Keywords: Prey-predator, Neural network; Bayesian regualrization; Sigmoid function; Numerical results

Approximations to the complete solution of the nonlinear optimization problem for oscillation processess

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Abstract: In the work [1] an algorithm is developed for constructing the complete solution to the optimization problem problem, where it is required to minimize the following quadratic integral functional

$$J[\bar{u}(t,x),\bar{\vartheta}(t,x)]=\int_Q\left\{[V(T,x)-\xi_1(x)]^2+[V_t(T,x)-\xi_2(x)]^2\right\}dx+$$

$$+\int_0^T\left[\alpha\int_Q h^2[t,x,\bar{u}(t,x)]dx+\beta\int_\gamma b^2[t,x,\bar{\vartheta}(t,x)]dx\right]dt,\alpha,\beta>0,$$

on the set of solutions of the following boundary value problem

$$V_{tt}-AV=\lambda\int_0^T K(t,\tau)V(\tau,x)d\tau+f[t,x,\bar{u}(t,x)],\quad x\in Q\subset R^n,0<t<T,$$

$$V(0,x)=\psi_1(x),\qquad V_t(0,x)=\psi_2(x),$$

$$\Gamma V(t,x)\equiv\sum_{i,j=1}^n a_{ij}(x)V_{x_j}(t,x)\cos(\delta,x_i)+a(x)V(t,x)=p[t,x,\bar{\vartheta}(t,x)],x\in\gamma,0<t<T.$$

The complete solution of this nonlinear optimization problem is defined as the triple $\left\{\left(\bar{u}^0(t,x),\bar{\vartheta}^0(t,x)\right),V^0(t,x),J[\bar{u}^0(t,x),\bar{\vartheta}^0(t,x)]\right\}$ [1], where $\bar{u}^0(t,x)$ is a vector distributed optimal control, $\bar{\vartheta}^0(t,x)$ is a vector boundary optimal control, $V^0(t,x)$ is a optimal process, $J[\bar{u}^0(t,x),\bar{\vartheta}^0(t,x)]$ is a minimum value of the functional.

In this paper the convergence of approximations of the complete solution is investigated of nonlinear optimization problem for oscillation processes with distributed vector control of the process final state. An algorithm is developed for constructing approximations of the vector distributed and vector boundary optimal controls, resolvent and finite-dimensional approximations of the optimal process and corresponding approximations of the minimum value of the functional, and their convergences are proved in the norm of the corresponding functional spaces.

Keywords: approximations of complete solution, nonlinear optimization, convergence of approximations, vector distributed optimal control, Optimal processes, minimal value of functional

On absolute matrix summability method

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Abstract: Sulaiman has obtained a theorem dealing with $|N^{-},p_n|_k$ summability factors of infinite series. In this paper, we have generalized this theorem for $|A,\theta_n|_k$ summability method for infinite series.

Keywords: Matrix summability, summability factor, infinite series, Hölder inequality, Minkowski inequality

Programming classic linear optimization problems using java: methods, implementation, and practical applications

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Abstract: This article explores implementing linear optimization algorithms in Java, including the simplex and interior point methods. It provides code examples for custom and built-in libraries to solve classical linear programming problems. Practical applications in logistics, economics, production planning, and supply chain management showcase specific usages and advantages of programming these techniques in Java.

Keywords: Transportation problem, linear programming, linear optimization, objective function, optimal solutions.

Numerical analysis of single and adjacent shallow foundations constructed within slope surface

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Abstract: In this study, parametric analyses were performed using the two-dimensional finite element program Plaxis 2D.2024 for comparative analysis of the behavior of single and adjacent multiple foundations constructed within the slope surface. In the analyses, the foundation soil was assumed to be pure sand and different foundation soil profiles were created using different relative stiffness values. By analyzing the cases constructed for single and adjacent foundations in the soil profiles created based on three different relative stiffness values, the limit states that bring the slope to the limit state by loading at the ultimate bearing capacity rate in different ways within the slope surface are examined. In addition, the effect of varying the slope height and the distance between the foundations on the deformation state change in specific cases and on the number of safety and mobilized slip planes is focused. The results are instructive in determining the interaction distance of single and multiple adjacent foundations to be constructed in slope surfaces composed of sand soils, considering the deformation and slip mechanisms, perceiving the change of conditions affecting the stability state and predicting the possible collapse mechanisms.

Keywords: Slope, Adjacent foundations, Single foundations, Shallow foundations, Sand.

Geometric intersections of multiple curves and specific curves on a punctured torus

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Abstract: In this paper, the author derived formulas for the geometric intersection numbers between multiple curves and elementary curves (specific types of multiple curves) on the punctured torus with boundary, using Dynnikov coordinates. Our process begins by identifying the elementary curves on this surface, followed by separately determining the formulas that calculate the geometric intersection numbers of multiple curves with each elementary curve. For future work, one can calculate the action of the mapping class group of an orientable genus-1 surface with punctures and one boundary component in terms of Dynnikov coordinates stated in this presentation and integrate it with the formulas presented in this work for computing the geometric intersection number of two arbitrary multiple curves on this surface.

Keywords: Multiple curves, Elementary curves, Geometric intersection number, Punctured torus, Dynnikov coordinates.

A soft view on lie groups and lie hypergroups

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Abstract: The aim of this paper is to conclude and investigate the concepts of soft lie groups over a lie group and soft lie hypergroups over a lie hypergroup. Some important soft lie constructions are suggested, several results and examples are obtained. Morever, two new categories of the soft lie groups and soft lie hypergroups are presented, and substructures of these concepts are studied in detail. Finally, rela-tions between different soft algebraic structures of the soft lie groups and soft lie hypergroups are examined.

Keywords: Lie group, Lie hypergroup, Soft set, Soft lie group, Soft lie hypergroup

Illustrative examples of generalized magnetic curves in differential geometry

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Abstract: In this paper, we delve into the study of generalized magnetic curves within the framework of para-Kähler manifolds. Our investigation encompasses a thorough examination of the characteristics and properties associated with these curves, highlighting their significance in the broader context of differential geometry. We also explore various mathematical techniques and concepts that play a crucial role in understanding the behavior of these curves. To further enrich our findings, we present a series of illustrative examples that are closely connected to our main topic, demonstrating the practical implications and applications of our theoretical results. Through this comprehensive approach, we aim to contribute to the existing body of knowledge in this area and provide insights that may inspire future research.

Keywords: Mathematical physics, Generalized magnetic curves, Para-Kähler manifolds, Magnetic fields, Curves

Special thematic session proposal (Optional): Natural and applied sciences

The numerical solution of difficult nonlinear dae test problem with laplace-padé series method

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Abstract: In this paper, we apply Laplace-Padé method to solve a difficult nonlinear DAE Test Problem. The example in its original form was given by the Dow Chemical Company as a challenging test problem for parameter estimation software. For proprietary reasons, the true nature of the reacting species has been disguised. Firstly, the basic properties of the Laplace-Padé method are given. Secondly, we calculate Power series of the given equations system, then transform it into Laplace-Padé series form, which gives an arbitrary order for solving differential-algebraic equations (DAEs). Then, the nonlinear Difficult Chemical Problem are solved by Laplace-Padé series method. This means that Laplace-Padé series method is a powerful tool for solving nonlinear differential-algebraic equations (DAEs).

Keywords: Differential-Algebraic Equations (DAEs), Power series, Laplace-Padé Series Method, A Difficult Nonlinear DAE Test Problem.

Obtaining convergence results using a random iteration process

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Abstract: In this paper, we define a new random iterative process. We introduce a more effective iteration technique that enhances previous methods, demonstrating its convergence to a common random fixed point of the operators. Moreover, with this iteration, we prove that the random operators converge.

Keywords: Random operators, common random fixed point, Banach spaces.

Special Thematic Session Proposal (Optional): Natural and applied sciences

A Study on Fekete-Szegö inequality for a class of analytic functions satisfying subordinate condition associated with Chebyshev polynomials

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Abstract: In this paper,firstly we give the subclass $A(n,m,\lambda,\alpha)$ defined by generalized Salagean operator $D_{\lambda}^{n}\cdot$ Furthermore, we introduce a class of analytic functions $A(\Gamma,n,m,\lambda,\alpha)$ satisfying the following condition

$$\frac{D_{\lambda}^{n+m}f(z)}{D_{\lambda}^{n}f(z)} \prec \Gamma(z,t)$$

where $\lambda \geq 0$ $0 \leq \alpha < 1$, $n,m \in \mathbb{N}^{*} = \mathbb{N} \cup \{0\}$, $t \in \left(\frac{1}{2},1\right]$ and for all $z \in \Delta$. In this study, we examine Fekete-Szegö inequality for the functions belonging to this defined class.

Keywords: Analytic functions, Salagean Operator, Subordination, Chebyshev polynomials, Fekete-Szegö inequality

Special Thematic Session Proposal (Optional): Natural and Applied Sciences

A study on the univalent and starlike of analytic functions

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Abstract: In this study, univalence and starlike conditions of some special types of analytic functions are determined.

Keywords : Analytic functions, univalent functions, Starlike functions

Special Thematic Session Proposal (Optional): Natural and Applied Sciences

Decay and nonexistence of solutions for a hyperbolic-type equation with fractional type time delay

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Abstract: This presentation we consider the hyperbolic-type equation with a fractional-type time delay term. We show the existence of a global solution of the problem and establish the energy decay of the solution by introducing an appropriate Lyapunov functional. Furthermore, we prove the nonexistence of the solution in finite time for $E(0)<0$.

Key Words: Global existence, Decay, Nonexistence, Fractional time delay.

Nonexistence of global solutions for a fractional petrovsky equation

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Abstract: In this presentation, we explore the fourth-order wave equation with a fractional time delay term. We give some information about our equation in order to prove blow up of solution.

Keywords: Blow up, Fractional time delay, Petrovsky equation, Caputo's fractional derivative

Aboodh transform by Bernstein polynomials for approximate solutions fractional differential equations

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Abstract: The aim of this study is to present an innovative solution method for solving differential equations by combining traditional techniques with the Aboodh integral transform and the Bernstein method. The Aboodh-Bernstein method has been developed to enhance the effectiveness of solving fractional differential equations. By integrating Bernstein polynomials with integral transforms, both theoretical and practical contributions are comprehensively examined.This method utilizes the Aboodh transform to convert fractional differential equations into a system of algebraic equations. Subsequently, the unknown function is determined by numerically inverting the Aboodh transform. This process is accomplished by expressing the equation as a Bernstein series. The advantages of this approach and its impact on computation are demonstrated through various numerical examples, with results compared to existing methods.

The findings indicate that the proposed method provides effective solutions for fractional differential equations. Additionally, error estimates and convergence criteria supporting the effectiveness of the approach are presented. This study aims to contribute to future research in the field of fractional differential equations by investigating the practical and theoretical efficacy of the Aboodh-Bernstein method.

In conclusion, this new solution method provides a foundation for evaluating practical applicability in studies conducted using programming languages.

Keywords: Differential equation, Aboodh transform, Fractional differential equations, Bernstein polynomials.

Strongly open reflexive relation spaces

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Abstract: In this paper, we characterize strongly closed and strongly open subset of reflexive relation space and examine the relationship between them. Moreover, we show that there is a bijection between the set of all strongly open subset of a reflexive relation space (X,R) and the set of all reflexive relations on X.

Keywords: Topological category, reflexive relation space, strongly open, strongly closed.

Application of some simple method to the second kind of Volterra integral equation

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Abstract: There are many methods that can be used to analyze nonlinear systems in the frequency domain. The most common of these are the Volterra series method, the method of defining functions, and the method of generalized equilibrium equations.

Keywords: Voltero method, integral equation, modern methods, mathematical method, mathematical solution.

A fast and accurate heuristic for the p-median problem

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Abstract: The p-median problem, probably the most applied location model in the facility location literature, seeks to locate *p* facilities to minimize the total distance between facilities and demand points. This study introduces a new heuristic algorithm inspired by the *k*-means clustering in the unsupervised machine learning literature. In the heuristic, the crust of the utilized analogy between clustering and the *p*-median problems is to consider demand points served by each facility as clusters. To mitigate the risk of getting stuck in local optima or oscillating, the proposed algorithm incorporates several countermeasures. The performance of the proposed algorithm was evaluated on 40 benchmark instances with known optimal solutions from the OR Library. Experimental results demonstrate that the proposed approach is computationally efficient and consistently produces solutions of high quality, often approaching the optimal solutions. We conclude that the proposed approach is effective in solving large-scale p-median problems.

Keywords: *p*-median, *k*-means, facility location, clustering, unsupervised machine learning

Traveling wave structures and applications for the coupled higgs equation

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Abstract: This article describes the successful application of the Modified Generalized Riccati Equation Mapping Method (M-G-REMM) to find traveling wave solutions of the Coupled Higgs equation. The main contribution of this method is the elucidation of new traveling wave solutions for nonlinear partial differential equations (NLPDEs), which help the investigation of the stability of the Coupled Higgs equation by other researchers and serve as representations of real phenomena. In addition, the physical properties of the solutions were investigated by establishing unique relationships between wave number and wave speed in the traditional wave transformation used in the M-G-REM method. We use 3D and 2D graphics with support from the Matlab package program to better explain our solutions. In terms of application, the studied method can be used to investigate the traveling wave structure mechanics of other equation models.

Keywords: Modified Generalized Riccati equation mapping method (M-G-REMM), Coupled Higgs Equation, trigonometric wave solution, exact solution.

The use of software program packages in teaching physics course

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Abstract: The article is devoted to the use of MATLAB software program package for studying mechanical movements in the physics course for mathematicians. There is a need of application software program package in case of absence of analytical solutions of problems. The involvement of computer programs in training allows to focus students' attention on the analysis of the obtained solutions, also to conduct numerical experiments in order to investigate the dependencies of solutions on the initial parameters. It helps to pay more attention to understanding the physics of mechanical phenomena, to activate the intellectual activity of students and increase their interest in the study of physics.

The MATLAB has such universal functions as mathematical calculations, algorithm development, data analysis, visualization of results, etc. There are examples of solving problems of Mechanics with the help of MATLAB in this article, such as: the problem of central elastic collision of three balls; the problem of a dead loop with the friction of the surfaces of the washer and the hinge; the problem of damped oscillation of the body attached to the spring. There were numerical experiments conducted at different values of parameters of mechanical systems.

The work with MATLAB software program package in practical classes of physics course contributes to the formation of knowledge, skills and abilities of students in the application of information technologies to build mathematical models of physical processes, to learn the elements of research and to use them in solving scientific and engineering problems in the future.

Keywords: Physics, problems, MATLAB, numerical solution, numerical experiment

Special Thematic Session Proposal (Optional): Natural and Applied sciences

MECHANICAL ENGINEERING

Bir SUV taşıt modelinde ön süspansiyon ve ön tekerleklerin toplam aerodinamik direnç katsayısına etkisinin deneysel belirlenmesi

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Özet: Taşıtlara hareketleri sırasında etki eden aerodinamik kuvvet ve momentlerin tespiti ve uygun taşıt tasarımların belirlenmesi aerodinamiğin en temel konusudur. Taşıt modelinin prototipi üretilmeden ilgili kuvvet ve momentlerin tespitinde kullanılan ve üreticilere büyük avantajlar sağlayan yöntemlerden birisi yol ve sürüş şartlarının modellenebildiği rüzgâr tüneli test ortamlarıdır. Bu çalışmada, 1/32 ölçekli bir SUV taşıt modelinde süspansiyon sistemi ve ön tekerleklerin toplam sürükleme kuvveti içerisindeki oranı rüzgâr tüneli testleri ile deneysel olarak tespit edilmiştir. Testler dinamik benzerlik şartının sağlanabildiği 2.31×10^5-5.35×10^5 Reynolds sayısı aralığında gerçekleştirilmiştir. Kinematik benzerlik şartının sağlanabilmesi için uygun boyutlarda taşıt modeli kullanılmış ve blokaj oranı %6.43 belirlenmiştir. Model araca etki eden sürükleme kuvvetleri 4 değişik serbest akış hızında belirlendikten sonra ölçekli taşıt modeli üzerindeki süspansiyon ve tekerlekler sökülerek aynı deney şartlarında testler gerçekleştirilmiştir. Süspansiyon ve ön tekerleklerin toplam aerodinamik direnç katsayısı içerisindeki oranının %8.60 olduğu tespit edilmiş, çalışmada bu oranı azaltabilecek yöntemler tartışılmıştır.

Anahtar Kelimeler: C_D katsayısı, Rüzgâr tüneli, Aerodinamik direnç kuvveti, SUV taşıt modeli, Süspansiyon sistemi

Experimental determination of the effect of front suspension and front wheels on the total aerodynamic drag coefficient on an SUV vehicle model

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Abstract: Determining the aerodynamic forces and moments affecting vehicles during their movements and determining appropriate vehicle designs are the most basic subjects of aerodynamics. One of the methods used to determine the reletad forces and moments without producing a prototype of the vehicle model and providing great advantages to manufacturers is wind tunnel test environments where road and driving conditions can be modeled. In this study, the ratio of the suspension system and front wheels to the total drag force in a 1/32 scale SUV vehicle model was determined

experimentally through wind tunnel tests. The tests were carried out in the Reynolds number range of 2.31×10^5-5.35×10^5, where the dynamic similarity condition was provided. In order to provide the kinematic similarity condition, a vehicle model of appropriate dimensions was used and the blockage rate was determined as 6.43%. After the drag forces acting on the model vehicle were determined at 4 different free flow speeds, the suspension and wheels on the scale vehicle model were removed and tests were carried out under the same experimental conditions. It was determined that the ratio of suspension and front wheels in the total aerodynamic resistance coefficient was 8.60%, and the study discussed methods that could reduce this ratio.

Keywords: C_D coefficient, Suspension system, Front Wheels, Wind tunnel, Aerodynamic, Drag force

Hibrit/alternatif yakıt kullanan ticari gemilerin çevresel etkilerinin incelenmesi

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Özet: Deniz taşımacılığı sektöründen kaynaklanan emisyonlar, fosil yakıtlara olan aşırı bağımlılık nedeniyle iklim değişikliğine katkıda bulunan başlıca unsurlardan biridir. Küresel ticarette en büyük paya sahip olan denizyolu taşımacılığından kaynaklanan emisyonların dünya toplamı içindeki payı günden güne artmaktadır. Küresel denizcilik sektörünün bir bütün olarak küresel ekonominin karbonsuzlaştırılmasında bir sorumluluğu ve rolü bulunmaktadır. Denizcilik sektörü, neredeyse tüm sektörlerin tedarik zincirlerinin kilit bir parçasıdır ve bu nedenle iklim değişikliğinin olumsuz sonuçlarını önlemek için emisyonlarını her yıl artırmayı bırakması, mutlak emisyonlarını azaltmaya başlaması ve sıfıra giden bir yola girmesi gerekmektedir. Bu hususta Uluslararası Denizcilik Örgütü 2023 yılında seragazı stratejisini kabul etmiştir. 2023 Uluslararası Denizcilik Örgütü (IMO) Sera Gazı Stratejisi, özellikle uluslararası deniz taşımacılığının karbon yoğunluğunun (taşıma işi başına CO_2 emisyonlarının azaltılması), uluslararası deniz taşımacılığı genelinde ortalama olarak, 2030 yılına kadar en az %40 oranında azaltılmasını öngörmektedir. Ayrıca, 2030 yılına kadar uluslararası denizcilik tarafından kullanılan enerjinin en az %5'ini temsil edecek ve %10'u için çaba gösterecek olan sıfır veya sıfıra yakın sera gazı emisyonu teknolojileri, yakıtlar ve/veya enerji kaynaklarının alımına ilişkin yeni bir hedef içermektedir. Bu çerçevede, deniz taşımacılığını karbonsuzlaştırmak için düşük ve sıfır karbonlu yakıtlara ihtiyaç duyulmaktadır. Deniz taşımacılığı için gelecekteki potansiyel yakıtlar ve itici güçler arasında amonyak, biyoyakıtlar, elektrik enerjisi, yakıt hücreleri, hidrojen, metanol ve rüzgar enerjisi bulunmaktadır. Gemi emisyonlarının en yüksek bölümü gemi tahrik sistemlerinden kaynaklandığından, tahrik sistemlerinde daha ileri bir dönüşüm gerekli ve kaçınılmazdır. Elektrikli tahrik sistemleriyle entegre edilen tamamen elektrikli gemiler artık yeşil denizciliğin geleceğini şekillendirmek için önemli ve umut verici bir teknoloji olarak görülmekte ve dünya çapında artan bir ilgiye yol açmaktadır. Bu çalışmada, elektrikli gemilerin çevresel faydaları, teknolojik açıdan hazır olma durumu, avantaj ve dezavantajları incelenmiştir.

Anahtar Kelimeler: Alternatif yakıtlar, denizyolu taşımacılığı, karbonsuzlaşma, elektrikli gemiler

Temperlenmiş 55Cr3 yay çeliği mekanik özelliklerinin doğrusal regresyon analizi ile modellenmesi

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Özet: Bu çalışmada, otomotiv endüstrisinde ticari araçların yaprak yay imalatında kullanılan 55Cr3 yay çeliğinde temperleme sıcaklığının mekanik özelliklere (sertlik, akma ve çekme dayanımı, darbe enerjisi) etkisinin doğrusal regresyon analizi ile incelenmesi amaçlanmıştır. Bunun için çelik numunelere, 870 °C'de 30 dakika östenitlemenin ardından yağda su verme ve farklı sıcaklıklarda (300°C, 375°C, 450°C, 525°C) temperleme işlemleri uygulanmıştır. Mekanik özellikleri belirlemek amacıyla sertlik, çekme ve farklı ortam sıcaklıklarında (-40°C, 0°C, 25°C ve 80°C) çentikli darbe deneyleri yapılmıştır. Elde edilen deney sonuçları regresyon analizinde kullanılarak sertlik, akma, çekme dayanımı ve darbe enerjisi değerleri için ayrı ayrı matematiksel modeller oluşturulmuştur. Analizler sonucunda 0.9' un üzerinde R2 değerleri elde edilmiş, temperleme sıcaklığı ile mekanik özellikler arasında güçlü bir doğrusal ilişki olduğu görülmüştür. Elde edilen deney sonuçları ile regresyon analizinden öngörülen sonuçlar arasındaki farkların az olduğu, sonuçların birbiri ile yakın olduğu görülmüştür. Darbe enerjisi üzerine temperleme sıcaklığı etkisinin darbe test sıcaklığına göre daha fazla olduğu matematiksel model ile ortaya çıkmıştır.

Anahtar Kelimeler: 55cr3 yay çeliği, Temperleme sıcaklığı, Mekanik özellikler, Regresyon analizi

Katı oksit yakıt pillerinde elektrot kalınlığının elektrokimyasal reaksiyon bölgeleri üzerindeki etkisi

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Özet: Katı oksit yakıt pili elektrotlarında, elektronları ileten katalizör fazı, iyon ileten elektrolit fazı ve yakıt/oksitleyici gazların iletildiği gözenek fazı olmak üzere üç farklı fazın temas ettiği bölgelerde elektrokimyasal reaksiyonlar gerçekleşmekte ve hücre performansı bu bölgelerin sayısı/uzunluğu ile ilişkilendirilmektedir. Bu bölgeleri belirleyen önemli parametrelerden biri olan elektrot kalınlıklarının hücre performansı üzerinde oldukça etkili olduğu da bilinmektedir. Bu amaçla optimum elektrot kalınlığının belirlenmesi üzerine literatürde gerçekleştirilen çalışmalarda elde edilen sonuçlar farklılık göstermekte olup rapor edilen ideal bir elektrot kalınlık değeri bulunmamaktadır. Bu çalışmada ise gözenek, katalizör ve elektrolit olmak üzere üç fazlı kompozit elektrotlar için 5, 10, 20 ve 40 µm olmak üzere farklı elektrot kalınlıklarının aktif reaksiyon bölgeleri üzerindeki etkisi sentetik mikroyapı üretimi yardımıyla incelenmiştir. Elde edilen sonuçlarda artan elektrot kalınlığı ile reaksiyon bölgelerinin olumsuz etkilenmediği ve sadece bu bölgelerin uzunluğu ile doğrudan hücre performansının ilişkilendirilemeyeceği sonucuna ulaşılmıştır.

Anahtar Kelimeler: Katı oksit yakıt pili, Elektrot, Sentetik mikroyapı, Elektrot kalınlığı, Reaksiyon bölgeleri

The effect of a hybrid treatment combining phase homogenization in electrochemical boriding and dual phase heat treatment on the mechanical properties and impact-sliding wear behavior of low carbon AISI 1020 steel

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Abstract: Modifying the phase homogenization in the electrochemical boriding (PHEB) process of AISI 1020 steel improved the mechanical and impact-sliding wear performance, providing an alternative to the medium-hardness and wear-resistant steels used as mold equipment in production activities carried out with high-pressure injection of metals such as zamak, aluminum, and plastic that require impact and sliding. A new hybrid heat treatment consisting of PHEB and dual-phase heat treatment produced a high-strength steel (~832 MPa) with a dual-phase structure in the core. Additionally, the proposed hybrid treatment led to the formation of a 50 μm-thick single-phase Fe_2B layer with 1744±100 $HV_{0.05}$ on the surface. In impact-sliding wear tests conducted at room temperature, it was determined that the wear rate in the impact and sliding zones decreased by 11% and 16%, respectively, compared to untreated AISI 1020 steel, in parallel with the increase in the hardness of the single-phase Fe_2B boride layer on the surface with a dual-phase steel structure in the core.

Keywords: AISI 1020, Electrochemical Boriding, Dual Phase Steel, Hybrid Process, Impact-Sliding

Investigation of the tribological properties of shot peening/salt bath nitriding duplex surface treated AISI 1020 steel

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Abstract: Samples produced from AISI 1020 low carbon steel were shot peened at 16, 20, and 24 Almen intensities and subsequently nitrided in a salt bath after shot peening process. To determine the tribological properties of the steels, linear reciprocating plane-ball wear tests were conducted, and the structural and mechanical properties of the steels were determined using an optical microscope and a microhardness tester, respectively. The studies revealed that shot peening/salt bath nitriding, which created a duplex surface treatment, enhanced the mechanical properties and wear performance of low-carbon AISI 1020 steel by enhancing surface hardness, reducing grain size, and forming hard phases on the steel's surface.

Keywords: AISI 1020, Wear, Shot Peening, Salt Bath Nitriding

Mathematical modeling of two-phase flow of composite fuel and its optimization in COMSOL Multiphysics

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Аннотация: The subject of this study is the modeling of a two-phase composite fuel flow, consisting of water and coal, using the COMSOL Multiphysics software environment. A macroscopic model of the composite fuel production technology was developed, which is both economically and environmentally efficient. The purpose of creating the model was to conduct a mathematical analysis of the state, movement, and distribution of coal particles in water, as well as to optimize the composition and properties of the fuel to improve the stability and efficiency of the composite fuel. The study employed the equations of the law of momentum conservation, continuity equation, and the law of mass conservation of the mixture, using the Laminar Flow parameter of the COMSOL Multiphysics software. As a result of the study, based on the developed model, the influence of coal grade, water viscosity, coal particle size, and the concentration of coal and water in the mixture on the quality of composite coal-water fuel was investigated and analyzed. The uniqueness and scientific value of the results obtained lie in the ability to assess the quality of the coal-water fuel by analyzing the state of coal particles in water and their migration behavior during mixing, using the developed macroscopic model. The practical significance of the obtained results consists in the potential use of plasticizers and stabilizers to improve the basic characteristics of composite fuels under industrial conditions. Future research may focus on modeling the effect of temperature and pressure to further improve the quality of composite fuel.

Ключевые слова: Water-coal mixture, Macroscopic model, Mathematical model, Rheological properties, Laminar flow

Tij tipi mikro-tüp katı oksit yakıt pilinin izostatik pres parametrelerinin optimizasyonu

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Özet: Bu çalışmada tij tipi mikro-tüp olarak adlandırılan yeni bir katı oksit yakıt pili geometrisinin üretimi başarı ile yapılmıştır. Tij tipi mikro-tüp desteklerin üretimi, geleneksel olarak kullanılan yöntemlerin aksine anot destek döküm şeritlerinin dişli bir çubuk üzerine sarılması ve ardından izostatik preslenmesi ile gerçekleştirilmektedir. Bu nedenle izostatik presin basınç (10-70 MPa) ve sıcaklığını (30-70 °C) hücre performansı üzerindeki etkisi araştırılmış ve bu parametreler elektrokimyasal performans baz alınarak optimize edilmiştir. Elektrokimyasal performans ölçümleri anot destek tabakasının 70 MPa basınç ve 60 °C sıcaklıkta izostatik preslendiği hücrenin 800 ºC çalışma sıcaklığında en yüksek maksimum performansı (0,6 W/cm^2) sergilediğini ortaya koymuştur.

Anahtar Kelimeler: Katı oksit yakıt pili, tij tipi mikro-tüp, şerit döküm ve izostatik pres

Katı oksit hücrelerde atık anot malzemelerinin geri kazanımı

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Özet: Bu çalışma, özellikle son teknoloji NiO-YSZ anot malzemelerini hedef alarak, katı oksit hücre anot desteği üretiminden kaynaklanan üretim atıklarının geri kazanımı ve geri dönüşümüne odaklanmaktadır. Katkı maddelerini çıkarmak için bir yakma işlemini içeren pratik bir geri kazanım stratejisi geliştirilmiş, ardından tane büyümesini yönetmek ve istenen toz özelliklerini elde etmek için öğütme işlemi yapılmıştır. Farklı koşullarda öğütüldükten sonra elde edilen çeşitli geri kazanılmış tozlar, daha sonra ekstrüzyon yoluyla anot destek mikrotüpleri üretmek için kullanılmıştır. Mikrotüp hücreler de bu destekler üzerine inşa edilmiştir. Ticari tozlar ve geri kazanılan tozlar ile üretilen hücrelerin elektrokimyasal performanslarının karşılaştırmalı analizleri gerçekleştirilmiştir. Sonuçlar, önerilen yöntemle geri kazanılan tozlardan imal edilen anot desteklerinin, ticari tozlardan yapılanlarla karşılaştırılabilir elektrokimyasal performanslar sergilediğini ve önerilen geri kazanım stratejisinin etkinliğini doğruladığını göstermektedir.

Anahtar Kelimeler: Katı oksit yakıt hücresi; Malzeme geri kazanımı; Üretim atıkları; Ekstrüzyon

Hydrogen production via dry reforming of methane in the presence of anionic clay catalysts: preparation, characterization and application

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Abstract: In the present work, Ni and Co-based hydrotalcite anionic clay catalysts (Ni@MgAl, and Co@MgAl) were prepared by solid-phase crystallization method at a basic pH (pH = 11),

calcined at 450°C for 6 h and reduced under H2 at 700°C for 1 h. In order to determine the structural, textural, physical and chemical properties of the samples so they were characterized by different technical-physical techniques: ICP, XRD, BET, FTIR, ATG/ATD, SEM, and RTP. They then were tested in the dry reforming of methane at the reaction temperature 700°C with a heating rate of 4°C/min.

The characterization results showed the good structure, textural and chemical characteristics of the hydrotalcites catalysts series Ni and Co prepared. But for the catalytic tests, the Ni@MgAl catalyst showed the best catalytic performance for hydrogen production due to the presence of the Ni0 active phase and also to its high specific surface area, high basicity and good dispersion of the Ni active phase.

Keywords: Hydrotalcite, Hydrogen, Greenhouse gases, Ni^0, CoO, Climate change, Comparative study, SPC preparation method

Diesel particulate filters (DPF)

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Abstract: In this article, a new diesel particulate filter (DPF) system with reciprocating flow is proposed, and an experimental study on the characteristics of the active−passive component regeneration of the DPF system is carried out. Several control parameters such as temperature distribution, pressure difference, and pollution emissions of the DPF system are measured for different reciprocating cycles. The mechanism of reciprocating flow regeneration of the DPF system and the effects of the reciprocating flow cycle on the performance of the DPF system are analyzed. Results show that (1) the DPF system can use a tiny amount of extra fuel to maintain the chemical reaction, which in turn realizes the regeneration of the catalyzed DPF because of its properties of heat recovery and reverse blowing of ash; (2) with the increase in the reciprocating flow cycle, the temperature profile moves toward the downstream side of the DPF system and the fluctuation amplitudes of the components of CO, NO, and NO2 increase; (3) if reasonable temperature distribution is formed in the DPF system for a certain reciprocating cycle, the regeneration efficiency can be obviously improved and the average content of particulate matter emission can be kept at quite a low level.

Keywords: Diesel particulate filter, Diesel particulate matter, Exhaust gas , Diesel engine

Design and implementation of a 24V-DC electro-thermal actuator for underfloor heating systems

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Abstract: This paper explores the design and implementation of a 24V-DC electro-thermal actuator for underfloor heating systems, offering a more energy-efficient and flexible alternative to the widely used 220V AC actuators. The actuator integrates a paraffin-based heat transfer mechanism combined with a high-precision DS18B20 temperature sensor, enabling rapid and accurate temperature control while ensuring durability in high-pressure environments. A key advantage of this design is its compatibility with both 24V AC and DC power, making it suitable for residential and industrial applications. The actuator is designed for domestic production, contributing to cost reduction and supporting local manufacturing. A microcontroller-based control system regulates the actuator, optimizing energy use and improving performance. Testing demonstrated that the actuator's power consumption is significantly lower than traditional models, consuming just 38.4W(24V) compared to the 3150W of 220V AC systems. The actuator also withstood industrial pressure conditions, ensuring long-term durability. In addition to energy efficiency, the project highlights potential future enhancements, such as IoT integration for remote control and monitoring, positioning the actuator as a smart solution for modern heating systems. This project paves the way for sustainable, locally produced, and technologically advanced solutions in the field of thermal actuators.

Keywords: 24V actuator, Electro-thermal actuator, Underfloor heating, Energy efficiency

Thermodynamıc modeling of the oxidation process of coal from the kara-keche deposit and calculation of the additive carbon footprint in the gas phase

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Abstract: The paper examines local coal sources and presents their physicochemical characteristics. The Kara-Keche coal deposit has been adopted as the model system, with the following composition percentages: hydrogen (H) - 3.65%, carbon (C) - 79.03%, nitrogen (N) - 0.84%, sulfur (S) - 0.55%, and moisture content considering oxygen (H_2O) - 18.47%. Thermodynamic modeling of the coal oxidation process at the maximum entropy of the system was carried out. The concentration distribution of components containing H, C, N, S, and O, as well as active particles and condensed phases, was established over a wide temperature range (298-3000 K). At the theoretical combustion temperature of coal (1998 K), the complete composition of carbon-containing substances in the gas phase was determined, and the additive value of the carbon footprint was calculated for the first time, taking into account the initial mass of carbon in the solid phase. The anthropogenic carbon load in the gas phase is useful for assessing the carbon capacity per unit of industrial production obtained from the combustion of solid fuel.

Keywords: Coal-air system, Oxidation, Carbon footprint, Thermodynamic modeling, Entropy, Gas phase

Special Thematic Session Proposal (Optional): Environmental engineering

Solar-powered thermal electricity generation system from disused telecommunication dish receivers

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Abstract: This project presents the design and development of a solar parabolic dish collector technology to curb the global high demand for energy. Traditionally, there has been reliance on fossil fuels such as coal, oil, natural gas which are major contributors to greenhouse gas emissions and climate change. This has led to the transition towards more sustainable and renewable energy sources. These renewable sources like solar power and many others, offer abundant, inexhaustible, and importantly produce little to no greenhouse gas emission during energy generation. This system harnesses the sun's energy using a disused telecommunication dish receivers covered with mirrors that reflect solar radiation onto a receiver located at the focal point of the dish. These concentrators are mounted on a structure with a two-axis tracking system enabling it to follow the sun. The receiver is a Stirling engine which generates electrical power from thermal energy. This enables the production of a reliable and green energy solution. The solar parabolic dish collector technology has the potential to solve the many energy problems and can be scaled for grid integration to meet national energy demands. Implementation of this system seeks to reduce the reliance on non-renewable resources, significant contribution to efficient sustainable energy, cost-effective alternative to traditional energy generation and alleviating the effects of climate change.

Keywords: Solar parabolic dish collector technology, Disused telecommunication dish receiver, Two-axis tracking system, Stirling engine, Sustainable energy

From powder to power: Ukrainian way, state & perspectives

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Abstract: The presentation is a short survey of the R&D activity of Laboratory for Ceramic Fuel Cells at Frantcevych Institute for Problems of Materials Science, Ukraine, on their way from cubic zirconia powder development to creation and elaboration of Ceramic (Solid Oxide) Fuel Cells in deep and fruitful cooperation with European institutions and universities under NATO and European support. It was started in 2004 and continuing currently moving to new SOFC paradigm to be resulted in creation of 3D energy cheeps on new materials base. Initially, the R&D was started with Zirconia doped with 10-mol. % Sc_2O_3 and 1-mol. % CeO_2 (1Ce10ScSZ) that was considered as a promising highly conductive alternative to widely used yttria stabilized zirconia (8YSZ) ceramic electrolyte and studied now extensively though comprehensive optimization of initial materials and their processing was resulted in a high improvement of 8YSZ electrolyte and 600 ^oC operating temperature. The comparative study of three types of 1Ce10ScSZ zirconia powders (Ukrainian and two commercial – Japan, DKKK, and USA, Praxair), which differ by initial particle size, size and properties of particle agglomerates, impurities and their distribution across agglomerates and ability to sinter, allows concluding as follows: Despite the formal similarity of three 1Ce10ScSZ zirconia powders by their chemical formula, their ceramic (solid) electrolytes are very different by both their electrical conductivity and mechanical behavior. At short-term testing, less 300 hours, Ukrainian 1Ce10ScSZ powder consisting of really nanosized, 9-13 nm, particles and doped with aluminum, silicon and iron oxides developed by V. Vereshchak [1,2] may provide almost one order of magnitude higher conductivity than its the purest industrial counterpart. At long-term testing, for at least 1500 hours of testing, 1Ce10ScSZ electrolytes made of powders, purity of which differs for more than one order of magnitude, namely Ukr and DKKK, have practically the same conductivity. The laminar-columnar structure of EB-PVD 1Ce10ScSZ film provides 5-6-fold gain of electrolyte conductivity in comparison with conventional screen-printed film. The NiO-ZrO_2 anode composite based on the Ukr 1Ce10ScSZ powder ensures above 100 MPa mechanical strength and near zero electrical resistance at >30 % porosity in reduced state. The novel powder and structure developments have allowed drastically improve transformation ability of SOFC for above 50% and decrease their operating temperature below 600 ^oC.

Keywords: Solid oxide fuel cell, Stabilized zirconia, Electrolyte, Anode, Electrical conductivity, Mechanical strength

Titanium based alloys for SOFC interconnect application

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Abstract: The work was devoted to development of the solid oxide fuel cell (SOFC) interconnects system made from titanium alloy was and testing under SOFC operating conditions (800℃, H2, O2). The system used by the Turkish partners under the NATO G5949 project was chosen as the basis for the design of the SOFC interconnect system. The manufactured system of interconnects allows conducting studies on the electrical properties of SOFCs with a size of 50x50mm under different operation conditions (gas supply speed, temperature 600-800 ℃). Comparative studies of the interconnect systems made of heat-resistant titanium alloy and stainless steel (Crofer APU22) were performed during short-term tests (5 hours) of the electrical properties of several SOFCs under the same conditions. The average values of maximum power of SOFCs tested using Crofer APU22 interconnects were found to be 0.33 W/cm2 and titanium alloy interconnects to be 0.29 W/cm2. In all cycles of short-term SOFC studies on titanium alloy interconnects, no failures were detected. The difference in values of SOFC performances were not significant and were at level of the experimental error. The obtained data indicated the promising application of the Ti-based SOFC interconnects. This should solve the problems associated with the poisoning of SOFC components with chromium compounds during long-term operation of CHP with Crofer APU22 interconnects (traditional interconnects). Further work will be focused on long-term studies of the developed interconnect systems under the SOFC operating conditions in order to study degradation processes of the materials.

Keywords: SOFC interconnect, Titanium based alloy, Electrical properties

Qualification of gas pipeline welding technology in relation to currently applicable standards and tests

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Abstract: In recent years, despite the increasing popularity of the share of renewable sources in energy production, there has been a noticeable increase in the demand for energy, natural gas and crude oil. Natural gas is the most practical method of energy transmission. It has many advantages that have influenced intensive development in the gas industry. Natural gas is a key energy raw material necessary for the development of a modern economy. For this reason, its uninterrupted transmission is necessary. The research described the so-called combined welding technologies, which are marked as: method "A" - 141/135, method "B" - 141/111, method "C" - 141/136. In each of the methods, the fusion layer was made using the 141 method and the groove was filled using the following methods: 135, 111, 136. With regard to the process of qualifying the welding technology, the main aspect was to find the optimal range of values for the amount of welding heat input in each of the passes, in order to avoid dangerously high grain growth in the HAZ resulting from the accumulation of welding heat. The obtained test results of welded joints are consistent with the recommendations of the PN-EN ISO 15614-1 and PN-EN 12732 standards, as well as Annex No. 5 to PI-ID-I03.

Keywords: Welding, Steel, Gas pipelines, Natural gas

Surface engineering strategies: Biocompatibility of titanium alloy implants

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Abstract: Enhanced well rehabilitation using a hydrodynamic cavitation stimulator offers an innovative approach to restoring well performance. The method is based on cavitation, where steam bubbles form and collapse, creating microjets and shockwaves that dislodge deposits such as paraffin, scale and other blockages in the wellbore. Compared to traditional mechanical or chemical methods, hydrodynamic cavitation is energy efficient, environmentally friendly and versatile, allowing it to be used in a variety of environments. This approach increases wellbore permeability and extends the life of oil and gas wells.

Keywords: Wellbore rehabilitation, Hydrodynamic cavitation, Stimulation techniques, Well cleaning, Enhanced oil recovery (EOR)

Intensification of the wellbore restoration process using a hydrodynamic cavitation stimulator

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Abstract: The Titanium alloys play a crucial role in modern biomedical engineering due to their exceptional combination of strength, fatigue resistance, corrosion resistance, and biocompatibility. These materials are particularly critical in the development of implants for various medical applications, including Total Artificial Hearts (TAH), dental implants, total joint replacements, and other Cardiac Medical Devices (CMDs). The objective of this project is to explore how surface engineering strategies can enhance the biocompatibility and performance of titanium alloy implants, ensuring their long-term success in the human body. And also addressing the properties of titanium alloys that make them suitable for medical implants, including their high-temperature resistance, fatigue strength, resistance to cracking, and excellent weldability. Additionally, this project investigates the international ISO certifications and classifications that regulate the use of titanium alloys in medical implants, ensuring the materials meet safety and performance standards. The project incorporates a meta-analysis of existing studies on surface engineering techniques, allowing for a comprehensive assessment of the most effective methods to improve titanium alloy implants. This will provide a broad overview of the discoveries and challenges faced in the field. Common problems such as poor osseointegration, inflammation, or implant failure is being addressed, and strategies has been proposed to mitigate these issues through advanced surface modifications.

Keywords: Material science, Biocompatibility, Medical device, Surface engineering

Definition of the Mean Temperature Profile in the Wall Turbulent Boundary Layer

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Abstract. This study investigates the processes occurring within the turbulent boundary layer, with a particular focus on the internal region near the wall. The analysis employs an analogous approach to describe both velocity and temperature profiles using a single equation that spans the entire thickness of the internal boundary layer. The approach accounts for both constant and variable fluid properties across a wide range of Prandtl numbers. A method is proposed to derive a unified equation that accurately represents the velocity and temperature profiles for the entire turbulent boundary layer. The results demonstrate strong agreement with experimental data for various fluids, including liquid metals, air, and fluid droplets, across a wide range of Prandtl and Reynolds numbers, as well as dimensionless wall distance (y+).

Keywords: velocity profile, temperature profile, wall boundary layer, Prandtl number, turbulent flow

Influence of operational parameters of porous materials on their deformation behavior

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Abstract: The article is focused on the inelastic deformations of porous and layering macrostructure and their influence to the deformation behavior of like this design . The influence of the relaxation deformation of design elements to the parameters of the exploitation efficiency, such as filling fluid pressure, porosity, and degree of saturation has been addressed. The numerical analysis was performed in assumption that the design being developed as a uniform deformational medium and under conditions of operating exploitation parameters.

The performed analysis demonstrates the relaxation process of the design being developed during the exploitation stages in regard to the defined specific parameters of the like this structure deformational behavior. It has been concluded that the medium relaxation parameters have the highest effect to deformational behavior design being developed with the highest initial operating parameters.

Keywords: Macrostructure, Porous, Layering, Inelastic, Relaxation, Creeping

Kürəvi qrafitli çuqunun injeksion üsulla saflaşdirilmasi

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Xülasə: Neft maşınqayırmasında istifadə olunan kürəvi qrafitli çuqundan (KQÇ-dən) hazırlanmış mürəkkəb konstruksiyalı hissələrə yüksək tələblər qoyulur. Bu hissələrin materialı yüksək möhkəmlik, bərklik, yaxşı mexaniki emal olunma qabiliyyəti, aşağı sürtünmə əmsalı, yeyilməyə və korroziyaya dözümlülük, aqressiv mühitlərdə işləmə qabiliyyəti kimi kompleks xassələrə malik olmalıdır. Mövcud metallurji emal üsulları ilə çuqunun sadalanan xassələr kompleksinə nail olunması mümkünsüz sayılır. Ona görə də, KQÇ-nin saflaşdırılması prosesində injeksion metallurgiyanın imkanlarından istifadə olunması gündəmdə olan aktual məsələdir.

Açar sözlər: Kürəvi qrafitli çuqun, İnjeksion metallurgiya, Saflaşdırma, kükürdsüzləş-dirmə, Fosforsuzlaşdırma

Аннотация: К сложным конструктивным деталям из чугуна с шаровидным графитом (ЧШГ), применяемым в нефтяной машиностроении, предъявляются высокие требования. Материал этих деталей должен обладать комплексными свойствами, такими как высокая прочность, твер¬дость, хорошая обрабатываемость, низкий коэффициент трения, стой¬кость к корро¬зии, способность работать в агрессивных средах. Достижение комплекса перечисленных свойств чугуна существующими методами металлургической обработки считается невоз¬мож¬ным. Поэтому использование возможностей инжекционной металлур¬гии в процессе рафинирова¬ние ЧШГ является актуальным вопросом

Ключевые слова: чугун с шаровидным графитом, инжекционная металлургия, рафинирование, десульфуризация, дефосфорация

Abstract: High demands are placed on complex structural parts made of ductile iron (DIG) used in shipbuilding. The material of these parts should have complex properties such as high strength, hardness, good machinability, low friction coefficient, resistance to corrosion and corrosion, ability to work in aggressive environments. It is considered impossible to achieve the set of listed properties of cast iron with existing metallurgical processing methods. Therefore, using the capabilities of injection metallurgy in the process of purifying ferrous metals is an urgent issue on the agenda.

Keywords: Ductile iron, Injection metallurgy, Refining, Desulfurization, Dephosphorization

Study the effect of Powder mixed EDM on MRR, TWR and SF of AISI D3 Die steel

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Abstract: Electric discharge machine (EDM) is effective tool for machining materials which are problematic to machine with conventional machining methods. It is based on thermo electric energy between the work piece and an electrode. The present work investigates the EDM of AISI D3 Die steel material. The tubular copper electrode utilized for concentric flushing of silicon carbide (SiC) abrasive suspended in dielectric medium. In this paper find correlation among the parameters are surface roughness, material removal rate, tool wear rate and working parameters of machining EDM required to determine for SiC abrasive powder. For the design of experiment Taguchi method is adopt. The SEM of the machined surface is also performed to survey the surface topography. The micro graphs determine that the SiC particles are implanted in the recast layer of the machined surface results in uniform properties of base materials phase and the machined surface.

Keywords: EDM, Silicon carbide, SiC, Tool wear rate, TWR, Scanning electron microscope(SEM), material removal rate, MRR, Powder mixed dielectric fluid

Elektromobillər üçün enerji doldurma stansiyalarinin layihələndirilməsi xüsuyyətlərinin tədqiqi

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Annotasiya: Nəqliyyatın optimal işləməsini təmin etmək üçün müvafiq nəqliyyat infrastrukturu yaratmaq lazımdır. Daxili yanma mühərrikləri (DYM) olan avtomobillərin mövcudluğu zamanı ənənəvi nəqliyyatdan istifadənin bir çox çatışmazlıqları və kritik nəticələri müəyyən edilmişdir. Bir çox ekspertlərin hesab etdiyi kimi, şəxsi nəqliyyat sahəsində və eyni zamanda enerji istehlakı strukturunda inqilaba başlamaq üçün elektromobilləri və onlar üçün zəruri olan infrastrukturu inkişaf etdirmək lazımdır. İndi infrastruktur nə dərəcədə inkişaf edib və biz elektriklə işləyən nəqliyyat vasitələrinə keçidə hazırıqmı - tədqiqatın problemi kimi ifadə etmək olar.

Açar sözlər: Elektromobil, Doldurma stansiyası, Konnektor, Infrastruktura

Özet: Ulaşımın en iyi şekilde çalışmasını sağlamak için uygun ulaşım altyapısının oluşturulması gerekmektedir. İçten yanmalı motorlara (içten yanmalı motorlara) sahip araçların varlığı sırasında, geleneksel ulaşım kullanımının birçok dezavantajı ve kritik sonuçları tanımlanmıştır. Pek çok uzmanın inandığı gibi, kişisel ulaşım alanında ve enerji tüketiminin yapısında bir devrim başlatmak için elektrikli araçların ve onlar için gerekli altyapının geliştirilmesi gerekiyor. Altyapının şu anda ne kadar gelişmiş olduğu ve elektrikli araçlara geçişe hazır olup olmadığımız bir araştırma sorunu olarak tanımlanabilir.

Anahtar Kelimeler: Elektrikli araç, Şarj istasyonu, Konektör, Altyapı

Abstract: Appropriate transport infrastructure should be established to ensure optimal transport performance. With internal combustion engine (DYM) vehicles, many disadvantages and critical consequences of using traditional transport have been identified. According to many experts, it is necessary to develop electric vehicles and the infrastructure necessary for them in order to start a revolution in the field of personal transport, as well as in the structure of energy consumption. How developed the infrastructure is and whether we are ready for the transition to electric vehicles - this can be called a research problem.

Keywords: Electric car, Charging station, Connector, Infrastructure

Comparative analysis of the extrusion process of precision composite machine parts with straight-through screw heads

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Abstract: In the article, a comparative analysis was carried out in the process of extrusion of precision machine parts from composite materials with the design of direct-flow screw heads in thermoplastic machines, the main defects of some designs of machine parts were determined, including the working strokes of the screw depending on the movement of the direct-flow heads were characterized. In addition, the article considers the main functions of screws with direct-flow heads, alloy heating and alloy injection, cooling in molds, and output of manufactured products. The productivity of manufacturing parts from precision composite materials depending on technological methods was analyzed, including the design of tips (mouthpieces) with a straight thread in the dosing zone, the main zones were determined by injection molding with screws with tips with a straight thread or straight-flow nozzles. Including a comparison was made With the existing structure of the crystallized material in the process of melting, the main reasons for the uneven section of the nozzle channel and the composite material passing through it are collected and cooled along the nozzle channel, while the composite material crystallizes and hardens at the exit from the nozzle channel. Including the reasons found, why the nozzle located in the head of the screw is periodically removed from the screw to perform cleaning of the structures of the head of the spraying screw and the crystallized mass is removed, etc. It was determined that with the existing design technological processes with technical and economic efficiency.

Keywords: Auger, Composite material, Straight-through tips, Precision parts, Heads

Investigation of the variation in surface microhardness depending on longitudinal feed in the processing of HARDOX-500 chromium-nickel steel by various methods

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Abstract: In this article, the microhardness of 15 mm thick HARDOX-500 chromium-nickel steel blanks has been measured before hydroabrasive processing, after grinding, after cutting with different longitudinal feeds, and after grinding with grinding wheels post-cutting. The surface microhardness of parts processed through hydroabrasive and grinding methods has been determined using a HECKERT device. Thus, the variation in the surface microhardness of blanks prepared by different technological methods depending on the longitudinal feed has been determined. The conducted studies revealed that the surface microhardness of chromium-nickel steels increases by several units after hydroabrasive processing compared to its pre-processing value, which enhances the wear resistance, reliability, and longevity of the produced component.

The primary aim of studying microhardness on surfaces obtained through various methods is to determine the patterns of microhardness variation resulting from the cutting forces encountered in different technological operations on blanks, thereby establishing their limits.

Keywords: Hydroabrasive processing, Steel blanks, Abrasive grains, Microhardness, Grinding wheel, Chromium-nickel steels

Critical thickness of presion parts hardened by laser method

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Abstract: The article is devoted to increasing the surface strength of precision parts by laser hardening and determining the critical thickness of the boundary layer to ensure durable operation of machines and devices. After laser surface treatment, the thickness of the nanodiffusion layer and its microhardness are the main factors that ensure the durability of machines and devices. When machining laser surface-hardened precision parts, the thickness of the diffusion layer can be significantly reduced, the diffusion layer is brittle and the core of the part has a soft treated metal, so the wear can occur. Along the axis perpendicular to the surface, the impact force P and abrasive grains with radius Rna affect the surface of the hardened layer. When laser hardening the surface of precision parts, the thickness of the layer must be greater than the critical value, and this will ensure their durable operation.

Keywords: Laser, Nanodiffusion layer, Precision parts, Strength, Critical thickness

Application prospects of $Bi_{1-x}(Ni_3Sn)_x$ alloys in thermomagnetic energy converters

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Abstract: The temperature dependence of transverse and longitudinal Nernst-Ettingshausen coefficients in Bi0.995(Ni3Sn)0.005 eutectic alloy was studied. Using this alloy the active part of the thermomagnetic radiation converter was constructed, and its parameters were calculated. The obtained results were compared with the similar data in the literature and it was determined that the receiver and detector constructed on $Bi_{0.995}(Ni_3Sn)_{0.005}$ have superior application parameters.

Keywords: Eutectic alloy, Thermomagnetic effects, Thermomagnetic energy converter

Alloy-based reinforcements in aluminium mmcs: ınsights into manufacturing, characterization, and optimization strategies

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Abstract: The addition of alloying elements to steel markedly improves its characteristics. This study investigated alloying elements as secondary reinforcements in Aluminium Metal Matrix Composites (AMMCs). Composites based on an Aluminium (LM 25) matrix were produced via the stir casting method. The SiC content, as the principal reinforcement, was maintained at 10 wt.% in all samples, while the secondary reinforcement compositions—nickel (0, 5, and 10 wt.%), molybdenum (0, 2, and 4 wt.%), and chromium (0, 1.5, and 3 wt.%)—were adjusted based on a L9 orthogonal array design. The composites were assessed for microhardness, tensile strength, wear resistance, scratch hardness, and porosity in accordance with ASTM standards to determine the impact of the reinforcing type and composition. Metallographic analysis was performed utilizing SEM, EDS, XRD, and optical microscopy (OM). The secondary reinforcement composition (Ni, Mo, and Cr) was optimized utilizing the Taguchi technique and Grey Relational Analysis (GRA) to determine a composite with superior attributes. The results indicated that the existence of several secondary phases in composites with a blend of secondary reinforcements adversely affected their performance. Furthermore, the reinforcements were evenly distributed within the aluminium matrix. The GRA results demonstrated that an ideal composition for AMMCs is attained with 5 wt.% nickel and 10 wt.% SiC, excluding the addition of molybdenum or chromium, resulting in the most favorable attributes.

Keywords: Nickel, Molybdenum, Chromium, GRA, optimization, Silicon Carbide, AMCs

Study of the problem of linear fluid percolation using the Laplace transform

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Abstract: The article examines the problem of complete flow of liquid into the well, which is related to the problem of linear percolation, and its solution. In this paper, it is assumed that the layer, which is infinite in length, is separated from the unused layer by a thin partition.

The mathematical model of the problem of hydrodynamics is characterized by a system of special differential equations. The solution of the problem was investigated and solved using the method of integral transformation and separation into variables.

Keywords: Research, Conversion, Reservoir, Mathematical model, Separation method

Резюме: В статье исследована проблема полного притока жидкости в скважину, связанная с задачей линейной фильтрации и ее решение. В данной работе предполагается, что слой, имеющий бесконечную длину, отделен от неиспользуемого слоя тонкой перегородкой.

Математическая модель задачи гидродинамики характеризуется системой специальных производных дифференциальных уравнений. Решение задачи исследуется и решается методом интегрального преобразования и разложения по переменным.

Решение задачи было исследовано и решено методом интегрального преобразования и разложения по его переменным.

Ключевые слова: исследование, преобразование, резервуар, математическая модель, метода разделения

Xülasə: Məqalədə xətti süzülmə məsələsinə aid olan mayenin quyuya tam axması məsələsi və onun həlli araşdırılır. Bu məqalədə fərz edilir ki, uzunluğuna görə sonsuz olan lay istifadə olunmayan laydan nazik arakəsmə ilə ayrılır.

Hidrodinamika məsələsinin riyazi modeli xüsusi törəməli diferensial tənliklər sistemi ilə xarakterizə olunur. Problemin həlli inteqral çevirməsi və dəyişənlərinə ayrılma üsulundan istifadə etməklə araşdırılmış və həll edilmişdir.

Açar sözlər: Tədqiqat, Çevirmə, Su anbarı, Riyazi model, Ayırma üsulu

PEM yakıt pili soğutma plakası için meyilli akış alanı tasarımı

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Özet: Bu çalışmada, bir polimer elektrolit membran (PEM) yakıt pilinin en önemli bileşenlerinden biri olan soğutma plakası için farklı akış alanı tasarımları oluşturulup, bu tasarımlar ısı transferi ve akışkan akışı açılarından incelenmiştir. Soğutma plakası malzemesi olarak grafit, soğutucu akışkan olarak ise su kullanılmıştır. Göz önüne alınan farklı akış alanı tasarımları için sonlu hacimler metodu kullanan Ansys Fluent yazılımı yardımı ile modelleme çalışmaları yapılmış ve bu çalışmalar neticesinde optimum akış alanı tasarımı belirlenmiştir. Optimum akış alanı tayin edilirken tasarımlardaki ortalama sıcaklıklar, sıcaklık homojenliği ve basınç düşüşleri esas alınmıştır. Nihai olarak 0.5-1.5 meyilli tasarıma sahip soğutma plakası ile daha homojen bir sıcaklık dağılımı elde edilmiştir. Özellikle yüksek Reynolds sayılarında sabit meyilli, giriş ve çıkış kanal yükseklikleri eşit ve 1 mm olan tasarıma sahip soğutma plakası ise daha düşük bir basınç kaybına imkan sağlamıştır.

Anahtar Kelimeler: PEM Yakıt Pili, Soğutma Plakası, HAD, Akış Alanı Tasarımı

Endüstriyel uygulamalar için geliştirilen pasif üst ekstremite dış iskeletin Opensim kullanılarak simülasyonu

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Özet: Endüstriyel uygulamalar için tasarlanan üst ekstremite pasif dış iskeletler, göz üstü seviyesinde çalışan bireyler için kas yorgunluğunu azaltmak ve fiziksel aktivitelerini iyileştirmenin yanı sıra zaman kayıplarının önüne geçerek üretimde verimliliği arttırmayı amaçlamaktadır. Yapılan çalışma; tasarım gereksinimlerinin belirlenmesi, kuvvet uygulama noktaları ve değişkenlerin sınıflandırılması ve simülasyon kurgusunun oluşturulması ile şekillendirilmiştir. Göz üstü seviyesinde çalışan bireyler için Ön kol ve arka kol hareketleri üzerine yoğunlaşılmıştır. Bu çalışmada Opensim programı yardımıyla kolun paralel konumdan 80 derecelik hareket aralığı içerisinde kas aktivasyonlarının analizleri yapılmıştır. Uygulanma alanına göre aktif olan kaslar Biceps, Triceps ve Brachialis kas grupları baz alınmıştır. Her kas hareketi ayrı ayrı incelenerek desteklenen kas gruplarının sonuçları, tasarım için girdi oluşturacak şekilde analiz edilmiştir.

Anahtar Kelimeler: Mekanik Dış İskelet, Opensim

Experimental investigation of circumferential temperature variation in large diameter wickless glass heat pipes

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Abstract: The objective of this study is to examine the circumferential temperature changes in large diameter wickless glass heat pipes utilized in glass heat pipe solar collectors. The low wettability of the glass surface by the working fluid, combined with the relatively low heat transfer coefficient, is anticipated to have a negative impact on the operational performance of the heat pipe. The study employed a heat pipe utilizing ethanol as the working fluid. The heat pipe was subjected to testing at varying tilt angles and heat loads, with surface temperatures recorded in the evaporator section of the heat pipe, both along its length and circumferentially. The experimental study revealed that there was no uniformity in the circumferential temperature change along the heat pipe. At 30° and 60° of tilt, the circumferential temperature difference was observed to be similar; however, at 90° of tilt, a significant disparity was identified. At an angle of 90°, there is an excessive increase in temperature towards the bottom of the heat pipe. In contrast, at inclinations of 30° and 60°, the upper surface of the heat pipe is consistently at a higher temperature, while the lower surface is at a lower temperature due to wetting by the working fluid. This results in a temperature difference between the top and bottom surfaces. Since high surface temperatures lead to increased thermal resistance, it is recommended that a wick be used to reduce the circumferential temperature variation and ensure complete wetting of the evaporator surface.

Keywords: Heat pipe, Glass heat pipe, Thermosyphon, Wickless heat pipe

Approbation of Ukrainian 8YSZ zirconia powder for SOFC manufacturing

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Abstract: Today, the main trend in the development of SOFC is to reduce operating temperatures while maintaining high efficiency. This can be realized through the search for new materials and manufacturing methods, or the improvement of existing ones.

Despite the presence of various materials, 8YSZ is the most widely used material for the SOFC manufacturing.

It is known that Ukraine has own zirconia-sand deposit that is the third in the World and practically the only in the Northern hemisphere. Ukrainian companies, Science & Technology Centre “NOVITECH” and Zirconia Ukraine Ltd., are starting their own pilot productions of zirconia powders with different stabilizers, currently 8YSZ and 10Sc1CeSZ to be optimized for electrolyte and electrode applications.

The goal of present work was approbation of developed Ukrainian 8YSZ zirconia powder for SOFC manufacturing.

The electrolyte supported SOFC samples were produced from conventional commercial Tape Cast Grade powder, and from Ukrainian 8YSZ powder: electrolyte 8YSZ; 8YSZ-NiO anode and LSM-cathode. To test the SOFCs performance, pure H2 (fuel) and air (oxidant) were fed into the anode and the cathode at a flow rate of 300 and 900 ml·min−1, respectively.

It was established that at 800 °C SOFC made from commercial powder demonstrated 0.44 W/cm2, while SOFC from developed powder showed 0.41 w/cm2 which indicates the promising nature of the developed powder.

Keywords: SOFC, 8YSZ, Electrolyte, Anode

Swelling behaviour of N-isopropyl acrylamide (NIPA) depend on ammonium persulfate (APS)

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Abstract: The manuscript deals with previous experimental investigation of the swelling behavior of NIPA in the interval of temperatures ranging from 10 up to 45 °C. Our objective is to investigate critical temperature features of its volume change response in water. For this purpose, eight series of equilibrium swelling tests (for 24 hours) were performed at various temperatures in water. The main objective is that the dependence of BIS amount on critical temperatures. Additionally, diffusion-swelling tests of NIPA were carried out at different temperature levels with different time intervals in water. Our objective is to investigate the capacity of re-swelling/de-swelling at different temperatures (6, 20 and 40 °C). For this purpose, four series of diffusion tests were conducted in water at different temperatures with different time intervals up to 24 hours in water.

Keywords: Hydrogel, Swelling, N-isopropyl acrylamide (NIPA), Ammonium Persulfate (APS)

The comparative study of electrical properties of electrolyte-supported and anode-supported SOFCs

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Abstract: The paper represents the comparative study of current–voltage characteristics of solid oxide fuel cells (SOFCs). Cells were tested at the same conditions. At 800 °C the electrolyte supported SOFC gives a power density of 2.4 mW/cm−2 at 0.7 V and a maximum power density of 6.8 mW/cm−2, the anode supported SOFC gives a power density of 3.2 mW/cm−2 at 0.7.V and maximum power density 4.1 mW/cm−2. In spite of thick electrolyte, commercial electrolyte-supported SOFC showed the highest electrical performances among studied fuel cells. This can be explained with high conductive material of electrolyte – 10Sc1CeSZ. SOFC based on anode has the good reproducibility and reasonable performance. The data will be used as a base for an optimization of SOFC manufacturing route.

Keywords: Solid oxide fuel cell, Current-voltage characteristic, Power characteristic

Analysis of thermal characteristics of Cattaneo-Christov heat flux on a dusty ternary nanofluid in a magnetic field with slippery conditions using artificial neural networks

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Abstract: In this study, the thermal properties of powdered ternary nanofluid subjected to magnetic field and shear boundary conditions were investigated using artificial neural networks. The nanofluid comprises graphene, tungsten oxide, and zirconium oxide nanoparticles, with heat transfer approximated by the Cattaneo-Christov heat flux theory, which accounts for thermal nonlinear radiation and velocity shear effects. The principal objective is to ascertain the friction factor and Nusselt number, which are essential factors in defining the thermal performance of the nanofluids. Constructed two artificial neural network models employing a multi-layer perceptron architecture with a Bayesian Regularization training algorithm. Models are trained on a total of 42 datasets from the literature, utilizing 15 neurons in the hidden layer. Artificial Neural Networks are utilized to determine the friction factor and Nusselt number for both the dusty and ternary nanofluid phases. The findings demonstrate a remarkable concordance between the ANN predictions and target values, with average variances of under -1.5%.

Keywords: Ternary nanofluid, magnetic field, slippery conditions, artificial neural networks, Cattaneo-Christov

Transient slip flow and activation energy effects in Williamson nanofluid under convective boundaries

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Abstract: Due to the enhanced thermal properties of nanoparticles and their crucial role in various industrial and engineering applications—such as heat exchangers, cooling systems, boilers, MEMS, chemical processes, laser diode arrays, and automotive engine cooling—a substantial body of research has focused on this area. In this context, the present study examines the unsteady flow of Williamson nanofluid over a rotating cylinder. The analysis incorporates additional factors, including activation energy, chemical reactions, and variable thermal conductivity. The flow model also accounts for second-order slip effects, introducing two slip parameters that significantly influence the boundary layers. The governing equations are transformed into a dimensionless form through suitable transformations, and a self-similar solution is obtained using the shooting method. Validation of the results is achieved through comparison with existing studies, showing excellent agreement. A comprehensive graphical analysis is presented for the involved parameters, with both the circular cylinder and the flat plate considered as limiting cases. The physical significance of each parameter is discussed in detail. Additionally, numerical results for the local Nusselt and Sherwood numbers are provided in tabular form. The findings reveal that both the temperature ratio parameter and slip constant lead to an increase in the nanofluid temperature, with the effect being more pronounced for the circular cylinder.

Keywords: Williamson nanofluid; Stretched cylinder; Second order slip; MHD;variable thermal conductivity

MEDICINE

Genomic Signatures in Uterine Cancer Subtypes Reveal Biomarkers and Precision Targets

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Abstract: Uterine cancer is the most prevalent malignancy of the female reproductive system, characterized by distinct molecular subtypes that significantly influence clinical outcomes. The discovery of new biomarkers and therapeutic targets is critical for improving diagnosis, prognosis, and treatment strategies for this highly heterogeneous disease. In this study, RNA sequencing data from the NCBI Sequence Read Archive (SRA) were analyzed using advanced next-generation sequencing (NGS) techniques. Following rigorous quality control and genome alignment, differential expression analysis using the edgeR package in R identified 82 differentially expressed genes (DEGs) ($p < 0.05$, log fold change > 2). Gene Ontology (GO), WikiPathways, and Reactome were utilized for functional enrichment analyses, revealing significant involvement in biological processes such as 'cell differentiation,' 'cell development,' and 'tissue formation.' Molecular function analysis pointed to enrichment in 'scaffold protein binding,' 'neuregulin binding,' and 'protein binding,' while cellular component analysis highlighted roles for 'extracellular vesicles' and 'membrane-bound organelles.' Pathway analysis revealed key processes including 'Fibronectin matrix assembly,' 'Cell junction regulation,' 'TROP2 signaling,' and 'YAP/TAZ mechanoregulation via Hippo and non-Hippo pathways.' A protein-protein interaction (PPI) network analysis using Cytoscape's StringApp identified 10 hub genes, with CDKN2A, LCN2, MUC1, FOXA1, and EPCAM emerging as promising therapeutic targets. These findings enhance our understanding of the molecular landscape of uterine cancer and offer potential avenues for developing precision therapies, underscoring the importance of molecular subtyping to tailor treatments for improved patient outcomes.

Key words: Biomarkers, Differential gene expression, Precision medicine, Therapeutic targets, Uterine cancer

Combating Alzheimer's Disease: Targeting DYRK1A with Naringenin and Quercetin

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Abstract: Motivation and Aim: Alzheimer's disease (AD) is a neurodegenerative disorder, characterized by progressive cognitive decline and loss of memory. Current therapies have limited efficacy, and less selectivity, so it is essential to look for new treatment strategies. DYRK1A is a highly conserved protein kinase that performs vital functions in various biological processes, including signal transduction, mRNA splicing, cellular differentiation, cell cycle regulation, and neuronal development. Situated on chromosome 21q22.2, DYRK1A is found to be overexpressed in Down syndrome (DS). This protein kinase is believed to have a noteworthy involvement in the occurrence of developmental brain disorders and the onset of neurodegeneration at an early stage including AD and DS is an attractive drug target for AD therapy. This study shows that naringenin and quercetin, known to have neuroprotective properties, can inhibit DYRK1A activity and, therefore, the progression of AD through a multidisciplinary approach. Fluorescence spectroscopy was employed to measure the binding affinity of naringenin and quercetin to DYRK1A. Molecular docking studies were carried out to predict the binding modes and identify key interactions between the compounds and DYRK1A. Molecular dynamics simulations analyzed the molecular binding dynamics of the protein-ligand complex. Enzyme inhibition assays were carried out to determine the inhibitory potency of naringenin and quercetin against DYRK1A. Both, naringenin and quercetin showed a very high affinity with the DYRK1A as confirmed by fluorescence spectroscopy and molecular docking studies. Molecular dynamics also showed the stable interactions of the free compounds, and the key residues present in the DYRK1A pocket. Enzyme assays confirmed the reduced activity of DYRK1A having IC50 value of 5.04μM and 09.16μM to inhibition of DYRK1A. These findings propose that targeting DYRK1A with natural compounds like naringenin and quercetin can be a good way to deal with AD. Furthermore, research is still needed for clinical trials to validate these findings and explore the potential therapeutics of these compounds for the treatment of AD.

Key words: Alzheimer's disease, Enzyme inhibition, Fluorescence spectroscopy, Naringenin, Quercetin

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The Shrinking Human Brain in Neurobiology

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Abstract: The brain is responsible for the formation of speech, thinking, attention, consciousness, memory and imagination. And in order to accommodate the sheer number of neurons and necessary connections in the skull, the brain must be highly complex. As a result, the brain forms gyrus, or ridges, and furrows. The most impressive feature of the brain is the number of connections formed between neurons. Human aging is accompanied by shrinkage of the brain parenchyma and declines in cognitive performance. However, the trajectories of age-related change vary among individuals, brain regions and cognitive domains. Although the observed pattern of age-related change may in part depend on the sample characteristics and the time window of longitudinal assessment, age-related changes in the brain and cognition follow, on average, a reasonably consistent pattern. Working memory, episodic memory, processing speed and spatial reasoning exhibit particular sensitivity to aging, whereas vocabulary and verbal comprehension are spared until the end of life. The studies on this issue are ongoing, and further study of the mechanisms underlying brain shrinkage may help to develop more effective treatments and support for people facing similar dilemmas.

Key words: Brain shrinkage, Human brain, Human aging, Memory, Neurobiology

Creating a dataset of turkish mammography reports for natural language processing applications

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Abstract: Mammography is the primary imaging method for early breast cancer detection and can detect tissue changes and lesions that may be missed during a physical examination. Therefore, it is necessary for it to be evaluated by a radiologist experienced in breast radiology.
While natural language processing (NLP) in medicine has seen significant development in English-speaking countries, it has not received adequate attention in Turkey, with limited studies available and most using English datasets. This study fills that gap by utilizing a Turkish dataset.
NLP processes include data preprocessing, tokenization, creating word vectors, and model training. These steps were applied to 47 mammography reports then to expand the dataset, a program was developed to allow doctors to input data. Retrospective data from 35,000 records spanning 2020-2023 were collected with ethics approval from NEU Medical School's Radiology Department. These data consist of doctors' interpretations of mammography, MRI (Magnetic Resonance Imaging), and USG (Ultrasonography) images of real patients. Some matching and filtering processes were applied during the preprocessing stage to ensure the consistency of the data for use in artificial intelligence systems. As a result, 4,678 records out of 35,000 became usable. The data were examined while generating the reports, and frequently occurring medical terms were extracted from the reports. By sharing the NLP workflow in the field of medicine, this study aims to guide researchers interested in conducting similar NLP studies in medical informatics.

Keywords: Natural Language Processing, Mammography, Deep Learning, Medical Dataset

Effects of a Lifestyle Intervention on Health Markers, Inflammatory and Oxidative Status, and Kidney Function in Patients with Non-Alcoholic Fatty Liver Disease

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Abstract Non-alcoholic fatty liver disease (NAFLD), the most common chronic liver disease observed in clinical practice worldwide, has been independently associated with a pro-inflammatory and oxidative state, as well as an increased risk of developing chronic kidney disease (CKD). The aim of this study was to evaluate whether a 24-month intervention based on a Mediterranean diet and physical activity, aimed at reducing intrahepatic fat content, is also associated with a reduction in stress and inflammation markers and the risk of chronic kidney disease. Forty adults (20 men and 20 women), aged 48 to 60, diagnosed with NAFLD and residing in the Balearic Islands, were recruited. Participants were divided into two groups based on whether or not they reduced their intrahepatic fat content, measured by nuclear magnetic resonance, after the nutritional intervention. A reduction in intrahepatic fat was associated with increased HDL-c levels, a decrease in body mass index, and lower circulating levels of glucose, HbA1c, triglycerides, LDL-c, total cholesterol, liver function markers (transaminases), and cytokeratin 18. Additionally, there was an increase in the activity of the antioxidant enzymes catalase and superoxide dismutase in erythrocytes, along with a reduction in the concentrations of the pro-inflammatory cytokines IL-6, TNF-α, and IL-18 (the latter being more specific to kidney inflammation). Regarding kidney function, an increase in the estimated glomerular filtration rate (MDRD) was observed. In contrast, participants who did not improve their NAFLD showed no significant changes in the aforementioned parameters, except for a decrease in MDRD. In conclusion, a healthy lifestyle promotes improvements in various parameters related to cardiovascular, liver, and kidney health.

Key words: Fatty liver, Inflammation, Nutrition, Oxidative stress, Renal disease

Syringin from Tinospora Crispa Downregulates Pro-Inflammatorymediator Production Through Myd88-Dependent Pathways Inlipopolysaccharide (LPS)-Induced U937 Macrophages

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Abstract: Syringin, a phenylpropanoid glycoside, has exhibited numerous biological properties including inhibitory activities against various immune and inflammatory disorders. In this study, syringin isolated from Tinospora crispa was evaluated for its ability to down-regulate activated nuclear factor-kappa B (NF-κB), phosphoinositide-3-kinase-Akt (PI3KAkt) and mitogen-activated protein kinases (MAPKs) signal transducing networks in U937 macrophages activated bylipopolysaccharide. The attenuating effects of syringin on the productions of prostaglandin E2 (PGE2), cyclooxygenase-2 (COX-2), interleukin-1β (IL-1β), and tumor necrosis factor-α (TNF-α), and the expressions of signaling molecules of the signaling pathways were investigated by using ELISA, Western blot, and qRT-PCR. Syringin downregulated the NF-κB, MAPKs, and PI3K-Akt signal networks by significantly reducing PGE2 production in the macrophages via suppression of COX-2 gene and protein expression levels. It also reduced TNF-α and IL-1β secretion and their mRNA expression, suppressed phosphorylation of NF-κB (p65), IKKα/β, and IκBα, and restored ability of IκBα to degrade. Syringin dose-dependently attenuated Akt, p38 MAPKs, JNK, and ERK phosphorylation. Also, the expression of corresponding upstream signaling molecules toll-like receptor 4 (TLR4) and myeloid differentiation primary response gene 88 (MyD88) were down-regulated in response to syringin treatment. The suppressive effect of syringin on the inflammatory signaling molecules in MyD88-dependent pathways suggested it's potential as a drug candidate for development into an agent for treatment of various immune-mediated inflammatory disorders.

Key words: Anti-inflammatory, Macrophages, MAPKs, NF-κB, PI3K-Akt, Syringin

Müze Materyali Olarak Saklanan Örümceklerde Antik DNA'nın Kullanımı

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Özet: Antik DNA; yıllar öncesine ait olan, özel koşullarda saklanamamış biyolojik kalıntılardan elde edilen DNA olup, geçmişe ait, eski gibi anlamları taşıyan "ancient" kelimesinden köken alıp "aDNA" şeklinde ifade edilmektedir. İlk olarak 1984 yılında yumuşak dokudan izole edilen aDNA, daha sonra müze materyalleri ve arkeolojik kazılar sonucunda ortaya çıkan kemik ve dişler gibi alternatif iskelet elemanlarından elde edilmiştir. Yaşamış ve yaşamakta olan canlı türleri ve bu canlı türleri arasındaki ilişkilerin ortaya çıkarılması, yeni türlerin tanımlanması, popülasyonlar arasındaki genetik farklılıkların ve gen akışının belirlenmesi, nesli tükenmiş canlılar hakkında bilgi edinilmesi ve filogenetik ağaçların oluşturulmasında önem taşımaktadır. Araknida (Örümceğimsiler) sınıfının bir üyesi olan örümceklerden aDNA eldesi; karmaşık korunma geçmişleri, küçük boyutları, müzede bulunan örnek sayısının azlığı ve müzelerde saklanma koşulları nedeniyle oldukça zordur. Müze örneklerinin DNA analizi yapılırken tamamen parçalanmaması gerekir. Son zamanlarda, hücrelerde lizis işleminde yüzey aktif maddeler ve indirgeyici ajanlar kullanarak, müzede saklanan örnekleri tamamen parçalamadan DNA elde etmeyi amaçlayan yöntemler uygulanmaktadır. Müzede saklanan örümcek örneklerinde aDNA'nın ortaya çıkarılması; elde edilen endojen DNA miktarının azlığı ve yaşayan türlere ait karşılaştırmalı moleküler verilerin yetersizliği ve örneklerin korunma geçmişine ilişkin eksik kayıtlar nedeniyle oldukça karmaşıktır. Müze materyali örümceklere özgü dizileme zorluklarına rağmen son yıllarda yeni genom dizileme teknolojisi (NGS) ve elde edilen verilerin birleştirme metodolojisindeki gelişmeler örümcek genomlarının daha etkin çalışılmasını sağlayacaktır.

Anahtar Kelimeler: aDNA, Yeni Genom Dizileme Teknolojisi (NGS)

The Utilisation of Ancient DNA in Spiders Preserved as Museum Material

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Abstract: Ancient DNA is DNA obtained from biological remains from years ago that cannot be stored under special conditions, and is referred to as "aDNA", originating from the word "ancient", which means "belonging to the past, old". First isolated from soft tissue in 1984, aDNA was later obtained from museum materials and alternative skeletal elements such as bones and teeth from archaeological excavations. It is important in revealing the living and living species and the relationships between these species, identifying new species, determining genetic differences and gene flow between populations, obtaining information about extinct species and creating phylogenetic trees. The extraction of aDNA from spiders, a member of the class Arachnida, is very difficult due to their complex conservation history, small size, small number of specimens available in museums and storage conditions in museums.

Museum specimens should not be completely lysed during DNA analysis. Recently, methods have been applied to extract DNA from museum specimens without completely lysing them, using surfactants and reducing agents in the cell lysis process. Unraveling aDNA in museum-stored spider specimens is complicated by the small amount of endogenous DNA obtained, the lack of comparative molecular data from living species, and incomplete records of the preservation history of specimens. Despite the sequencing challenges specific to museum material spiders, recent advances in new genome sequencing technology (NGS) and data assembly methodology will enable more efficient study of spider genomes.

Key words: aDNA; New Genome Sequencing Technology (NGS)

Enzyme Activity in Pancreatitis

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Abstract: In acute and chronic pancreatitis, activated pancreatic enzymes act as the primary factors of aggression, exerting primarily a local effect, and only then, penetrating into the retroperitoneal space, abdominal cavity, liver, bloodstream, they act at the systemic level. This feature is traditionally used in the diagnosis of this disease, determining the activity of pancreatic enzymes in the blood serum: amylase, lipase, trypsin, elastase, etc.. The maximum level of amylase is characteristic for the first day of the disease, while the activity of lipase remains longer. Similar patterns have been identified by us in the study of the enzyme spectrum in patients with pancreatitis. The aim of our study was to determine the enzyme activity in the blood serum of patients with pancreatitis before and after treatment. Serum and urine amylase levels were determined by a standardized method using a stable starch substrate (Karavey method); lipase and alkaline phosphatase levels were determined by a colorimetric method. The content of fecal elastase 1 (elastase test) was determined by enzyme-linked immunosorbent assay. To determine the activity of amylase, lipase, alkaline phosphatase, patients gave blood from a vein in the morning on an empty stomach, as well as the average portion of morning urine. It has been shown that pancreatitis causes hyperfermentemia in the body of patients And our studies showed that in the urine of patients with pancreatitis before treatment, the activity of α-amylase increased from 1000 U/L to 1580.5±34.5 U/L ($P<0.05$), and after treatment in patients with pancreatitis, this indicator was 746.4±1.2 U/L. In the blood and urine of patients with pancreatitis, the levels of alpha-amylase and lipase were found to be increased before treatment and decreased within the normal range after treatment. In patients with pancreatitis, the activity of alkaline phosphatase in the blood serum increased before treatment and decreased after treatment. In patients with pancreatitis, the content of fecal elastase decreased before treatment. Fecal elastase is recommended as a prognostic and diagnostic indicator. It was found that the leukocyte intoxication index is increased in the body of patients with pancreatitis.

Keywords: Alkaline Phosphatase, Alpha-amylase, Enzyme Activity, Elastase, Lipase, Pancreatitis

Активность ферментов при панкреатите

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При остром и хроническом панкреатите активированные ферменты поджелудочной железы выступают в качестве первичных факторов агрессии, оказывая, в первую очередь, местное действие, и только затем, проникая в забрюшинное пространство, брюшную полость, печень, кровоток, действуют на системном уровне. Эту особенность традиционно используют в диагностике этого заболевания, проводя определение в сыворотке крови активности ферментов поджелудочной железы: амилазы, липазы, трипсина, эластазы и др. Максимальный уровень амилазы характерен для первых суток заболевания, активность липазы при этом сохраняется более длительное время. Аналогические закономерности выявлены нами и при исследовании ферментного спектра у больных с панкреатитом. Целью нашего исследования явилось определение активности ферментов до и после лечения в сыворотке крови у больных с панкреатитом. Содержание в сыворотке и моче амилазы определяли по унифицированному методу со стойким крахмальным субстратом (метод Каравея); содержание липазы и щелочной фосфотазы колориметрическим методом. Содержание фекальной эластазы 1 (эластазный тест) определяли иммуноферментным методом. Для определения активности амилазы, липазы, щелочной фосфатазы пациенты сдавали кровь из вены утром натощак, а также средняя порция утренней мочи. Показано, что панкреатит в организме больных вызывает гиперферментемии. И наши исследования показала, что в моче у больных панкреатитом до лечения активность α-амилазы повышалось с 1000 ед/л до 1580,5±34,5 ед/л ($P<0,05$), а после лечения у больных с панкреатитом этот показатель составлял 746,4±1,2 ед/л. Установлено, что в крови и моче у больных панкреатитом уровень α-амилазы и липазы до лечения повышался, а после лечения уменьшался в пределах нормы. У больных панкреатитом в сыворотке крови активность щелочной фосфотазы до лечения повышалась, а после лечения уменьшалась. Показано, что у больных панкреатитом содержание фекальной эластазы до лечения уменьшалось. Фекальная эластаза рекомендована как прогностический и диагностический показатель. Установлено, что в организме больных панкреатитом лейкоцитарный индекс интоксикации повышен.

Ключевые слова: активность ферментов, панкреатит, α-амилаза, липаза, эластаза, щелочная фосфатаза.

Layered Precision: Crafting Multilayer Capsules for Next-Generation Cancer Therapy

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Abstract: Cancers, as a complex group of disorders, arise from the uncontrolled division and growth of cells. Such dysregulation leads to the formation of tumors, which may be either benign or malignant. There are numerous types of cancer, differing in their location, growth rate, and level of aggressiveness. Current research focuses on understanding the underlying mechanisms of carcinogenesis, improving early detection, and developing effective treatment strategies. Nanotechnology plays a pivotal role in the fight against cancer, particularly through the use of nanoparticles as drug delivery vehicles. Nanoparticles can enhance the stability, bioavailability, and biocompatibility of anticancer drugs, while simultaneously reducing their harmful effects on healthy tissues. One promising approach to nanoparticle-based drug delivery involves the use of capsules formed via the "layer by layer" (LbL) technique. This method entails the sequential deposition of various material layers onto particle surfaces, thereby increasing capsule stability. In our research, we focus on developing model capsules composed of poly(allylamine) (PAH) and polystyrene sulfonate (PSS), and comparing them with capsules based on poly-L-lysine (PLL) and poly(glycolic acid) (PGA). The stability of these capsules, analyzed through zeta potential measurements, has provided valuable insights that will facilitate further modifications to materials used in the transport of anticancer drugs.

Keywords: Cancer, Drug delivery, Layer-by-layer (LbL) technique, Nanotechnology, Phospholipid

Application of mHealth technologies in the control of ventricular arrhythmias

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Abstract: Ventricular arrhythmias (VAs) are life-threatening heart rhythm disturbances that require timely recognition and intervention. With the increasing prevalence of cardiovascular diseases (CVDs) and the growing global burden of healthcare costs, mobile health (mHealth) technologies have emerged as a promising solution for early detection and monitoring of VAs. This review explores the current landscape of mHealth technologies used for the recognition of ventricular arrhythmias, assessing their technological capabilities, challenges, and future potential. The analysis highlights the increasing integration of wearable devices, machine learning algorithms, and real-time data analysis, while also addressing challenges such as data accuracy, user compliance, and regulatory hurdles.

Keywords: mHealth Technologies, remote monitoring, wearable devices, ventricular arrhythmias

Mango Pectin’s from Côte d'Ivoire Use for Pharmaceutical Application

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Abstract: Mangoes, a prevalent tropical fruit, offer valuable pectin in their peels with antioxidant and gelling properties. This study explores the potential pharmaceutical applications of pectin extracted from four mango varieties in Côte d'Ivoire. The pectin extraction utilized a microwave-assisted acidic technique. The pectins were characterized by their esterification degrees, pH, and gel flow properties, which were assessed using a pH meter and rheometer. The study revealed varying esterification degrees which testified to the presence of low methoxyl pectin that gelled on addition of Cacl2 solution in citrate buffer. These gels exhibited a shear-thinning behavior that would facilitate their spreading on the skin, indicating potential use in cutaneous pharmaceutical formulations.

Keywords: Gels, Low Methoxy Pectin, Mangifera indica, Rheology

Chemical characterization and preliminary assessment of efficacy and tolerability of a food supplement based on an extract of *Mallow sylvestrıs* extract and sorbitol for functional constipation in healthy consumers.

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Abstract: Study rationale; Functional constipation (CF), according to the Rome IV criteria, consists of constipation that has no recognizable organic causes. The aim of this work was to evaluate the efficacy and tolerability of a dietary supplement (DS) based on Mallow sylvestris L. and sorbitol.

Materials and Methods: The chemical composition of *M. sylvestris* extract and its fiber content were determined by RP-UHPLC–HRMS method and gravimetric method, respectively. In addition, a market survey was conducted among consumers through validated questionnaires that assessed the number of bowel movements per week (EV/WK), stool consistency (via the Bristol scale) and abdominal pain (via the VAS - *Visual Analogue Scale*) in 56 subjects, treated for 20 days.

Results: Chemical analysis showed the presence of flavonoids and dietary fiber (2.7g±1.1g/100g of insoluble fiber and 5.9±0.2g/100g of soluble fiber). Consumers reported a statistically significant improvement for the parameters measured as a result of DS treatment. Specifically, the number of EVs/WKs, stool consistency, and severity of pain increased from 2.9±1.35 pre-treatment (t0) to 5.6±2.3 post-treatment (t1), from 2.1±0.85 at t0 to 3.3±1 at t1, and from 4.2±2.7 at t0 to 2.4±2.05 at t1, respectively. No side or adverse effects have been reported.

Conclusions: DS based on *M. sylvestris* and sorbitol is able to alleviate CF in healthy subjects and is well tolerated.

Hippophae rhamnoide: effect on the expression of aquaporins in colorectal adenocarcinoma (HT-29) cells, as a possible mechanism of action underlying its property of regulating intestinal function.

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Abstract: Study rationale; Gastrointestinal problems, including impaired intestinal motility (constipation and diarrhea), often due to incorrect lifestyle and dietary habits, are common disorders that affect a large part of the population. Among the treatment used, beside the modification of eating habits, there is the use of laxative drugs. However, long-term treatment with these drugs can cause side effects. Therefore, we focused our research on an extract of Hippophae rhamnoides (Elaeagnaceae - Sea buckthorn), which holds the property of regularizing intestinal transit.

Materials and methods: First of all, in order to determine the maximum non-cytotoxic concentration, the cytotoxicity on colorectal adenocarcinoma (HT-29) epithelial cells of an extract of *H. rhamnoides* was evaluated by the MTT assay (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium. Therefore, the modulation of the expression of Aquaporin 3 (AQP3), a trans-membrane protein that regulates the passage of water through the plasma membrane following treatment with the extract by Western blot analysis, was evaluated in the same cellular model.

Results: Treatment with the extract at a concentration of 100 µg/ml, for 24 hours significantly increased AQP3 protein expression compared to control.

Conclusions: In conclusion, the results of this preliminary investigation justify the traditional use of *H. rhamnoides* for the regulation of intestinal function.

PHYSIC

Kimyasal Buhar Biriktirme (CVD) Yöntemi ile 2D MoS_2 Üretimi ve Potansiyel Uygulamaları

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Özet: Yarı iletken geçiş metali dikalkojenürleri (TMD'ler), atomik olarak katmanlı yapıları sayesinde üstün elektronik, optik, mekanik ve kimyasal özellikler sergilemektedir. Sıfır bant boşluğuna sahip, yarı metalik özellik gösteren iki boyutlu (2D) grafenin keşfinden sonra Tungsten disülfür (WS_2), Molibden diselenid ($MoSe_2$), Molibden disülfür (MoS_2), Tungsten diselenür (WSe_2) gibi 2D yarı iletken özellik gösteren malzemelere olan ilgi artmıştır.

Bu TMD'ler arasında 2D MoS_2 ~1.8 eV bant boşluğunda doğrudan geçişli elektriksel özellik göstermesinin yanı sıra yüksek yük taşıyıcı hareketliliği, güçlü foton-madde etkileşimleri, kararlılık ve mikroelektronik uyumlu üretim özellikleri sayesinde nanoelektronik, optoelektronik ve esnek elektronik gibi çeşitli uygulamalarda potansiyel bir malzeme türü olarak ön plana çıkmaktadır.

MoS_2'nin elektronik uygulamalarda kullanılabilmesi ve ticarileştirilmesi için üstün özelliklerinin korunarak yüksek kalitede ve geniş yüzey alanında üretilmesi önem taşımaktadır. Kimyasal buhar biriktirme (CVD) yöntemi, yüksek kaliteli ve büyük ölçekli MoS_2 üretilebilmesi için en uygun yöntemlerden birisi olarak görülmektedir. CVD ile MoS_2 üretimi temel olarak bir Molibden (Mo) öncüsü ve Kükürt (S) tozunun taşıyıcı bir gaz aracılığıyla, yüksek sıcaklıklarda (~800 ^oC) reaksiyona girmesine dayanmaktadır. CVD yöntemiyle büyütülen ve üçgen yapılarla karakterize edilen MoS_2 yapılarının kalitesi ve yüzey alanı boyutu Mo:S oranı, büyüme sıcaklığı, büyüme süresi ve büyüme substratı ile S tozu arasındaki mesafe gibi faktörlerden etkilenebilmektedir.

Bu çalışmada da CVD yöntemi ile MoS_2 büyütülmesi gerçekleştirilerek büyüme parametreleri ile MoS_2 yapılarının ilişkisi incelenmiştir. Bulgular sonucunda S tozu ve büyüme substratı arasındaki ilişkiye yoğunlaşarak ayarlanabilir boyutlu MoS_2 üretimi için yeni bir yöntem geliştirilmiştir. Elde edilen MoS_2, grafen gibi çeşitli atomik incelikteki yapıların üst üste istiflenmesiyle katmanlı kompozitler oluşturulmasında ve elektronik uygulamalarda kullanılmaktadır.

Anahtar Kelimeler: Molibden disülfür (MoS_2), Kimyasal Buhar Biriktirme (CVD), İki Boyutlu (2D) Malzemeler, Geçiş Metali Dikalkojenürleri (TMD)

Özel Tematik Oturum Önerisi (İsteğe Bağlı): Fiziksel ve Teknik Bilimler: Nano Teknoloji ve Uygulamaları

2D MoS_2 Production by Chemical Vapour Deposition (CVD) Method and Potential Applications

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Abstract: Semiconducting transition metal dichalcogenides (TMDs) exhibit superior electronic, optical, mechanical and chemical properties due to their atomically layered structure. After the discovery of two-dimensional (2D) graphene with zero band gap and semi-metallic properties, interest in 2D semiconducting materials such as Tungsten disulfide (WS_2), Molybdenum diselenide ($MoSe_2$), Molybdenum disulfide (MoS_2), Tungsten diselenide (WSe_2) has increased.

Among these TMDs, 2D MoS_2 stands out as a potential material type in various applications such as nanoelectronics, optoelectronics and flexible electronics due to its high charge carrier mobility, strong photon-matter interactions, stability and microelectronics compatible fabrication properties as well as its direct transition electrical properties in the ~1.8 eV band gap.

In order for MoS_2 to be used in electronic applications and commercialised, it is important to produce MoS2 in high quality and large surface area while maintaining its superior properties. Chemical vapour deposition (CVD) method is considered as one of the most suitable methods for high quality and large scale MoS_2 production. The production of MoS_2 by CVD is mainly based on the reaction of a Molybdenum (Mo) precursor and Sulfur (S) powder at high temperatures (~800^oC) through a carrier gas. The quality and surface area size of the $_{MoS2}$ structures grown by CVD and characterised by triangular structures depend on the Mo:S ratio, growth temperature, growth time and growth time.

In this study, MoS_2 growth was carried out by CVD method and the relationship between growth parameters and MoS_2 structures was investigated. As a result of the findings, a new method for the production of MoS_2 with tunable size was developed by focusing on the relationship between S powder and growth substrate. The obtained MoS_2 is used in the formation of layered composites by stacking structures of various atomic fineness such as graphene and in electronic applications.

Keywords: Molybdenum disulfide (MoS_2), Chemical Vapour Deposition (CVD), Two Dimensional (2D) Materials, Transition Metal Dichalcogenides (TMD)

Special Thematic Session Proposal (Optional): Physical and Technical Sciences: Nano Technology and Applications

Grafen oksit katkılı $MgFe_2O_4$ nanokompozitinin ilaç taşıma sistemi platformu olarak uygunluğunun araştırılması

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Özet: Son yıllarda ilaç taşıma sistemleri, hedefe yönlendirilebilme ve yan etkileri azaltma gibi avantajları nedeniyle dikkat çeken bir araştırma konusu haline gelmiştir. Bu sistemlerde, grafen türevleri (grafen oksit, indirgenmiş grafen oksit, vb.) ve manyetik nanoparçacıklar önemli rol oynamaktadır. Grafen ve türevleri, geniş yüzey alanları ve yüksek ilaç taşıma kapasiteleri sayesinde tercih edilmektedir. Bu malzemeler, ilacın stabilitesini artırarak biyoyararlanımını optimize eder. Özellikle grafenin yapısal özellikleri, daha fazla ilaç yüklenmesine ve düşük dozlarla yüksek etkinlik sağlanmasına olanak tanır. Ayrıca, biyouyumlu ve biyodönüştürülebilir olmaları, vücutta daha iyi tolere edilmelerini sağlar.

Manyetik nanoparçacıklar ise dışarıdan uygulanan manyetik alanlar aracılığıyla ilacı vücut içerisinde hedefe yönlendirebilmektedir. Bu teknoloji özellikle kanser tedavisinde öne çıkmaktadır. Ek olarak nanoparçacıklar, tümörlü bölgelere ulaştıklarında manyetik alanla ısıtılarak kontrollü bir şekilde ilaç salınımını sağlayabilirler.

Kanser hücrelerinin yok edilmesi 42 °C gibi kritik sıcaklıklarda meydana geldiğinden, manyetik nanoparçacıkların ısınma kapasitesi önemli bir faktör haline gelmektedir. Böylece nanoparçacıkların ısınma miktarı kontrol edilerek hem ilaç salınımı hem de manyetik hipertermi gibi kombine tedavilerin yapılabilirliği mümkün olmaktadır. Ayrıca sıcaklığın kontrol edilmesiyle aşırı ısınma sonucu meydana gelebilecek yan etkilerin de önüne geçilebilmektedir.

Grafen türevi malzemeler ve manyetik nanoparçacıklardan oluşan kompozit yapılar, her iki malzemenin avantajlarını bir araya getirir.

Bu çalışmada manyetik özellikli $MgFe_2O_4$ nanoparçacıkları ve grafen oksit (GO) nano yapısı üretilerek $MgFe_2O_4$/GO nanokompoziti oluşturulmuş ve ilaç taşıma sistemleri için uygunluğu incelenmiştir.

Anahtar Kelimeler: Grafen oksit, ilaç taşıma sistemleri, manyetik nanoparçacık, manyetik hipertermi, $MgFe_2O_4$

Investigation of the suitability of graphene oxide doped $MgFe_2O_4$ nanocomposite as a drug delivery system platform

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Abstract: In recent years, drug delivery systems have become an attractive research topic due to their advantages such as targeted delivery and reduced side effects. In these systems, graphene derivatives (graphene oxide, reduced graphene oxide, etc.) and magnetic nanoparticles play a significant role. Graphene and its derivatives are

preferred due to their large surface area and high drug transport capacity. These materials optimize the bioavailability of the drug by increasing its stability. In particular, the structural properties of graphene allow for greater drug loading and high efficacy with low doses. Furthermore, they are biocompatible and biodegradable, which enhances their tolerability within the body.

The use of magnetic nanoparticles enables the targeted delivery of drugs within the body through the application of external magnetic fields. This technology is particularly prominent in cancer treatment. Moreover, the nanoparticles can be heated by the magnetic field when they reach tumour areas, thereby enabling the controlled release of the drug.

Since the destruction of cancer cells occurs at critical temperatures such as 42 °C, the heating capacity of magnetic nanoparticles becomes an important factor. It is therefore possible to control the amount of heating of the nanoparticles in order to facilitate the release of the drug and to enable combined therapies such as magnetic hyperthermia. In addition, by controlling the temperature, side effects that may occur as a result of overheating can be prevented.

Composite structures comprising graphene-derived materials and magnetic nanoparticles offer the advantages of both materials.

In this study, magnetic $MgFe_2O_4$ nanoparticles and graphene oxide nanostructure were fabricated to form $MgFe_2O_4$/GO nanocomposite and its suitability for drug delivery systems was investigated.

Keywords: Graphene oxide, drug delivery systems, magnetic nanoparticle, magnetic hyperthermia, $MgFe_2O_4$

Point of Care (PoC) sensörleri için grafen alan etkili biyosensör (GFET) platformu geliştirilmesi

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Özet: Klinik teşhis ve evde yapılabilecek testler için minyatürleştirme ve uygulama kolaylığı, biyosensörlerin geliştirilmesinde kritik öneme sahiptir. Bakım noktası (Point of Care-PoC) sensörleri, doktorlara muayene esnasında anlık olarak hızlı ve kesin karar verebilme yeteneği sunarak, teşhis süresini hızlandırmasının yanısıra, hastane dışında da kullanılabilme imkanı sunmaktadır. PoC sistemlerinin yüksek hassasiyet, doğruluk, hızlı algılama ve spesifik analit tespiti gibi çeşitli gereksinimleri karşılaması gerekmektedir. Mikro ve nano işleme teknolojilerindeki gelişmeler, elektronik devre elemanlarının küçülmesine ve performanslarının artmasına katkı sağlamıştır. Transistörler, ilk makroskopik prototipten entegre çiplere kadar ölçeklenebilmiş devre elemanı olarak, yüzey etkilerinden yararlanarak kimyasal ve biyolojik sinyalleri izleyebilme yeteneğini göstermiştir. Alan etkili transistör (FET) tabanlı biyosensörler, yüksek hassasiyetleri ve etiketsiz algılama özellikleriyle dikkat çekmektedir. FET biyosensörlerde, analit moleküllerinin oksit tabakası yakınında birikmesi, elektriksel yüzey potansiyelini değiştirerek, kanalda geçmekte olan akımı modüle eder. FET yapısını oluşturan Drain-Source kanalında nanomalzemeler kullanıldığında geleneksel teşhis yöntemlerinde elde edilenden daha yüksek hassasiyet elde edilebilir. Bu kanal yapısında 2D grafen kullanılması ile Grafen Alan Etkili Transistör (GFET) tabanlı sensörler elde edilir. Grafen, yarımetalik özellik gösteren bir malzemedir. Değerlik ve iletkenlik bantları Dirac noktasında kesişir ve Fermi seviyesi yapılan doping işlemleri sonucu değiştirilebilir. Bu değişimler, biyomoleküllerin algılanmasında kullanılabilir. Grafenin yüzeyinde oluşan elektriksel potansiyel, dış yükler, kimyasal modifikasyonlar ve bağlanmalar gibi faktörlerden etkilenir. Grafen, biyosensörler için spesifik biyoreseptörler (antikorlar, DNA probları,v.b.) ile fonksiyonlaştırılarak biyomoleküllerin seçici olarak algılanmasını sağlar. Hedef biyomoleküller grafen yüzeyine bağlandığında, elektrik iletkenliği değişir ve bu değişim biyo-algılama için kullanılabilir. Bu çalışmada, kimyasal buhar biriktirme (CVD) ve eksfoliasyon yöntemleri ile üretilmiş grafen tabakaları kullanılarak GFET'ler üretilmiş ve elde edilen bu biyosensör platformlarının Ferritin tespiti için biyosensör özellikleri incelenmiştir.

Anahtar Kelimeler: Grafen, Biyosensörler, Transistörler, Point of Care (PoC) Sensörleri

Özel Tematik Oturum Önerisi (İsteğe Bağlı): Fiziksel ve Teknik Bilimler-Nano Teknoloji ve Uygulamaları

Development of graphene field effect biosensor (GFET) platform for Point of Care (PoC) sensors

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Abstract: The miniaturisation of biosensors and the ease of their application are of critical importance in developing devices for the clinical diagnosis of disease and the monitoring of health in the home environment. Point of Care (PoC) sensors afford physicians the capacity to make prompt, accurate, and precise determinations during examinations, thereby accelerating the diagnostic process and enabling their utilisation in non-hospital settings. Point-of-care (PoC) systems must meet several requirements, including high sensitivity, accuracy, rapid detection and the ability to detect specific analytes. Advances in micro and nano processing technologies have facilitated the miniaturisation of electronic circuit elements and enhanced their functionality. Transistors, as a circuit element that has been scaled from the first macroscopic prototype to integrated chips, have demonstrated the capacity to monitor chemical and biological signals through the utilisation of surface effects. Field effect transistor (FET) based biosensors are of particular interest due to their high sensitivity and label-free detection properties. In field-effect transistor (FET) biosensors, the accumulation of analyte molecules in proximity to the oxide layer modulates the current passing through the channel, thereby altering the electrical surface potential. The utilisation of nanomaterials in the drain-source channel, forming the FET structure, has the potential to achieve a higher level of sensitivity than that attained through traditional diagnostic methods. Graphene field-effect transistor (GFET) sensors are constructed using two-dimensional graphene in the channel structure. Graphene is a semi-metallic material. The intersection of the valence and conduction bands at the Dirac point allows for the alteration of the Fermi level through doping processes. Such alterations can be employed in the detection of biomolecules. The electrical potential that is formed on the surface of graphene is subject to several factors, including external charges, chemical modifications and bonds. The functionalisation of graphene with specific bioreceptors (antibodies, DNA probes, etc.) enables the selective detection of biomolecules in biosensors. The attachment of target biomolecules to the graphene surface results in a change in electrical conductivity, which can be utilised for biosensing purposes. In this study, graphene field-effect transistors (GFETs) were produced using graphene sheets produced by chemical vapour deposition (CVD) and exfoliation methods. The biosensor properties of these biosensor platforms were investigated for the detection of ferritin.

Keywords: Graphene, Biosensors, Transistors, Point of Care (PoC) Sensors

Special Thematic Session Proposal: Physical and Technical Sciences-Nano Technology and Applications

The cosmological constant in anisotropic solution for vacuum

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Abstract: Conformably to early epoch, when the Universe was young may presence the cosmological a picture, greatly differs from homogeneous and isotropic expansion, supposing in standard model of Universe. The Friedman's model conformal for describe the real Universe in epoch, probable from a fraction of a second after beginning expansion and during all following time. In this case very early stages of the expansion of Universe not described of Friedman's model, since the expansion was anisotropic. In this early non-Friedman stage in some choosing direction may be rapidly expansion and at the same time in some another direction happen compression. In the [1] work shown, that in very general case beginning of expansion, if it is submit to equations of Einstein, must carry oscillating nature with sharp anisotropy on different direction.

In this work considering possibility situation, when early stage of expansion essential non-Friedman, since such possibility while should not exclude. It is considering particular case strictly homogeneous, but anisotropic solution of General Theory of Relativity. As a result, it was found that the early stages of the expansion of the Universe are determined by the cosmological constant or some state of matter imitating it. The presence of a cosmological constant at an early stage of expansion shows the transition from the Friedman regime to the de Sitter state.

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Keywords: Universe, expansion, friedman's model, cosmological constant, anisotropic solution.

Special Thematic Session Proposal (Optional): Physical and Technical Sciences: Astronomy & Space Technologies.

Relaxation time of the Blume-Capel model with a random crystal field in the neighborhood of equilibrium states

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Abstract: In this study, we have analysed the phase transitions and the relaxation time of the Mean-Field Blume-Capel model with random crystal field. The random crystal field is drawn from the bimodal probability distribution $P(D_i)=\frac{1}{2}\{\delta(D_i-D(1+\alpha))+\delta(D_i-D(1-\alpha))\}$. First, we assume that a small uniform external field is applied for only a short time. This moves the system slightly out of equilibrium. As a result, the system is slightly out of equilibrium and a finite magnetic Gibbs free energy production occurs. Gibbs free energy production is then used to introduce a generalised force and a generalised current. The dipolar and quadrupolar magnetic moments versus temperature and crystal field have been obtained. The first- and second-order phase transitions, tricritical and isolated critical points are obtained.

The phase diagrams have been represented for different ranges of α. The single relaxation time was then obtained by linearising the kinetic equation. In addition, the relaxation time as a function of the temperature and the crystal field is determined near the tricritical and isolated critical points as well as first transition points which occur for

different α values. The relaxation time displays a jump discontinuity at the first-order phase transitions. The diverging behavior is observed in the case of continuous phase transitions such as critical, isolated critical and tricritical points in accordance with the well known critical slowing down phenomenon which takes place near continuous phase transition point. Finally, the relaxation time versus crystal field reveal the fact that the first-order phase transitions disappear and partly ordered phase emerges for

large α.

Keywords: Mean-field approximation, random crystal field, relaxation time, Spin-1 Ising model.

Special Thematic Session Proposal (Optional): Online presentation

Grafen Okside Manyetik Özellik Kazandırılması ve Karakterizasyonu

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Özet: Biyoteknolojik asitlerin adsorpsiyonunda kullanmak üzere Grafen Okside manyetik özellik kazandırılmıştır. Adsorban maddesi olarak ticari satın alınan Grafen oksit kullanılmıştır. Adsorpsiyon çalışmalarında Grafen oksite manyetik özellik kazandırılmıştır. Hem manyetik özellik ile geri kazanım sağlanmış aynı zamanda yüzey alanı genişletilmiştir. Grafen oksit-magnetit kompozitlerinin üretimi için yapılan deneysel çalışmalarda deneysel prosedürün ekonomik olması, uygulanmasının kolay olması ve yüksek hacim kabiliyeti nedeniyle magnetit (Fe_3O_4) partiküllerin sentezinde kimyasal çöktürme işlemi tercih edilmiştir. Bu yöntem, suda çözünmüş olan Fe^{2+} ve Fe^{3+}'nın baz eklenerek birlikte çöktürülmesine dayanmıştır.

Anahtar Kelimeler: Grafen Oksit, kompozitler, adsorpsiyon

Kademeli a-Si Yapıların c-Si Heteroeklem Güneş Hücresi Performansına Etkisi

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Özet: Silisyum heteroeklem (HJT) güneş hücreleri, Si tabanlı güneş hücreleri arasında yüksek verimlilikleriyle öne çıkmaktadır. Bu yüksek verimliliğin temel nedeni, amorf silisyum (a-Si) katmanlarının sunduğu üstün yüzey pasivasyonudur. Bu çalışmada, katkısız amorf silisyum çok katmanlı yapılar kullanılarak yüzey pasivasyonunun iyileştirilmesi hedeflenmiştir. Farklı H_2 seyreltme oranları ile dört katmanlı a-Si yapılar geliştirilmiş ve HJT hücrenin pasivasyon kalitesi ile açık devre voltajı (Voc) üzerindeki etkileri incelenmiştir. Kademeli azalan ve kademeli artan gaz akışı ile üretilen a-Si yapıları karşılaştırıldığında, kademeli azalan yapının daha iyi bir pasivasyon sağladığı tespit edilmiştir. Bu bulgular, HJT güneş hücresi üretiminde gaz akış oranlarının ve çok katmanlı yapıların optimize edilmesinin verimliliği artırmada önemli bir potansiyele sahip olduğunu göstermektedir.

Anahtar Kelimeler: Hidrojenlendirilmiş katkısız amorf silisyum ((i)-a-Si:H), pasivasyon, kademeli yapı, Silan/Hidrojen (SiH_4/H_2) gaz akış oranı, heteroeklem güneş hücresi

Effect of Na-CMC surfactant on electrical parameters of Al/SnO2/p-Si photodiodes

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Abstract: The energy band gap of metal oxide semiconductors is of great importance in optoelectronic applications. Among the metal oxide semiconductors, SnO_2 has recently attracted attention due to its relatively low energy band gap (3.6 eV), thermal stability, high electron mobility, and being an environmentally friendly material. SnO_2 has many application areas such as sensors, solar cells, photocatalysis, photosensors and photodiodes. In this study, SnO_2 was used as the interface for Schottky type photodiodes and mesoporous SnO_2 (mp-SnO_2) was obtained by using a surfactant called sodium carboxymethyl cellulose (Na-CMC) to increase the electrical properties of this photodiode. Al/SnO_2/p-Si and Al/mp-SnO_2/p-Si heterojunctions were produced by spin coating and thermal evaporation methods. Current-voltage (I-V) and current-transmission (I-t) measurements were carried out to obtain various electrical parameters such as ideality factor, barrier height, series resistance, and photodetector parameters. Using the thermionic emission (TE) and Cheung models, the ideality factor values for the pure one were found to be 3.02 and 2.98, respectively, and for the mp-SnO_2 photodiode, they were found to be 3.84 and 3.83, respectively. With TE, Cheung and Norde models, barrier height values for the pure one were found as 0.516 eV, 0.521 eV and 0.522 eV, while the same values were found as 0.634 eV, 0.630 eV and 0.633 eV for mp-SnO_2 photodiode. Using I-t results, photodetector parameters such as responsivity, photosensitivity and specific detectivity parameters were also calculated. The results show that the photodiode and photodetector parameters of the mp-SnO_2 device are increased.

Keywords: Na-CMC, SnO_2, photodiode

Mikaelian Striped Waveguide Lens for Efficient Nanowire Coupling

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Abstract: This paper presents the design and numerical analysis of a Hyperbolic Secant (HS) Graded Index (GRIN) medium constructed using waveguide strips for efficient subwavelength light focusing and enhanced coupling efficiency. The HS GRIN structure, designed on a silicon-on-insulator (SOI) platform, demonstrates strong focusing capabilities with Full Width at Half Maximum (FWHM) values smaller than 0.425λ for structural lengths greater than 3.5 μm. The medium is designed to operate in the wavelength range of 1.48 μm to 1.57 μm, with a transmission efficiency of approximately 90%. The proposed medium's refractive index is modulated laterally using a lattice-spacing approach, allowing efficient light confinement and coupling. This approach addresses the challenge of fabricating continuous GRIN media, replacing it with all-dielectric waveguide stripes for index modulation. Numerical simulations, using the Finite-Difference Time-Domain (FDTD) method, confirm subwavelength focusing and efficient nanowire coupling. The potential applications of subwavelength light focusing span nanolithography, optical sensing, imaging, microscopy, precision optical measurements, and data storage. The proposed design shows potential for applications in nanophotonics, particularly in improving optical power transfer between mismatched waveguides.

Keywords: subwavelength focusing, GRIN optics, nanowire coupler, photonic device, silicon-on-insulator.

Active Tuning of Focusing Effect by Semicircular Nanohole LC-infiltrated Structure at Visible Light

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Abstract: This paper presents a novel design of a semicircular nanohole structure infiltrated with nematic liquid crystals (LCs) for actively tuning light focusing at visible wavelengths. Leveraging the birefringent properties of LCs, dynamic control of the refractive index is achieved through an applied voltage, which alters LC orientation. This enables precise tuning of the focal distance and Full Width at Half Maximum (FWHM) of focused light, enhancing the structure's versatility for photonic applications. Composed of indium tin oxide (ITO) with radially distributed nanoholes (35 nm), the structure's refractive index can be varied between 1.59 and 2.22, resulting in tunable focusing characteristics. Numerical simulations show that increasing voltage shifts the focal point closer, reducing FWHM and enhancing focusing sharpness. The structure demonstrates subwavelength focusing with FWHM values decreasing from 0.44λ to 0.33λ, offering high precision for light confinement. Efficient at 680 nm, the device's tunable focal distance and spot size make it a flexible solution for various optoelectronic applications. This approach has strong potential for a variety of photonic applications, including high-resolution imaging, optical sensing, and microscopy, where precise control over light focusing is crucial. Additionally, the low voltage requirement and compact nature of the design make it suitable for integration into portable and compact optoelectronic devices. The use of nematic LCs offers low power dissipation and cost efficiency, making this design an attractive option for both industrial and consumer applications where energy-efficient, tunable photonic components are needed.

Keywords: active tuning, focusing, refractive index control, nematic liquid crystals, nanohole structures

Exploring Self-Collimation Effects in Hexagonal Photonic Crystals with Symmetry Modifications

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Abstract: In this research, we present the design of a photonic crystal (PC) structure based on a hexagonal lattice, wherein modifications to the symmetry of the PC unit cell result in the emergence of an all-angle self-collimation (SC) effect. By systematically optimizing key opto-geometric parameters, such as the rotational angle and spatial arrangement of auxiliary rods, we conduct an in-depth analysis of the SC characteristics. This investigation employs group velocity dispersion (GVD) and third-order dispersion (TOD) as key metrics to evaluate the dispersion behavior. Additionally, we assess the impact of symmetrical variations on the dispersion properties of the structure.

Our findings reveal that a PC structure exhibiting C1 symmetry supports an all-angle SC effect within the normalized frequency range of $a/\lambda = 0.652$ to $a/\lambda = 0.668$, corresponding to a bandwidth of $\Delta\omega/\omega c = 2.4\%$. Upon further symmetry breaking, transitioning from C1 to C2 symmetry, the SC bandwidth expands significantly to $\Delta\omega/\omega c = 6.5\%$, and we observe nearly ideal linear equi-frequency contours (EFCs) in two distinct frequency bands. Specifically, all-angle SC is achieved between $a/\lambda = 0.616$ and $a/\lambda = 0.656$ in the fourth transverse magnetic (TM) band, and between $a/\lambda = 0.712$ and $a/\lambda = 0.760$ in the fifth TM band. For both TM bands, detailed GVD and TOD calculations are performed to characterize the SC behavior.

Furthermore, we propose a hybrid PC structure with C2 symmetry, wherein two auxiliary rods are replaced by rectangular photonic wires of identical refractive index and width equivalent to the original rods' diameter. This hybrid configuration exhibits an expanded all-angle SC effect with an operational bandwidth of $\Delta\omega/\omega c = 11.7\%$, while demonstrating near-zero GVD and TOD values, as well as enhanced resilience to fabrication tolerances.

Keywords: Photonic crystal, self-collimation, symmetry reduction, low symmetry

Influence of Mechanical, Electric, Temperature Fields and Corona Discharge on the Charge State of Polymers

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Abstract: Materials with irregular structures, mainly polymers and composites based on them, are analyzed from the point of view of the effect of elements and irregularity on the structures and the character of the physical-chemical stimulating factors on the process of the formation of the physical load and the effects associated with them.

In the article, the influence of electrical and mechanical stress, temperature and electrical discharge of different nature on the regularities and electrical properties of volume charge formation in material with heterogeneous structure and primarily on the initiation of electret and piezoelectric states in polymer composites was investigated. The relationship between parameters characterizing disorder or order in the structure, such as charge, electret and piezoelectric states, was revealed. Correlations between polymer structures and properties, discharge parameters, polymer oxidation, thermoluminescence and electret properties were determined.

Keywords: Polymer, Composite, Electret, Piezoelectric, Heterogeneous structure, Correlation

Hydrogen Production via Dry reforming of Methane in the presence of anionic clay catalysts: Preparation, Characterization and Application

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Abstract: In the present work, Ni and Co-based hydrotalcite anionic clay catalysts (Ni@MgAl, and Co@MgAl) were prepared by solid-phase crystallization method at a basic pH (pH = 11), calcined at 450°C for 6 h and reduced under H_2 at 700°C for 1 h. In order to determine the structural, textural, physical and chemical properties of the samples so they were characterized by different technical-physical techniques: ICP, XRD, BET, FTIR, ATG/ATD, SEM, and RTP. They then were tested in the dry reforming of methane at the reaction temperature 700°C with a heating rate of 4°C/min.

The characterization results showed the good structure, textural and chemical characteristics of the hydrotalcites catalysts series Ni and Co prepared. But for the catalytic tests, the Ni@MgAl catalyst showed the best catalytic performance for hydrogen production due to the presence of the Ni^0 active phase and also to its high specific surface area, high basicity and good dispersion of the Ni active phase.

Key words: Hydrotalcite, greenhouse gases, Ni^0, climate change, SPC preparation method

Виртуальная лабораторная работа при изучении физики в вузе

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В работе обсуждаются методические особенности и результаты использования компьютерных моделей в лабораторном практикуме по курсу физики в высшем учебном заведении. Организация виртуального практикума позволила перейти к фронтальному методу, при котором тематика каждой работы полностью соответствует тематике текущих лекционных и практических занятий. Появилась возможность создания полноценных работ по исследованию в учебной лаборатории статистических закономерностей в разделе электричество и магнетизм.

Основная особенность такого занятия заключается в том, что обучающийся может выполнять заданный эксперимент, в удобном временном режиме, ускоряя или замедляя время, изменяя парметры объекта, измеряя значения параметров и получая графическое изображение. Обоснована возможность организации физического практикума в виртуальном варианте при дистанционном обучении. Использование виртуальных лабораторных работ при изучении физики усиливает практическую направленность обучения, развивает мыслительную деятельность учащихся, формирует творческие способности и исследовательские навыки.

Ключевые слова: физический практикум, виртуальная работа, эксперимент, электричество и магнетизм.