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International Turkic World Congress on Science and Engineering

# III. INTERNATIONAL TURKIC WORLD CONGRESS on SCIENCE and ENGINEERING

## BOOK OF ABSTRACTS

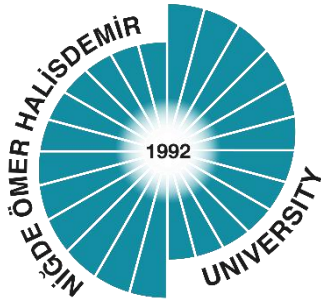
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## BOOK OF ABSTRACTS

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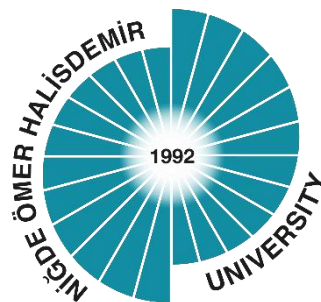
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## **INVITED SPEAKERS**

## Inference of Biological Network by Structural Equation Modelling

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**Abstract:** Several types of biological processes in a cell are generally controlled by internal network systems. Clarification of those complicated systems is one of the fascinating themes in systems biology field, and several types of network modelling algorithms have been developed and applied to many biological topics. I developed several types of network modelling algorithms, which are based on Boolean model, Graphical Gaussian Modelling, Graphical Chain Modelling and Structural Equation Modelling. In mathematical viewpoints, Structural Equation Modelling is one of the statistical methods to evaluate the accuracy of assumed model with the measured data. I showed you I have developed algorithms for network modeling, and especially the principle of biological network model estimation by Structural Equation Modelling and its applications.

**Keywords:** Network Modelling, Biological Network, Gene Regulatory System, Gene expression,

## **Geotechnical Challenges Of Mega Projects On Problematic Soils Of Kazakhstan**

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**Abstract:** Just as every civilization in the history is originated from the riverside, so the city of Nur-Sultan - new capital of Kazakhstan has been developed around the Ishim River. As its result, there are many bridges across the river. Also high rise building such Palace of Peace, Khan Shatyr, Abu-Dhabi Plaza, Ministry of Transportation Buildings, International Astana Airport, Mosque Hazret Sultan, New Railway Station, Expo2017 , LRT construction site and other many megastructures founded in problematical soil ground of Astana. These unique buildings need performing of deep driving and boring piling foundations. For designing of piling foundations on difficult soils are important investigations of behavior of piles by using of dynamic, static, O-cell, integrity piling tests. Also now we have development of geotechnical infrastructures of Megastructures in West Kazakhstan( Caspian Sea area). This paper includes of fresh results of several piling tests with comparison of numerical analysis by FEM. These investigations of interaction of piles with soil ground of new capital are important for understanding of mechanism of working of different piles on soft and hard soils of Nur-Sultan and West Kazakhstan. Also this paper introduced of experiences of piling constructions in winter season on freezing ground. The lecture includes recommendations and conclusion with proposing of methodic for the obtaining of bearing capacity and settlements of driving and boring piles on problematical soil ground of Nur-Sultan with Geoinformation Data Base . For Central Kazakhstan was provided of Complex Testing of New Conical Foundation on undermining soil ground of Karaganda coal prefecture. This presentation also included fresh information about the results of interaction of joint piles on difficulty soil ground of New Sea Port “ Prorva on coastal area of Caspian Sea at West Kazakhstan and Megastructure Bakad in Almaty.

## **Molecular mechanisms of plant anti-viral RNA interference**

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**Abstract:** RNA interference (RNAi) plays multiple biological roles in eukaryotic organisms to regulate gene expression. RNAi also operates as a conserved adaptive molecular immune mechanism against invading viruses. The antiviral RNAi pathway is initiated with the generation of virus-derived short-interfering RNAs (siRNAs) that are used for subsequent sequence-specific recognition and degradation of the cognate viral RNA molecules. As an efficient counter-defensive strategy, most plant viruses evolved the ability to encode specific proteins capable of interfering with RNAi, and this process is commonly known as RNA silencing suppression. Virus-encoded suppressors of RNAi (VSRs) operate at different steps in the RNAi pathway and display distinct biochemical properties that enable these proteins to efficiently interfere with the host-defense system. Recent molecular and biochemical studies of several VSRs significantly expanded our understanding of the complex nature of silencing suppression, and also remarkably advanced our overall knowledge on complex host–virus interactions. In this review, we describe the current knowledge on activities and biochemical mechanisms of selected VSRs with regard to their biological role of suppressing RNAi in plants.

## **Development of regulatory framework for genome-edited organisms in the European Union**

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**Abstract:** Genome editing is a set of techniques to make highly specific targeted changes in genomes. Unlike established methods of genome modification, genome editing may achieve desired plant traits without introducing any exogenous DNA in target genomes. These techniques have been hailed worldwide as a solution for targeted crop improvement, especially for tackling the challenges of climate change. However, the European Court of Justice indicated that the genome-edited organisms may be subject to the EU GMO Directive potentially facing extensive regulation for authorization. Since EU is a major importer of agricultural goods, such regulation may have broad implications for international trade. Per request of the Council of the European Union, the European Commission initiated and recently concluded a study involving input from the Member States and different stakeholders regarding the status of novel genomic techniques including genome editing,. In this talk, I will outline the major conclusions of the EC study. In particular, I will discuss current European Food Safety Authority scientific opinions on the site-directed nucleases 1 and 2 (SDN-1, SDN-2), synthetic biology plants and gene drive organisms which formed part of the EC study. The EFSA opinion will provide a temporary solution for scientific risk assessment of SDN-1 and SDN-2 plants; however, it is hoped that current stakeholder initiatives will result in updates to the EU GMO legislation that better reflect the benefits of modern agricultural biotechnology and the needs of society.

## **New Configuration of Microbial Fuel cell for waste water treatment and green electricity generation**

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**Abstract:** Microbial fuel cell (MFC) is a suitable device for biological wastewater treatment that can use different types of wastewater and simultaneously generate electricity in addition to pollutants removal. One of the factors affecting system performance is MFC structure and configuration. Air cathode MFCs have recently received much attentions due to their unlimited access to oxygen and low space between electrodes. In this study, the newest single chamber air cathode MFC was fabricated using a novel design without the presence of a proton exchange membrane (PEM) and its performance was studied in the field of bioelectricity production and dairy wastewater treatment under two batch and continuous operating conditions. After numerous studies, it was decided to fabricate electrodes based on stainless steel mesh (SSM), which were modified using cost effective carbon materials.

## **Genetic Dissection of Hereditary Hearing Loss and Ocular Diseases in Consanguineous Pakistani Families**

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**Abstract:** Pakistan, the second largest Muslim country in the world, is situated in South Asia. Our country is a central hub of approximately 18-20 ethnic groups (Punjabis, Sindhis, Pushtuns, Baloch, Siddis, Chitralis, Hindkowans, Gujrati, Kahmiris, Shina, Kalyu, Burusho, Hazara, Balti, Khowar and Kalash) with their own cultural norms. Despite of such as large socio-economic diversity, consanguinity in Pakistan is more than any other country in the world. This situation has contributed to genetic anomalies at mass scale. The current study was conducted in order to determine the genetic mutations underlying the hearing loss and inherited eye diseases. Moreover, our study also aimed at molecular as well as genetic factors which can exacerbate or mitigate the pathogenic mutations which affect the structure and function of cochlea and retina in affected persons. For this purpose, the clinical evaluation of affected people was done by audiometry, tandem gait, Romberg Test and Fundoscopy. After that, whole exon sequencing and prioritization of pathogenic variants (by CADD Score, Read Depth, link to the disease, Pedigree pattern filters) was performed followed by Sanger sequencing. In silico tools like Clustral Omega, Mutation Taster and Protein modelling were used to predict the pathogenicity of segregated variants. The results of our study revealed that hereditary hearing loss and inherited eye diseases are genetically and clinically eterogeneous. It was concluded that 12 pathogenic variants in 18 consanguineous Pakistani families. The findings of this study will help to better understand the genetic architecture and pathophysiology of hearing loss and eye diseases in Pakistani population and help to improve the molecular diagnosis for these diseases. It will also create public awareness and will reduce the socio-economic burden by decreasing the incidence of this disease through genetic counseling of the families.

## **Seismic Evaluation and Structural Health Monitoring of Heritage Buildings: A review of case studies in Peru**

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**Abstract:** The talk will present the application of innovative strategies for performing structural evaluation and long-term structural health monitoring of historical adobe buildings located in South America. The application of a combined strategy using experimental and numerical tools to assess the structural behavior of these buildings will be discussed in the context of their application in two case studies. Regarding structural health monitoring, the planning and installation processes of a monitoring system in an emblematic 16th Century Peruvian church and a detailed discussion of the results of almost two years of continuous monitoring will be presented. In this last case, the structural monitoring results evidence an annual cyclical behavior of the natural frequencies with a correspondence with the changes in environmental conditions due to seasonal influences when certain conditions are considered for data processing.

## Effectiveness of Green Extraction for Recovery of Plant-based Functional Components

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**Abstract:** Plants are a blessed source of high-value components so called functional compounds (FCs) with potential medicinal benefits. Due to wide diversity of chemical structures, reactivity and varying concentrations, the extraction/isolation of FCs from various plant sources is a challenging task. Conventional extraction techniques (CETs), which mostly involve the use of volatile organic solvents (VOSs) such as methanol, chloroform, acetone, ethyl acetate and hexane are employed for the extraction of FCs from different plant materials. Nevertheless, these CETs have limitations with regard to process safety and quality of the end-use products. In line with the emerging trends of optimal nutrition, coupled with high demand from food and pharmaceutical sector for purified and safer natural extracts, now green extractions are coming to the forefront as an eco-friendly alternatives to CETs. This lecture mainly explores the usefulness and applications of some innovative techniques such as microwave-assisted extraction, enzyme-assisted extraction, supercritical fluid extraction and plant milking technology for efficient recovery of potent FCs/ functional extracts from various plant materials with the perspective of their potential uses as ingredients in functional food and nutra-pharmaceutical industry.

## **NAD<sup>+</sup>: Promoting healthy ageing**

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**Abstract:** Ageing is the major demographic challenge of this millennium and has important implications for disease, health care practice and policy. Studies in recent years have shown that the molecule nicotinamide adenine dinucleotide (NAD<sup>+</sup>) can play an important protective role in some degenerative disease states and slow down 'ageing' by improving cellular bioenergetics. Dr. Braidy will show how boosting NAD<sup>+</sup> levels can profoundly reduce oxidative cellular damage and counter age-associated pathologies and promote 'healthy' ageing. Dr. Braidy was the first to show that intracellular levels of NAD<sup>+</sup> declines with age in catabolic organs including the brain, heart, lung, liver and kidney, in physiologically aged rats. He went on to show that oxidative stress-induced NAD<sup>+</sup> depletion could play a significant role in the ageing process, by compromising, energy production, DNA repair and genomic surveillance in human tissue. Dr. Braidy's research group recently developed a reliable, robust, and sensitive method to simultaneously quantify the NAD<sup>+</sup> metabolome across biological samples, cells, tissue, blood and other fluids. His group is currently using this orthogonal tool to gauge the therapeutic significance of NAD<sup>+</sup> in age-associated diseases

# **CONTROL, COMPUTER, ELECTRICAL, ELECTRONICS, AND MECHATRONICS ENGINEERING**

## A Sponge-Based Cryptographic Hash Function with Set of Internal Functions

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**Abstract:** The cryptographic hash function, as a cryptographic primitive, is the basis for creating effective tools of cryptographic protection of information to ensure information security in various information systems. Currently, the "Sponge" scheme is the most successful and promising way to build modern cryptographic hash functions. The purpose of this article is to build an example of a cryptographic hash function based on the "Sponge" scheme. The main and important component of the "Sponge " scheme is the internal function, which is a fixed-length transformation or permutation that operates with a fixed number of bits that make up the internal state of the function. The classic "Sponge" scheme and most of its modifications assume only one internal function. In this paper, we consider a modification of the "Sponge" scheme, which involves the use of a set of internal functions. The choice of one of the many internal functions is performed using the selection function. In this paper, we consider the implementation of the function of selecting an internal function from a given set for the modified scheme. The selection function is constructed for the case when the scheme specifies a set of three internal functions. Similarly, we can construct a selection function for the case of more than three internal functions using a cascade of demultiplexers. And finally, we consider an example of a modified sponge-based hash algorithm that specifies a set of internal functions.

**Keywords:** Cryptographic hash function, Scheme, Sponge, Internal function, Modification.

## About Choosing The Optimal S-Boxes

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**Abstract:** S-boxes are one of the main components that determine the nonlinearity of the encryption transformation and the level of security of modern symmetric cryptographic algorithms. In this article criteria for optimal S-boxes and methods for obtaining optimal S-boxes are considered. The analysis of the criteria and methods will make it possible to build the most efficient algorithm for generating optimal S-boxes.

**Keywords:** S-box, Substitution box, Optimal S-box, Criteria, Cryptographic algorithm.

## Обучение казахскому языку при помощи платформы «Revita» — из опыта работы

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**Abstract:** We describe the application of a CALL (computer-aided language learning) system to Kazakh, a major Turkic language, in a university setting. The system aims to support learners toward advanced levels of proficiency through continual detailed assessment of the learner's progress, based on an unlimited variety of linguistic exercises. The paper reports the experimental setup, as well as initial results, and suggests directions for further development and improvements.

**Keywords:** Kazakh, Language learning, Intelligent tutoring systems, CALL, Computer-assisted language learning, Artificial intelligence

## Testing of Methods with Synthetic Data: Logistic Regression and Likert Scale Example

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**Abstract:** Testing the robustness of techniques and performing a controlled assessment requires large training datasets consisting of samples labeled with the classes to which they belong, which is difficult and time costly. There are also many technical, ethical, or budgetary reasons for this challenge. Obtaining experimental results by producing synthetic data can overcome these disadvantages. The study aims to produce Likert-type synthetic data classified by traditional techniques such as logistic regression technique and evaluate synthetic data by the performance of classification models under different conditions. The results of the study are compared with results found in the literature. To evaluate classifier performance comprehensively the ROC curve was used.

**Keywords:** Synthetic data, Logistic regression, Likert scale

## **Борбордук Азиядагы университеттерде Moodle платформасынын колдонулушу**

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**Аннотация:** 2020 жыл адам баласы үчүн өзгөчө жылдардан болду. Жашоонун бардык секторлорунда өзгөрүүгө дуушар болду, анын ичинде билим берүү багыты да бар. Ар кайсы багытта санариптештирүү процесси аткарылып жатканда канчалык деңгээлде билим берүү багытында бул иш чаралар аткарылганын 2020 жылы бир аз да болсо таасир эткенин көрдүк. Moodle электрондук окутууну башкаруу тутуму (Learning Management Systems – LMS) дүйнө жүзүндө 50% процент колдонулат. Бул изилдөөдө, Кыргызстан, Казакстан, Өзбекистан жана Тажикстан мамлекеттеринде пандемия учурунда канчалык деңгээлде Moodle электрондук окутууну башкаруу тутуму колдонулганын каралып чыкты. Жыйынтыктарга жараша, окутууну башкаруу сайтына кирген студенттердин саны сырткы факторлор (б.а., бул сайтка канчалык деңгээлде башка булактардан шилтемелер берилгендиги) менен түздөн түз байланышы болгонун, мындан тышкары сайтта кармалуу убактысы (Visit duration) - веб баракчасынын түзүмүнө жараша экендиги аныкталды.

**Ачкыч сөздөр:** Окутууну башкаруу тутуму, Орто Азия, билим берүү, Издөө тутумду оптималдаштыруу

## Secure Outsourcing a Linear Programming Task with Secret Parameters

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**Abstract:** We investigate new methods for secure cloud processing of big data when solving applied computationally-complex problems with secret parameters. As a rule, standard cryptographic protocols are used to ensure the security of client-server communication. These cryptographic methods are effective for big data storage tasks, but are not always acceptable for secure information processing tasks. For example, the well-known mathematical methods of homomorphic encryption still have no practical application due to the huge computational costs on the client side. Therefore, along with classical cryptographic methods, it is necessary to use alternative (non-cryptographic) methods and technologies for protecting information. Such methods, as a rule, are used for the safe processing of big data arising in the mathematical modeling of economic problems, in linear programming problems, which, for one reason or another, may contain secret parameters.

**Keywords:** Information security, Big data, Protocol, Secure outsourcing

## Secure Outsourcing of Finding the Extremum of a Function with Secret Parameters

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**Abstract:** We study methods of secure outsourcing of finding the extremum of a function with secret parameters that can only be solved on very powerful computers. This is one of the topical issues of secure client-server communication. As part of our research work, we model the interaction "client-server": we give specific definitions of such concepts as "Solvable by the protocol", "Secure protocol", "Correct protocol", as well as actualize the well-known concepts - "Active attacks" and "Passive attacks". First, we will outline the theory and methods of secure outsourcing for various abstract equations with secret parameters, and then present the results of using these methods in solving applied problems with secret parameters, arising from the modeling of economic processes. Many economic tasks involve processing a large set of economic indicators.

**Keywords:** Information security, Finding the extremum of a function, Protocol, Secure outsourcing

## Yapay Zeka Yöntemleriyle Üstyapı Performans Tahmini

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**Özet:** Artan araç sayısına bağlı olarak karayolu ihtiyacının planlanması, mevcut karayollarının hizmet kabiliyetini koruyabilmesi ve bakım onarımının yapılabilmesi için üstyapı yönetim sistemi kullanılması zorunlu hale gelmektedir. Üstyapı Yönetim Sisteminden tam anlamıyla yararlanabilmek için karayolları ağının geleceği hakkında güvenilir ve doğru tahminler yapması beklenmektedir. Performans göstergeleriyle yapılacak doğru tahminler sayesinde kısıtlı kaynak ve bütçeyle yapılacak yatırımlar anlamlı ve zamanında yapılmış olacaktır. Teknoloji çağıyla birlikte veri madenciliğinin uygulama alanları her alanda gelişme göstermektedir. Genellikle tahminle ve sınıflandırma yapan birçok veri madenciliğine dayalı uygulamalar bulunmaktadır. WEKA veri madenciliği alanında ücretsiz ve açık kaynak kodlu sıklıkla tercih edilen uygulamalardan biridir. Bu çalışma ile Weka ile üstyapı yönetim sistemi için üstyapı performans modelleri geliştirilmiştir. Üstyapıların performans göstergesi olarak kullanılan değerlerden uluslararası düzgünlük indeksinin (IRI) verileri toplanarak değerlendirilmiştir. Modellerde kullanılan veriler Hergüner (2009)'den elde edilen verilerdir. Modellerin girdisi olarak üzerinde araştırma yapılan yollardaki bozulmalara sebep olan etkenler incelenmiştir Weka programı kullanılarak veriler analiz edilmiştir. Düzgünlük değeri olan IRI değerinin tahmini için Regresyon analizi, yapay sinir ağları yöntemlerinden faydalanılarak üstyapı performans tahmin modelleri geliştirilmiştir. Oluşturulan modellerin çıktı değeri olan IRI değeri gerçek değerlerle kıyaslanıp yakın sonuçlar elde edilmiştir.

**Anahtar Kelimeler:** Yapay zeka, Veri madenciliği, Weka, Üst yapı yönetim sistemi

## **Долбоорго багытталган окутуу ыкмасын "Программалык инженерия" сабагында колдонуу**

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**Абстракт:** Макалада долбоорго негизделген окутуу ыкмасынын (project based learning) колдонулушу, анын берген натыйжалуулугу каралган. Бул ыкманын колдонулушунун жеке учуру катары Кыргыз Түрк Манас Университетинин «Программалык инженерия» сабагынын курамында колдонулуп келе жатат. Ыкманын колдонуунун натыйжалуулугун баалоо үчүн анкеталык сурамжылоо жана ушул сабакты окуган студенттер менен маектешүү жүргүзүлдү. Алынган жыйынтыктардын талдоосу бул ыкма натыйжалуу экендигин жана бизнес өкүлдөрүн тартуу менен адистештирүү дисциплиналарын үйрөнүүдө кеңири жайылтуу үчүн сунуш кылына тургандыгын көрсөттү. Ошентип, жогорку окуу жайларын аяктагандан кийин, бүтүрүүчүлөр каалаган кызматтарга тапшыра алышат жана кошумча билим алуу үчүн убакытты текке кетирбейт.

**Keywords:** долбоорго негизделген окутуу, окутуу ыкмасы, университет, программалык инженерия, реалдуу долбоор.

## Arduino Based Design and Control Of Railway Revolving Bridge

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**Abstract:** In this study, a small-scale prototype of revolving bridge based on Arduino was developed to teach the structure and operating principle of the revolving bridge used in railways to the students, which are studying in the Rail Systems Electrical and Electronics Technologies program. A pair of reed contacts and neodymium magnets has been used with a stepper motor with high position sensitivity in order to stop the designed revolving bridge system in the desired position and to perform the locking process at this point. The control of the system and the stepper motor is carried out with the software embedded in the Arduino controller. In this way, a reliable system has been established. Also, with the design of this system, a way is opened for the applicability of different system designs for the next students.

**Keywords:** Arduino, Railway, Revolving bridge, Stepper motor.

## An Alternative Mixing Parameter Update Rule for Complex-Valued Collaborative Adaptive Filter Structures

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**Abstract:** This paper introduces an alternative mixing parameter update rule for complex-valued collaborative adaptive filter structures, which is based on the minimization of the kurtosis cost function defined by the instantaneous error signal. With the help of this alternative mixing parameter, the advantages of the CLMS and ACLMS algorithms over circular and noncircular complex-valued signals are integrated into the proposed hybrid adaptive filtering algorithm. The simulation results on system identification settings demonstrate that the proposed hybrid algorithm with an alternative mixing parameter update rule is outperformed in a collaborative manner of the CLMS and ACLMS algorithms when compared to the individual algorithms.

**Keywords:** Complex-valued collaborative adaptive filtering, Complex-valued least mean square algorithm, Augmented complex-valued least mean square algorithm, Circular and noncircular complex-valued signals.

## **Elektrikli Araçlar ve Dinamik Talep Cevabı İçeren Zaman Gecikmeli Yük Frekans Kontrol Sisteminin Kararlılık Bölgesini Oluşturan PI Denetleyici Kazançlarının Belirlenmesi**

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**Özet:** Bu çalışmada, grafiksel bir yöntem kullanılarak elektrikli araçlar (EA'lar) ve dinamik talep cevabı (DTC) kontrol çevrimi içeren zaman gecikmeli bir bölgeyi yük frekansı kontrol (YFK) sisteminin denetleyici parametre düzleminde kararlılık bölgeleri elde edilmiştir. YFK sistemlerine EA'lar ve DTC kontrol çevriminin entegre edilmesi (YFK-EA-DTC) hem yük gruplarının hem de EA batarya sistemlerinin frekans regülasyonu servisinde etkin olarak kullanılma imkanı sunmuştur. EA batarya grupları ve DTC kontrol çevrimi, YFK sistemlerinin kararlılığı üzerinde önemli avantajlar sağlamasına rağmen, YFK sistemlerinde veri transferleri ve kontrol komutlarının iletilmesi amacıyla meydana gelen haberleşme zaman gecikmeleri sistemin dinamik performansını olumsuz etkileyebilmektedir. Dolayısıyla, bu çalışmada zaman gecikmesi içeren bir bölgeyi YFK-EA-DTC sisteminin kararlılığını garanti eden oransal-integral (PI) denetleyici kazanç değerleri kararlılık sınır eğrisi yöntemi kullanılarak teorik olarak hesaplanmıştır. Elde edilen kararlılık bölgelerinin doğruluğu MATLAB/Simulink ortamında gerçekleştirilen zaman düzlemindeki benzetim çalışmaları ile gösterilmiştir.

**Anahtar Kelimeler:** Yük frekansı kontrol, PI kontrolör, Kararlılık bölgesi, Zaman gecikmesi.

## **Alfa-Bağımlı Gürültülü Ortamlarda Ağırlıklandırılmış Meridian Filtrelerin Diferansiyel Gelişim Algoritması İle Optimizasyonu**

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**Özet:** İstenmeyen gürültü ve paraziti gidermek için filtreleme işlemi büyük öneme sahiptir. Doğrusal bir filtre ile filtreleme yapıldığında doğrusal olmayan dürtü gürültülü ortamlarda filtre verimi oldukça düşmektedir ancak doğrusal olmayan Meridian filtre ile bu ortamlarda verimli filtreleme yapılabilmektedir. Dürtü gürültülü ortamlarda doğrusal olmayan Ağırlıklandırılmış Meridian filtrelerin optimizasyonu için klasik algoritmalar olarak adlandırılan türev tabanlı algoritmalar literatürde sunulmuştur. Bu çalışmada, çeşitli pencere uzunluklarına sahip olan Ağırlıklandırılmış Meridian filtreleri, evrimsel bir algoritma olarak bilinen diferansiyel gelişim algoritması (DGA) ile optimize edilmiştir. Bu makalenin katkısı, doğrusal olmayan Ağırlıklandırılmış Meridian filtrelerin parametrelerinin optimizasyonunda evrimsel bir algoritma olan DGA'nın kullanılmasına dayanan yeni bir yöntem önermektir. Simülasyon sonuçlarına göre; DGA ile optimize edilmiş Ağırlıklandırılmış Meridian filtreleri,  $\alpha$ -bağımlı gürültülü ortamları etkili bir şekilde bastırma yeteneğine sahiptir.

**Anahtar Kelimeler:** Optimizasyon, doğrusal olmayan filtreleme, Ağırlıklandırılmış Meridian filtre, diferansiyel gelişim algoritması,  $\alpha$ -bağımlı gürültü.

## Effects of Antenna Array on Throughput in 5G NR PDSCH

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**Abstract:** In order to increase spectrum efficiency and reduce the transmitter power, Multiple-Input Multiple-Output (MIMO) algorithms have been developed and successfully implemented in wireless communications. One of the key aspects of Fifth Generation New Radio (5G NR) is massive MIMO, where elements of an antenna array will be dynamically allocated to users. Therefore, the objective of this study is to examine the effects of MIMO on the throughput in 5G NR Physical Shared Downlink Channel (PDSCH). The study first simulates and observes how the required transmitter power is reduced with the use of multiple antennas both in the receiver and in the transmitter. Single-Input Multiple-Output (SIMO), Multiple-Input Single-Output (MISO) and MIMO cases are considered separately. Then, PDSCH with multiple layers is simulated in order to observe how spectrum efficiency is improved through spatial multiplexing gains. The results show both increase in spectrum efficiency and reduced transmitter power are achieved with the use of antenna arrays.

**Keywords:** 5G NR, MIMO, PDSCH, Spatial diversity, Spatial multiplexing

## Modeling of Thermoelectric Generator with Ansys and Matlab/Simulink

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**Abstract:** A thermoelectric module gives us electric power without using cycle fluid and active components. Thermoelectric modules can generate DC power by using thermal energy or can cooling or heating by using electric power. They are used commonly because of being light and reliable. In this study, we were aimed to create 2 different models with Matlab/Simulink and thermal-electric module of ANSYS program's for the Kryotherm TGM 199-1,4-0,8 module and then we compare that results of ANSYS, Matlab/Simulink and the given catalog datas of the manufacturing datasheet. We use two different temperature gradient in this work. These are 150-50 °C and 200-30 °C. In this temperatures, it is looked upon voltage, current, power sections and for this study found that Matlab Simulink, Ansys and catalog datas of the manufacturing datasheet informations are so close to each other.

**Keywords:** Thermoelectric Generator, ANSYS, Matlab/Simulink

## **Influence of Process Parameters on TWR In Electrical Discharge Machining Of Cu-Based SMA: An Experimental Investigation**

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**Abstract:** In the new age of science and technology, demand for specialized material goods has gradually grown. Accurate machining of specialized materials has become a problem for scientists and researchers. Shape memory alloys is a class of specialized materials whose market in the commercial and industrial sectors is gradually growing. This is a very special and distinct substance that has the nature of restoring its form after the metal has been subjected to low specific temperature conditions. The shape-recovery nature makes it a metal of considerable significance for large-scale industry applications. SMA's are often categorized into three groups, i.e. NiTi-based, Cu-based, and Fe-based. The Cu-based alloy has a wide temperature spectrum, a high elasticity and a high damping coefficient. This paper focuses on exploring the impact of pulse on time, pulse off time, peak current and gap voltage on TWR while processing Cu-Zn-Ni SMA in the electrical discharging phase. Pulse on time and peak current have a larger effect on TWR. SEM images revealed the surface characteristics like micro-cracks, craters, voids etc. on the tool electrode surface. SEM images provides information about the surface integrity and type of wear on the surface of the tool electrode.

**Keywords:** SMA, EDM, TWR, Cu-Zn-Ni, Pulse on time, Peak current

## **Adaptive Fading Extended Kalman Filter Based IM Drive Improved with Feed-Forward Control of Load Torque**

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**Abstract:** In this study, the design of the speed-sensored adaptive fading extended Kalman filter (EKF) observer for field-oriented controlled (FOC) induction motor (IM) drive has been realized. By designing an adaptive fading EKF (AFEKF) observer, the rotor mechanical speed, stationary axis components of rotor fluxes, and load torque are estimated. However, the performance of the control system is sensitive to load disturbances. In order to solve this problem, the load torque estimated by the proposed AFEKF observer has been feed-forward to the speed loop in the drive system. Unlike previous studies that use stator currents in the measurement equation, the proposed AFEKF observer using the rotor angular velocity estimates the states and parameters of the IM. The performance of the proposed drive system has been tested in simulations for a wide speed range under load torques variations. The results obtained by the simulation studies prove the effectiveness of both AFEKF observer and FOC improved by feed-forward control (FFC) of load torque.

**Keywords:** Induction motor, Adaptive extended Kalman Filter, Observer, Estimation

## Asenkron Motorun Durum ve Parametre Kestirimi İçin Karma Uyarlamalı Genişletilmiş Kalman Filtresinin Tasarımı

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**Özet:** ASM'lerin durum/parametre kestirimi bu makinelerin yüksek başarılı kontrolü ve hız-algılayıcısız kontrolü için önem arz etmektedir. Genişletilmiş Kalman filtresi (GKF) sistem ve ölçme gürültülerini de hesaba katarak durum/parametre kestirimine olası bir yaklaşım sunmaktadır. Bununla birlikte, GKF ile en iyi kestirimlerin gerçekleştirebilmesi için ASM'ye ait hem dinamik hem de istatistiksel model parametrelerinin bilgilerine eksiksiz ihtiyaç duyulmaktadır. Bu bilgilerin çoğu uygulamada bilinmemesi veya kısmen bilinmesi geleneksel GKF'lerin başarımını düşürmektedir. ASM'nin durum/parametre kestiriminde, eksik sistem ve ölçüm gürültü kovaryansları filtreleme başarımı üzerinde en büyük etkiye sahiptir. Bu sorunun üstesinden gelmek için uyarlamalı GKF yöntemleri önerilmiştir. Bununla birlikte, mevcut uyarlama yapıları ile ilgili literatürde belirtilen sıkıntılar bu yöntemlerin kullanımını sınırlandırmaktadır. Bu tez çalışmasında, literatürde mevcut olan uyarlama yöntemlerinin üstünlüklerini bir araya getiren karma bir uyarlama yapısının tasarımı gerçekleştirilmiştir. Önerilen karma uyarlamalı GKF gözlemleyicisi ASM'nin durum/parametre kestirim sorununa uygulanarak başarımı test edilmiştir. Önerilen yöntem hem benzetim hem de deneysel çalışmalarla doğrulanmıştır.

**Anahtar Kelimeler:** Asenkron motor, uyarlamalı Kalman filtresi, durum ve parametre kestirimi

## Multiband Microstrip Bandpass Filter Design

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**Abstract:** In this paper, a novel microstrip bandpass filter has four pass band is designed by using stepped impedance open loop resonators (OLR). The proposed filter structure has two strong coupled thin transmission feeding lines which has also coupled the OLR by coupling gaps. Each feeding lines has included two inductive strips and one of the strips has coupling gap inside. Multiband bandpass filter response is obtained by coupling the first and second resonance modes of CLs and OLRs, appropriately. The OLRs have unequal strip widths to control the reflection zeros and loop levels of the bands. A full wave Electromagnetic Simulator is used to design multiband bandpass filter structure. The simulation response shows good insertion loss levels for each band.

**Keywords:** Microstrip, Bandpass filter, stepped impedance open loop resonator, coupled lines.

## Security Analysis of Artificial Noise Aided Massive MIMO Hybrid Precoding Architecture for mmWave communication

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**Abstract:** The future belongs to millimeter wave (mmWave) communication systems owing to the growing demands of forthcoming wireless communication systems. Nevertheless, there are certain degradation issues with these waveforms, which can be further resolved by exploiting multiple antenna technology (i.e., massive multiple-input multiple-output, massive MIMO) and thanks to the advantages of shorter wavelengths. However, it is very challenging and impractical to use a massive number of RF chains in massive MIMO systems. The optimal solution is to take benefit of a hybrid precoding design that not only reduces the cost and energy consumption but also eases the circuit complexities. Moreover, the security of mmWave systems can be achieved by exploiting the integration of hybrid precoding architecture with massive MIMO systems. In this context, this study focuses on designing a hybrid precoder based on generalized triangular decomposition (GTD) scheme where artificial noise (AN) scenario has been also evaluated to ensure secure transmission in mmWave massive MIMO wiretap systems. Comprehensive simulation studies have been performed to investigate the outcomes of GTD-based hybrid precoder design with and without AN. It is confirmed via the extensive simulation results that AN aided hybrid precoding design provides remarkable results and ensures more secure transmission in mmWave massive MIMO systems.

**Keywords:** 5G, GTD, hybrid precoders, Massive MIMO systems, mmWave, AN, PLS.

## Mekânsal Verilerin Depolandığı İlişkisel Veritabanı Metin Arama İşleminde Sorgu Optimizasyonu

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**Özet:** Konum temelli veriler olarak bilinen mekânsal veriler fiziksel nesnenin coğrafi koordinat sistemindeki sayısal değerler ile temsil edilmesidir. Mekânsal verileri kaydetmek, düzenlemek, görselleştirmek ve analiz etmek için Coğrafi Bilgi Sistemi (Geographic Information System - GIS) yazılımları kullanılır. Mekânsal veriler GIS sistemleri sayesinde yaygın olarak kullanılmakta ve birçok sistemin alt yapısını oluşturmaktadır. Yaygın olarak kullanılan ve yer yüzünde bulunan bütün nesnelerin mekânsal veri olarak tanımlandığı GIS sistemlerinde arama işlemi ve aranan mekânsal verinin bulunması çok önemlidir. Bu çalışmada mekânsal verilerin depolandığı ilişkisel veritabanı metin arama işleminin daha doğru sonuçlar bulması için sorgu optimizasyonu önerilmiştir. Bu bildiride önerilen yöntem Kayseri Büyükşehir Belediyesine ait gerçek mekânsal verileri ve Oracle ilişkisel veritabanını kullanmıştır. Önerilen sorgu optimizasyonu tabanlı yöntem klasik sorgu yöntemi ile karşılaştırılmıştır. Deneysel sonuçlar, önerilen sorgu optimizasyonu tabanlı yöntemin klasik sorgu yöntemine göre kelime sayısı arttıkça çok daha başarı sonuçlar verdiğini göstermiştir.

**Anahtar Kelimeler:** Mekânsal veriler, Coğrafi Bilgi Sistemleri, Sorgu Optimizasyonu, Akıllı Şehir Kayseri, Mobil uygulama

# **AGRICULTURAL SCIENCES AND TECHNOLOGIES**

## **Pomegranate (*punica granatum* L.) Breeding; Flower Selection for Hybridization Success**

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**Abstract:** Pomegranate fruit crop have unique floral biology; flower types are sometimes grouped into two (functional male, hermaphrodite) or three (functional male, intermediate, hermaphrodite) categories. Genotypes also vary in structural development of their flower types, that's why selection of hermaphrodite flower for crossing can sometimes be very difficult. The objective was to determine the degree of variation in floral types and floral morphology of pomegranate genotypes under similar growing conditions and how successfully visual differentiation can be made among flower types within genotype. Fifteen pomegranate genotypes were selected for floral morphology parameters i.e., flower length, flower width and heterostyly were recorded for each flower type; during the same growing season cross pollination was also carried out. Based on flower sex ratio, male flowers were the highest in all genotypes while intermediate and hermaphrodite varied among genotypes. Ternab 2, Kandhari White and Kandhari Red showed highest crossing success percentage ( $\geq 70\%$ ) in all the cross combinations attempted due to clear difference in flower length, width and heterostyly which facilitated visual identification of hermaphrodite flower type. Genotype Sava had clear difference in length and heterostyly of intermediate/male and hermaphrodite flower type but ovary width of flowers was not very distinct leading to average crossing success (85-34%); in genotype Sava some of crossed flowers must had degenerative ovary from intermediate flower types. Genotype Takht-i-Babri and BW3 had close mean values for flower length and heterostyly between intermediate and hermaphrodite flower type but ovary width varied significantly in these flower types, fruit set percentage also had lower range. It can be concluded that single or combination of morphological parameters can be utilized for the identification of hermaphrodite flower.

**Keywords:** Pomegranate, Hybridization, Floral morphology, Cross compatibility, Floral variation

## **Drought and Salt Stress Effects on Biochemical Changes and Gene Expression of Photosystem II and Catalase Genes in Selected Onion Cultivars**

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**Abstract:** Onion is the main vegetable crop. However, there is no data in literature on biochemical or gene expression changes in onion subjected to drought or salt stresses. Here, we investigated seven onion cultivars used in Turkey with respect to biochemical and gene expression responses to drought and salt stresses under greenhouse conditions. There is limited data available on NCBI for onion genes; therefore, in this study degenerate PCR approach was used to amplify abiotic stress related catalase (CAT) and photosystem (PSII) genes of onion to observe their transcript levels. Results indicated salt and drought stress induced higher transcript level of CAT gene in Perama, Inci and Seyhan cultivars. Stressed conditions resulted in degradation of PSII mRNA. The decline in their gene expression level was observed lower in Perama and Seyhan. Our results revealed that Inci, Perama and Seyhan were tolerant to salt and drought stress conditions, whereas Elit and Hazar were grouped as sensitive to both stress regimes. Results of this study on onion to stress conditions can be used for screening of tolerant and susceptible cultivars. Moreover, the tolerant cultivars Inci, Perama and Seyhan can be used in future abiotic stress breeding programs.

**Keywords:** Abiotic stress, Ascorbate peroxidase, Catalase, onion genotypes, Photosystem II, Superoxide dismutase, Gene expression

## **Magnetic Field Effect on Drought Tolerance in Sugar Beet (Beta Vulgaris L.)**

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**Abstract:** Magnetic field is known as a factor affecting plant growth in a positive way. In this study, seeds of sugar beet cultivar 'Aranka' were used as plant material. Seeds were exposed to 150 mT magnetic field (MF) strength for different time periods (0-control, 24 and 48 h) before sowing. MF-treated seeds were then sown in peat containing pots (30 pots with 1 seed for each exposure time periods) and all pots were incubated in 16 h light/8 h dark photoperiod at a temperature of  $25\pm1^{\circ}\text{C}$  in greenhouse conditions for 30 days. Pots were irrigated with equal amount of water. After 30 days, developed seedlings were exposed to drought stress. Drought stress was performed by giving different amount of water (0-control, 12.50, 25 and 50 ml) to seedlings at 2-day-intervals during 10 days. After 10 days, plant height, root length, leaf length, leaf width, approximate leaf area, plant fresh weight, plant dry weight, plant water content, cell length, cell width, approximate cell area, the number of cells in view, stomata length, stomata width, the number of stoma in view, chlorophyll a, chlorophyll b and total chlorophyll were determined. According to the study, the best results were obtained in seedlings developed from seeds exposed to 150 mT MF for 48 hours except chlorophyll contents in which the highest values were obtained from 24-hour-MF treatment. Results showed that magnetic field treatment gained tolerance to seedlings against drought stress.

**Keywords:** Sugar beet, Drought stress, Magnetic field, Folerance

## Method for One-Step Synthesis of Biodegradable Hytozan Hydrogel with Integrated Mineral Fertilizers

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**Abstract:** The continental climate of the Republic of Kazakhstan is the cause behind its dry periods, as well as the dependency of the yields of important crops on weather conditions, which can negatively impact soil productivity and increase water consumption in irrigation. Plants require water and mineral fertilizers in constant and fixed amounts. For the issue of water supplies in arid regions, hydrogels — materials capable of storing water — are currently being used [1]. However, plants also require fertilizers. Hence, the application and prolonged supply of fertilizers is achieved through the use of ionitoponics, which an ion exchange resin (ion exchangers) saturated with fertilizer ions into the soil; it should be noted that these ion exchangers have a very low degree of swelling, within 0.1-5 grams per gram of dry polymer [2]. During irrigation, the ion exchanger releases the fertilizer into the water, though following the depletion of ion reserves, the ion exchange resin becomes a soil pollutant synthesized on the basis of cross-linked polystyrene [3]. Therefore, it was decided to synthesize in a single stage a biodegradable hydrogel embedded with mineral fertilizers.

The development of hydrogels based on chitosan with specified parameters and introduced fertilizers has not been studied in detail at present, which is a novelty of this work. Moreover, it should be noted that the use of hydrogels in agriculture is absent in our country and CIS countries in general. Furthermore, it is only in its initial stage in foreign countries, meaning that research in this area is advanced not only for CIS countries but also for more developed countries. As such, Belgian scientist Willem van Cotthem used hydrogels with the goal of making it possible to grow crops in hot and arid regions of the Earth [4]. For growing crops in sandy soil, Willem proposes the use of “Terracottem,” a layer of earth (~25 cm) containing hydrogels, organic fertilizers and bacterial crops that allow for the fullest realization of the biological potential of plants [5]. When tested in Dubai, the Belgian scientist’s technique was successful, allowing for harvest on lands previously unsuitable for agriculture [6, 7]

Hydrogels have the ability to absorb water in large quantities then release it gradually; however, there arises the issue of releasing fertilizer alongside water to the roots of plants. It is desirable to synthesize hydrogels as biodegradable so as to avoid soil contamination. There are agrogels sold mainly for decorative plants and for growing seeds, which is the result of the high cost of acrylate hydrogels, and so there has not been any large-scale application of them in the world yet [8, 9].

Industrial Technopark Aktobe LLP has developed a means for accumulating and preserving moisture in the soil — the moisture-retaining substance Agrogel-A, silicic acid gel with the effects of a mineral fertilizer, the use of which in agriculture can increase the yield of agricultural crops by 50-60% (spring wheat, oats, millet, safflower) [10]. With the use of Agrogel-A, more favorable conditions for moisturizing were formed due to the water-retaining properties of mineral nutrition provided by the tested material. Consequently, the plant variants grown showed yields greater than that of the control group.

The goal of this work is to develop a method for the one-stage synthesis of a biodegradable hydrogel with mineral and organic fertilizers.

Some of the most abundant organic materials in the world are cellulose and chitin. Both are natural polysaccharides that decompose in nature with an increase in the humus content of the soil. This is why we have considered the use of a biodegradable natural polymer — chitosan. Equally considered is the introduction of mineral and organic fertilizers in the one-stage synthesis of the hydrogel, as well as the use of dyes to visually distinguish between hydrogels containing different fertilizers. Single stage synthesis reduces production costs; it increases crop yields due to moisture retention and prolonged release of fertilizers into the root system whilst the soil is not contaminated with synthetic polymers; and the decomposition of the hydrogel component (chitosan) increases the humate content in the soil.

The cross-linking reaction between chitosan and glutaraldehyde (GA) has been used for many years in order to synthesize chitosan hydrogel for pharmacological, medico-technical and biotechnological use [11]. In work [12], a mechanism for the interaction of chitosan with GA was proposed, which consists of the formation of an aldimine bond. This initiates the growth of the oligomeric chain on chitosan, and subsequent intermolecular cross-linking by crotonic condensation of oligomeric chitosan chains. We carried out the synthesis of the chitosan hydrogel based on the data of the above works. However, the introduction of mineral fertilizers after synthesis is a long and energy intensive process; subsequently, we have developed a separate method for the one-stage synthesis of a hydrogel with embedded fertilizers.

This is achieved due to the fact that the method for one-stage synthesis of a biodegradable hydrogel of chitosan with embedded mineral and/or organic fertilizers includes the preparation of a 0.1-3% solution of chitosan in an aqueous solution of lactic or phosphoric acid with the addition of a mineral or organic fertilizer (for example, humate). In bulk, the ratio of chitosan: fertilizer = 1: 0.5-0.1. Then a solution of glutaraldehyde is added to the prepared solution at a mass ratio of chitosan: glutaraldehyde = 1: 0.2-0.001, which is followed by stirring and heating at a temperature of 40-80°C within 2-8 hours. Finally, water with potassium hydroxide is added to the resulting hydrogel. Dyes are then added to the chitosan solution to visualize the embedded fertilizers.

Glutaraldehyde, being a bifunctional aldehyde (2 aldehyde groups), forms an imino group with the primary amines of chitosan in an acidic medium at temperatures above 40°C. After aging, the hydrogel can then be used in its swollen state or dried and packaged. Furthermore, by varying the mass ratio of chitosan/glutaraldehyde from 1000/1 to 1000/50, it is possible to synthesize a hydrogel with a degree of swelling from 100 to 10g of water per gram of dry hydrogel.

By increasing the cross-linking reaction temperature from 60 to 100°C, the reaction time changes from 4 hours to 15 minutes, though the degree of swelling also decreases from 100 to 70g of water per gram of dry hydrogel. It is therefore possible to synthesize hydrogels with specific parameters by varying the above parameters.

For versatility and unification, only one type of fertilizer is added to the hydrogel and painted in a certain color; namely, the hydrogel embedded with nitrate (ammonium nitrate) is colored with red food coloring; the hydrogel with addition of urea is colored in yellow, those with phosphates in green, etc. This visually distinguishes between hydrogels with different additives to avoid confusion. Certain types of plants require different ratios of fertilizers based on soil conditions, and so, having compiled the required ratio of fertilizers for a specific plant and specific soil, the mixture of hydrogels was applied to the soil.

We synthesized hydrogels in the following way: 1g of chitosan was dissolved in 100ml of 1% lactic acid; to accelerate the process the solution was heated 60°C; after dissolution of chitosan, 0.5g of ammonium nitrate and a dye are added to the solution, following which the mixture is stirred until complete dissolution. To form the hydrogel, 2.5mg of 0.1 molar solution of glutaraldehyde was added then mixed thoroughly. The mixture was then heated in a thermostat at a temperature of 80°C for 2 hours. After the time had elapsed, the mixture had a jelly-like red consistency. It was then transferred into a container with a potassium hydroxide solution weighing 0.62g. After a week of ageing, the hydrogel had dried. As a result of the synthesis, a hydrogel with a degree of swelling of 65g of water per gram of hydrogel was obtained; the yield was 97%.

As a reagent for the creation of an acidic medium, both organic and inorganic acids can be used. For example, in the experiment, 1g of chitosan was dissolved in 100 ml of 1% acetic acid. It was heating to 60°C to accelerate the process, then, after the dissolution of chitosan, 0.1g of potassium dihydrogen phosphate and yellow dye were added to the solution. The mixture was then stirred until complete dissolution. As before, 2.5mg of 0.1 molar solution of glutaraldehyde was added and mixed thoroughly. It was heated in a thermostat at 80°C for 2 hours. Following this, the mixture had a jelly-like red consistency, after which it was transferred into a container with potassium hydroxide solution weighing in at 0.62g. The hydrogel dried after a week of exposure. The experiment yielded a hydrogel with a degree of swelling of 73g per gram of hydrogel, with a yield of 90%.

Significant differences between this work and known analogs using the former method are:

- The synthesis was carried out in a single stage with mineral fertilizers.
- The synthesis used organic acids like lactic acid.
- Phosphoric acid is used as an acid catalyst and phosphorus-containing fertilizer.
- Dyes were used in order to visualize the type of fertilizer used.

Therefore, we have developed a method for the one-stage synthesis of biodegradable hydrogels based on chitosan with added fertilizers. It was found that an increase in the content of the cross-linking agent (glutaraldehyde) leads to a decrease in the degree of swelling of the hydrogel, where the optimal ratio of chitosan/glutaraldehyde was found to be 1/0.0025 by weight. The reaction temperature was found to be 60°C with a reaction time of 2 hours. This resulted in a hydrogel with a degree of swelling in the range of 60-80g per gram of hydrogel. The presence of fertilizers (ammonium nitrate, phosphates, etc) practically do not affect the crosslinking reaction.

The next stage of scientific research is to investigate the impact and effect of hydrogel dosage on the growth of plants.

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## **Application of Lactic acid Bacteria to Reduce Methane Production in Ruminants**

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**Abstract:** In ruminants, enteric fermentation is the largest anthropogenic source of agricultural methane and plays a significant impact on global warming. There is a need to mitigate emissions of methane from livestock farming to ensure the sustainable production of food in future. one possible solution is the use of lactic acid bacteria (LAB), gram positive bacteria which produce lactic acid as a fundamental final product of carbohydrate fermentation. LAB is the naturally existed in the intestinal tract of mammals and most importantly groups of microbes used in food fermentations. Isolation of LAB can be done from ruminants and used on the farm as direct fed microbes and as silage inoculants. While it is also saying that this LAB can also be used in methane mitigation on livestock farms. This review has actually evaluated the utilization of LAB and its mechanism of action in methane mitigation. Some research results are surprising while it's a need of time to conduct more researches on use of LAB as methane mitigation for livestock.

**Keywords:** Lactic acid bacteria, Methane, Methanogens, Direct fed microbes, Silage inoculants.

## Rehabilitation Of Degraded Shooting Range Soil With Iron Hydroxyl Phosphate, Lignin And Vachellia Nilotica L. Biochar: Assessment Through Heavy Metals Distribution In Barley And Soil Enzymatic Activities

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**Abstract:** Expeditious urbanization and population boom have resulted in the shrinkage of productive agricultural lands. Resultantly, rehabilitation of degraded lands like salt-affected, sodic, nutrient-deficient and sandy soils for crop production is successfully being carried out by the scientists to overcome malnutrition and hunger. However, degraded lands like shooting range soils (SRSLs) and battlefields which were extensively spread in the 20<sup>th</sup> century, are at all times overlooked by the scientists for their rehabilitation to fertile agricultural lands. The novelty of our research is an attempt to rehabilitate SRSL to productive agricultural land with the use of cheap and effective amendments. The SRSL in this pot experiment was amended with iron hydroxyl phosphate (FHP), lignin (LN) and biochar (BH) (at 2.5 and 5% rates) to assess the Pb, Cd, Cu and Ni bioavailability in SRSL, and their corresponding distribution in barley plant as a test crop. Likewise, treatments effect on soil enzymatic activities, grain nutritional status, and plant oxidative stress were also scoped. Results affirm that BH5% and FHP5% treatments significantly reduced Pb, Cd, Ni, and Cu bioavailability in SRSL up to 83–84%, 83–85%, 75–77%, and 51–55%, respectively, while reducing their concentrations up to 45–48%, 45–51%, 50–51%, and 55–58% in grain, in contrast to control. Likewise, the activities of  $\beta$ -glucosidase, phosphomonoesterase, urease, catalase, and acid phosphatase depicted the highest in BH5% followed by LN5% treatment, compared to control. The BH5%, FHP5%, and LN5% treatments depicted the highest grain biochemistry, while improvement in plant biomass and oxidative stress alleviation were observed with BH5% and LN5% treatments, compared to control. Except for Ni, the rest of metals concentrations in grain were higher than permissible limit of WHO. We suggest further pot and field trials involving the usage of higher doses of BH, FHP, and LN in SRSL to bring grain HMs concentrations below critical limits.

**Keywords:** Degraded lands, Rehabilitation, Shooting range soil, Amendments, Soil enzymes, Grain biochemistry

## In Vitro Germination and Callus Formation of Soybean Cultivars

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**Abstract:** Soybean is a highly recalcitrant crop in tissue culture. The callus formation and regeneration capacity are restricted and tissue culture methods are being optimized to develop a standard protocol for soybean. Being cultivar dependent is also another limiting factor. This study aimed to test germination rate of five different soybean cultivars and the effect of (1) CIM1- 1 mg/L 2,4-D + 0.1 mg/L Kinetin, (2) CIM2- 2 mg/L BAP + 2 mg/L NAA and (3) CIM3- 1 mg/L BAP + 0.1 mg/L NAA + 0.1 mg/L GA3 + 0.1 mg/L TDZ on callus formation of four different explant types, cotyledonary node, cotyledonary leaf, hypocotyl and embryo in cv. Nova, Arısoy and Blaze. Callus induction rate, days to callus induction, callus quality, callus fresh and dry weight were recorded. Blaze, Nova and Arısoy had the highest germination rates of 94%, 92%, 94%, respectively. Callus induction rate was high in Arısoy unlike cotyledonary leaf as explant and callus initiation started as early as in 5-day. Callus induction rate in Nova was also high but callus formation was slower than Arısoy. Blaze was not able to efficiently develop calli. The effect of CIM type on calli formation was greatly affected by the type of explant, however, overall CIM2 can be considered as the most ideal media type for calli formation in these soybean cultivars.

**Keywords:** Germination, Callus, Soybean, Seed, In vitro

## The Cytogenetic Monitoring of Natural Populations of Semenov's Fir Tree (*Abies Semenovii*)

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**Abstract:** The result of cytogenetic studies of natural populations of Semenov's fir tree was presented in this paper. As a material for the current research work were used seeds of the Semyonov fir (*Abies Semenovii* B. Fedtsh) growing on the territory of the Sary-Chelek nature reserve of the Kyrgyz Republic. The meristematic tissues of the tips of the roots of germinated seeds were used for the preparation of chromosome elimination. The preparations for the cytogenetic analysis were used according to the generally accepted method. A total of 1287 cells were investigated and cytogenetic analysis of the mitotic activity of the cells was carried out, pathological mitoses and chromosomal aberrations were detected. According to the obtained results of the research, the index of mitotic activity of cells was  $MI=14.03\pm0.26\%$  and these indicators correspond to the normal natural indicators of proliferation processes in coniferous plant cells. The frequency of pathological mitosis was  $2.13\pm0.04\%$ . Consequently, cell division cycles are not disrupted and environmental factors do not have a mitotoxic effect and, cells in which pathological mitoses are observed have a spontaneous origin. In the range of mitotic anomalies, various chromosomal aberrations were found at frequencies equal to the normal indicators of spontaneous mutation. Thus, the research work showed that in the natural population of the Semenov fir tree, the indicators of cytogenetic disorders occur with a low frequency and are concerning stable, and the growing area is environmentally friendly and does not contain factors that have a genotoxic effect at all.

**Keywords:** Cytogenetic monitoring, Fir tree, Mitosis pathology

## **The Use of Agriculture Fruit Waste as Animal Feed: A Modern Review**

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**Abstract:** By 2075 the world population is proposed to cross a big number of 9 billion but unfortunately, almost 1000 tons of fruit is still wasted every minute. According to our current time zone, two billion more people will need to be fed in the upcoming twenty years, and because of the recent Covid-19 pandemic, the world is learning about the potential difficulties to transport necessities to far-off affected areas in such drastic situations. This increasing population demand and irrepressible food wastage will defiantly lead to an uncontrolled hunger challenge in upcoming years. Subsequently, our livestock production group will have to face a big dispute because of bio-physical factors like malnutrition, water shortage, land spoiling, global warming, viral pandemics, and supply of required food to third world countries. Therefore, to overcome such enormous demand, a synchronized food-feed-food scheme needs to be introduced. Using fruit waste products as animal feed is a two-way key to handle all this mess; An effective use to all the wasted fruit products and a productive way to fulfill human requirements without utilizing human food.

**Keywords:** Animal feed, Food-feed-food system, Fruit waste, Livestock, Challenges.

## Essential Oils as an Alternative to Synthetic Drugs in Poultry Production

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**Abstract:** Public concern on excessive application of antibiotic growth promoters (AGPs) has heightened at an alarming condition due to their contribution to health problems and the development of antimicrobial resistance strains, thus advocating the need for research to find out the protective and efficient alternatives. AGPs after being banned in 2006, essential oils (EOs) are preferred over them and used as a replacement of synthetic feed additives in order to enhance the growth performance parameters and feed efficiency in poultry production. It is a common practice to add EOs in poultry feed in the current era to enhance the feed intake, growth performance, improve enzymatic secretions, trigger immune response, proliferate beneficial microbes, inhibit pathogens and cure various diseases. Convincingly, EOs can be used in the poultry feed but there are inquiries concerning their activity, metabolic pathways and standard inclusion level in poultry, which are yet to be investigated in detail. This literature depicts the extending horizon in the exploration of natural feed additives in poultry nutrition.

**Keywords:** Antibiotic resistance, Immune response, Growth performance, Poultry production

## Plants Used By Public in Van (Turkey) Against Animal Parasites

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**Abstract:** As a result of the Ethnoveterinary studies carried out in the province of Van (Turkey) during the vegetation periods of 2019-2021, it was determined that a significant portion of the local people engaged in ovine and bovine breeding as a means of livelihood or additional income. For years, Van is ranked first in terms of ovine breeding in Turkey. According to the animal breeders in the research area, none of the diseases they encounter in the animals they breed pose a greater threat to animal health as much as internal and external parasites. Internal and external parasites in animals mainly result in a decrease in body weight, damage to tissues and organs, an increase in diarrhea and anaemia, a gradual decrease in appetite and feed consumption and eventually in mostly death. A large number of parasite species have been identified in Van and its surroundings, settling on the internal organs and tissues of animals and on the head and skin externally.

In addition to feeding animals from the vegetation of the region, local people use plants as a source of healing against some animal diseases and especially against animal parasites. As a result of our three-year field studies, a total of 12 plant taxa, including 8 genera belonging to 5 plant families have been identified to be used by the local people against internal and external parasites of animals. While 8 of them are used internally against internal parasites, 4 of them are used externally against external interference. Against internal parasites, plants are mostly fed to animals freshly or water prepared from plants is given to them. Against external parasites, these plants are mostly applied to animals by making ointment and after some plants are boiled in water, the parasitic animal is bathed in this water. It was determined that only 1 plant was burned indoors and used against external parasites of animals by means of its smoke.

**Keywords:** Animal, Internal and external parasites, Plant, Ethnoveterinary, Van

## Farklı Zambak (lilium spp.) Türlerinde İn Vitro Soğan Üretimi

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**Özet:** Türkiye genetik çeşitliliğinde önemli bir yere sahip olan ve geofit olarak tanınan soğanlı bitkiler, içermiş oldukları metabolitler ve sahip oldukları güzel çiçeklerden dolayı parfümeri, farmakoloji ve süs bitkisi olarak kullanılmaktadır. Bu çalışmada soğanlı bir bitki olan Zambak (Lilium spp.)'ta in vitro mikroçoğaltım yapılmıştır. L. helvetia, L. corcovado, L. candidum türlerine ve Lake Carey çeşidine ait eksplantlar (soğan, gövde, yaprak ayası ve boğum) farklı bitki büyüme düzenleyicisi içeren BAP (0.25, 0.50, 1 mg/l), NAA (0.25, 0.50, 1 mg/l) ve TDZ (0.25, 0.50, 1 mg/l) içeren MS (Murashige ve Skoog) besin ortamında kültüre alınmıştır. Çoğaltılan bitkilerde sürgün sayısı, sürgün uzunluğu ve rejenerasyon yüzdesi incelenmiştir. En yüksek sürgün sayısı, sürgün uzunluğu ve rejenerasyon yüzdesi 1 mg/l BAP+0.50 mg/l NAA+0.25 mg/l TDZ içeren MS ortamından elde edilmiştir. Elde edilen sürgünler ½ MS ortamında köklendirilmiştir.

**Anahtar Kelimeler:** Bitki büyümeyi düzenleyiciler, In vitro, Lilium spp., Rejenerasyon, Zambak

## **Tohumluk Patates Üretiminde Farklı İrilikteki Mini Yumrular İçin Dikim Sıklığının Optimizasyonu**

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**Özet:** Tohumluk patates üretimi serada Süper Elit kademedeki mini yumruların üretimiyle başlayıp, tarlada Ön Elit, Elit, Temel 1, Temel 2 ve Sertifikalı kademeler şeklinde devam etmektedir. Tarladaki tohumluk üretiminin ilk aşaması Süper Elit mini yumruların dikimidir, buradan üretilecek ön elit yumruların verimliliğinin artması, tüm tohumluk üretim sisteminin verimliliğini ve maliyetini etkileyecektir. Bu çalışmada, ön elit tohumluk üretim verimliliğini artırmak için farklı boyutlardaki süper elit mini yumruların dikim sıklıklarının optimize edilmesi amaçlanmıştır. Bu amaçla deneme, 2020 yılında, Konya- Sarayönü- Karatepe mevkiinde, Konya Şeker A.Ş.'ye ait tohumluk üretim alanında yürütülmüştür. Konya Şeker A.Ş doku kültürü serasında üretilen Lady Olympia (LO) ve Russet Burbank (RBB) çeşitlerine ait 3 farklı boyuttaki mini yumrular (YB; <20.0 mm, 20.1-25.0 mm, >25.1 mm) tohumluk olarak kullanılmıştır. Bu tohumluk yumrular sıra arası mesafe sabit 75cm olacak şekilde, beş farklı sıra üzeri mesafede (SUM; 10, 14, 18, 22, 26 cm) elle dikilmiştir. Deneme, bölünen bölünmüş parseller deneme desenine göre üç tekerrürlü olarak kurulmuştur. Sonuç olarak, en yüksek çıkış oranı (%), her iki çeşitte de >25.1 mm YB ve 10-14 cm SUM kombinasyonlarında meydana gelmiştir. Her iki çeşit için ocak başına sap sayısı (adet), ocak başına yumru sayısı (adet /ocak) ve ocak başına yumru verimi (g) değerleri en yüksek >25.1 mm YB ve 26 cm SUM kombinasyonundan elde edilmiştir. Hasat edilen yumruların irilik dağılımları (%) üç kategoride (<25 mm, 25-65 mm, >65 mm) ölçülmüştür. Optimum tohumluk iriliği olan 25-65 mm katagorisinde maksimum değer, LO çeşidinde 20.1-25.0 mm YB ve 10 cm SUM kombinasyonundan elde edilirken, RBB çeşidinde ise >25 mm YB ve 10 cm SUM kombinasyonu ile 20.1-25 mm YB ve 14 cm SUM kombinasyonunda kaydedilmiştir. Maksimum yumru verimi (kg/ha) her iki çeşit için de, >25.1 mm YB ve 10 cm SUM kombinasyonu uygulamasından elde edilmiştir. Çalışmanın sonuçları, mini yumru tohumluk patates üretimi yapan firmalar için büyük önem taşımaktadır

**Anahtar Kelimeler:** Patates, Solanum tuberosum L., Mini Yumru, Yumru İrilik Dağılımları.

## **Agronomic, Botanical and Breeding Approaches to Improve Groundnut Yield and Nutrient Quality in Sub-Saharan Africa**

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**Abstract:** Groundnut is an important leguminous food and a cash crop plant. It is grown globally, especially in the tropics and semiarid tropics, due to its high nutrient composition and income generation potentials. Groundnut is abundant in high sources of digestible protein, healthy fats, dietary fibre and immensely rich in phytonutrients such as potassium, calcium, phosphorus, folate, magnesium, and B vitamins which are beneficial for pregnant women, healthy growth of babies, lower the risk of cardiovascular disease and regulation of blood glucose levels. In sub-Saharan Africa, groundnut is ranked as the 2<sup>nd</sup> most important legume crop due to its significant contribution to the food supply for rural and urban folks and its positive impact on economic growth. Due to the importance attached to the groundnuts, there have been successes in the breeding efforts to develop improved groundnut varieties for yield quality and quantity in sub-Saharan Africa. Despite these successes, groundnut production is still facing several challenges such as inappropriate agronomic practices, biotic and abiotic stresses causing low yield and quality. This review highlights the breeding and agronomic approaches to improve groundnut production yields and nutrient quality in sub-Saharan Africa, the appropriate management practices for optimum yield production and yield components improvement, and the potential use of botanical extracts against various biotic stresses of groundnuts and their aflatoxin contamination effect. This paper provides a guiding framework for farmers and policymakers within the region to improve groundnut in the bid to achieve food security in Africa.

**Keywords:** Sub saharan Africa, Agronomic approaches, Botanical approaches, Breeding, Arachis hypogaea

## Utilization of Plant Genetic Resources in Plant Breeding

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**Özet:** Plant genetic resources (PGR) comprises genetic material that includes wild genotypes, traditional varieties, and more recent cultivars. The utilization of PGR creates a breeding opportunity by selection & development of superior crops in agriculture. For this purpose, plant breeders have been using wild relatives, landraces & primitive cultivars, obsolete cultivars, advanced breeding lines & other products of plant breeding programs and current cultivars, respectively depending on the availability of the desired traits for plant genetic resources or germplasm. One of the examples for the utilization of plant genetic resources in plant breeding is the development of day-neutral strawberries where some unique cultivars were developed via backcrossing where a wild clone was the donor for the trait. PGR requires the collection in a certain place and exploration & collection. Some plant materials have the highest priority for conservation. Next, PGRs are evaluated and documented for the identification of their superior traits. After these steps, PGRs considered for distribution and utilization in plant breeding. Breeders consider their needs while creating a collection. Among various collection types, the base collection is the optimal type for long term conservation. Secondly, the active collection is used when the breeding program actively conducted. Finally, the working collection has a limited set of accessions that came from available collections. The main idea underlying this type is to exemplify genetic diversity among all collections.

A global effort is provided collection and preservation of PGRs for international organizations such as the Food and Agriculture Organization. At national level, flora of Turkey eventuates notable endemics about 3000 out of the 9000 plant species. This number indicates that Turkey holds micro centers for many crops. To achieve preservation of plant diversity, The National Plant Genetic Resources and Plant Diversity Program were authorized by the Aegean Agricultural Research Institute of the Ministry of Agriculture and Rural Affairs in the manner of ex situ and in situ preservation. In addition to the national parks, Turkey Seed Gene Bank is responsible for main preservation of germplasm. Many other institutions contribute to this effort with plant breeding studies specific to those regions as well.

**Anahtar Kelimeler:** Germplasm, Plant breeding, Selection, Collection

## **Evaluation of Antibacterial Activity of Tea Tree Oil against *Clavibacter michiganensis* subsp. *Michiganensis***

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**Abstract:** *Clavibacter michiganensis* subsp. *michiganensis* is an important bacterium that is subjected to quarantine in the world and causes bacterial cancer in tomato plants. Essential oil extracts are widely used in organic farming applications for the management of the diseases. The aim of this study was to determine the antibacterial activity of Tea tree (*Melaleuca alternifolia*) essential oil on *Clavibacter michiganensis* subsp. *michiganensis* in tomato. The effects of essential oil against *Clavibacter michiganensis* subsp. *michiganensis* were investigated by disc-diffusion method in vitro. To determine the most effective amount of tea tree oil 5 µl, 7 µl, 9 µl, and 11 µl of essential oil was used. As a result of in vitro test, 11 µl dose of oil showed 15±16 mm inhibition zone diameter against *Clavibacter michiganensis* subsp. *michiganensis* as the most effective amount and in vivo plant applications were done. According to the results, it was shown that tea tree oil inhibited the development of *Clavibacter michiganensis* subsp. *michiganensis*. It could be used in the management of *Clavibacter michiganensis* subsp. *michiganensis*.

**Keyword:** Tomato, *clavibacter*, essential oil, disc diffusion, tea tree

## **Molecular Screening and Partial Characterization of N Segment of Tomato Spotted Wilt Orthotospovirus in Pepper Plants at Mersin Province**

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**Abstract:** Tomato spotted wilt orthotospovirus (TSWV), a member of the Orthotospovirus family, is one of the most important viruses in the tomato and pepper crops, causing massive yield and quality losses. TSWV comprised of three single-stranded RNA segments, as Large (8.9 kb), Medium (4.8 kb), and Small (2.9 kb). The small segment of the virus encoded the nonstructural protein (NSs) and the nucleocapsid (N) protein. It has been observed that this virus severely infected pepper in Mersin region of Turkey. The vital objective of the study was to identify the incidence of virus and partial characterization of N segment of TSWV. In this research, we collected 88 symptomatic samples from Mersin province to investigate the incidence of virus in those regions. Total RNA acids were extracted from leaves using RNA purification kit (Norgen Biotek) and used as a template for cDNA synthesis (abm's EasyScript™ cDNA Synthesis Kit). PCR analyses were carried out by using virus specific primer for TSWV (TSWV-F: 5'-ATTGCCTTGCAACCAATTC-3', R-5'-ATCAGTCGAAATG GTCGGCA-3'- 276 bp). All the TSWV positive samples were used further characterization of Partial N segment of TSWV by using N gene primers (TSWVN1-F: 5'-ATGTCTAAGG TTAAGC-3', R-5'-TTAAGCAAGTTCTGTGA-3'-777bp, TSWVN 2F: 5'TACGGATCCGATGTCTAAGGTTAAGCTCAC3', R:5'A TCTCGAGTCAAGCAAGTTCTGCGAG-3', 290 bp). Based on the PCR analyses, among the total samples only eight samples were amplified for N segment. The neighbor-joining method was used to create a phylogenetic tree by using the MEGAX program. TSWV-N gene multiple sequence alignment exhibited high variability among TSWV isolates when compared with GenBank. Confirmation analyses are still in progress.

**Keywords:** TSWV, N gene segment, Orthotospovirus, RT-PCR, Pepper, Mersin

## Contribution of the Polyploidy to Horticultural Crop Diversity

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**Abstract:** Polyploidy is having more than 2 sets of chromosomes and is common among the horticultural crops. Some examples include strawberries, apples and cherries. Polyploidization is a way to increase genetic diversity among horticultural crops in many ways. Paleopolyploid species developed from polyploid progenitors that experienced polyploidization, yet they existed as diploids themselves because rediploidized over evolutionary time. Neopolyploids indicate that newly formed polyploid. As an expanding number of genomes sequenced, the transformative directions of ancestral genomes and polyploidization occasions have deduced numerous species. For example, through genomic examinations between *Brassica rapa* and other Cruciferous plants, recent studies demonstrated the reconstructed three subgenomes of *B. rapa* and concluded the diploid familial genome ( $2n = 14$ ) preceding the *Brassica* whole genome triplication (WGT) occasion. The most recent common ancestor (MRCA) is a set of organisms that the most recent individual from which all the related organisms are descended from them. MRCA of monocots and eudicots proposed to have 15 proto chromosomes, which was additionally remade dependent on complete genome examinations. The MRCA-based developmental structure additionally concluded to unspeak the rise and transformative history of every single blossoming plant, which included a few patterns of polyploidization. Polyploidization also prompts quality development. Multicopy qualities that are made due to advancement following polyploidization may experience sub/neo-functionalization, giving hereditary materials to the development of new capacities or attributes.

**Keywords:** Polyploidy, WGT, MRCA, Ancestral

## Role of Microorganisms and Fermentation inside the Rumen

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**Abstract:** The ecosystem of rumen is very complex where ingested nutrients by ruminants are digested by the process of fermentation. In this whole fermentation process different microbes are involved like bacteria, fungi, and protozoa. The type of association among these microbes is symbiotic, because of the divergent nature of these microbes and their captivity and interactions also existed. Ruminants are responsible for establishment of such kind of environment which suits the microbial growth for obtaining energy from the host animal. Inside this ruminal ecosystem, these microbes existed in reduced environment and pH almost near to neutral. These rumen microbes are engaged in the fermentation of substrates contained in the diet of animals. Therefore, this fermentation is not 100% effective because there are some energy losses mainly in the form of methane gas. For the concern of improvement in ruminants production system, there are some nutritional strategies that aim to control this fermentation process by using feed additives in the diet like monensin, tallow, buffers, nitrogenous compounds, prebiotics, and probiotics have been used. The impact of using these additives in ruminant diet allow alteration in the process of fermentation in such a way that produce better growth while decreasing energy loss. The main objective of this review is to better understand the issue of global warming, fermentation in rumen, nutritional manipulation for improvement in digestion process for the sake of getting maximum production.

**Keywords:** Feed additives, Ruminal microbes, Symbiosis, Greenhouse gas, Global warming

## **Determining The Role of Calmodulin Binding Transcription Factor (CAMTA) Family for Drought Tolerance in Arabidopsis thaliana**

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**Abstract:** Due to the sessile nature of plants, their growth and development are under the influence of a wide variety of environmental stresses, such as drought, high salt and extreme temperatures. These stresses cause physiological and biochemical damages during the life cycle of the plants and eventually lead to serious production losses. Plants exhibits physiological, biochemical and molecular tolerance responses against drought stress.  $\text{Ca}^{2+}$ -activated calmodulin (CaM), is an important regulator for targeting the downstream transcription factors involved in these responses. Among these transcription factors, the CALMODULIN BINDING TRANSCRIPTION FACTOR (CAMTA) family is predicted to have important roles in adaptation to drought stress. To determine the appropriate PEG concentration, Arabidopsis thaliana camta mutants were first grown on diferent PEG concentrations, then the root lengths and germination percentages were recorded. Then, fresh and dry weights, relative water content, chlorophyll index, cell membrane damage, chlorophyll content,  $\text{H}_2\text{O}_2$ , proline and MDA levels together with the expression levels of important drought-tolerance genes were determined from the roots ans shoots of the plants under selected PEG concentration. The results of the study will be presented, and the adaptation and tolerance of plants to stress conditions by regulation of CAMTA levels via genetic engineering methods will be discussed.

**Keywords:** CAMTA, Arabidopsis thaliana, PEG-6000, Gene Expression, Drought Stress

## Lavantadan (*Lavandula angustifolia*) toplam flavonoid maddelerin ultrases destekli ekstraksiyonunda etkili faktörlerin belirlenmesi

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**Abstract:** Tıbbi ve aromatik bitkiler insan sağlığı üzerine olumlu etkileri olan uçucu ve uçucu olmayan doğal maddelerin varlığı ile özdeşleşmişlerdir. Lavanta (*Lavandula angustifolia*), dünya genelinde yaygın olarak yetiştirilen ve çeşitli hastalıkların tedavisinde kullanılan tıbbi ve aromatik bir bitkidir. Literatürde yer alan bilgiler incelendiğinde, lavanta ile ilgili çalışmalar ticari öneminden dolayı genellikle uçucu yağ üzerine yoğunlaşmış ve fenolik bileşikler gibi uçucu olmayan fraksiyonu üzerine nispeten az bilgi bulunmaktadır. Bu çalışmada lavantadan toplam flavonoid maddelerin ekstraksiyonu üzerine etkili ekstraksiyon parametrelerinin belirlenmesi amaçlanmıştır. Ultrases genliği (20-100%), sıcaklık (40-70°C), süre (5-30 dakika), sıvı/katı oranı (10-50 mL/g) ve ekstraksiyon çözeltisindeki su oranı (10-50%) gibi faktörlerin toplam flavonoid madde ekstraksiyonu üzerine etkileri kısmi faktöriyel deneme deseni ile belirlenmiştir. Kısmi faktöriyel deneme deseninden elde edilen sonuçlara göre lavanta ekstraktlarının toplam flavonoid madde miktarları 15,04-38,86 mg kateşin eş değeri/g arasında değişmiştir. Ekstraksiyon üzerine etkili faktörler yarı-normal dağılımı ve pareto çizelgesi kullanılarak analiz edilmiştir. Ekstraksiyon üzerine önemli derecede ( $p<0,05$ ) etkili olan faktörler sıcaklık, sıvı/katı oranı ve sıcaklık-ekstraksiyon çözeltisindeki su oranı arasındaki etkileşim olarak belirlenmiştir. Bu faktörlerdeki artışın ekstraktlardaki toplam flavonoid madde miktarını artırdığı gözlenmiştir. Ancak, ultrases genliği, süre ve ekstraksiyon çözeltisindeki su oranı gibi faktörlerdeki artışlar istatistiksel olarak önemsiz ( $p>0,05$ ) bulunmuştur. Varyans analizi sonuçları (F-değeri=23,86 ve p-değeri<0,0001), kısmi faktöriyel deneme deseninden elde edilen modelin doğruluğunu göstermiştir. Ayrıca yüksek  $R^2=0,8966$ , ayarlanmış- $R^2=0,8590$  ve tahmini- $R^2=0,7813$  değerleri model ile tahmin edilen ve deneysel verilerin uyumluluğunu göstermiştir. Toplam flavonoid madde ekstraksiyonunda sıcaklık, sıvı/katı oranı ve sıcaklık-ekstraksiyon çözeltisindeki su oranı arasındaki etkileşim toplam flavonoid madde ekstraksiyonu üzerine sırasıyla %62,38, 9,48 ve 17,50 katkı sağlamıştır.

**Keywords:** *Lavandula angustifolia*, Ekstraksiyon, Total flavonoid madde, Kısmi faktöriyel deneme deseni

## Patateste Potasyumun Yumru Kalitesi Üzerine Etkileri

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**Özet:** Bu çalışma, Türkiye’de yaygın olarak yetiştiriciliği yapılan Agria patates çeşidinde farklı dozlarda uygulanan potasyum gübrelemesinin yumru kalitesi üzerine etkilerini belirlemek amacıyla, 2019 yılında Niğde Ömer Halisdemir Üniversitesi Tarım Bilimleri ve Teknolojileri Fakültesi Araştırma ve Uygulama Alanında Tesadüf Blokları Deneme Desenine göre dört tekrarlamalı olarak kurulup yürütülmüştür. Denemede 6 farklı potasyum (K) dozu (K<sub>0</sub>: Kontrol, K<sub>4</sub>: 4 kg K/da, K<sub>8</sub>: 8 kg K/da, K<sub>12</sub>: 12 kg K/da, K<sub>16</sub>: 16 kg K/da, K<sub>20</sub>: 20 kg K/da) uygulaması kullanılmıştır. Çalışmada potasyum gübresi dikim öncesi toprağa uygulanmıştır. Çalışma sonucunda, artan miktarlarda uygulanan potasyumun yumru kuru madde miktarı, özgül ağırlık ve nişasta miktarını artırdığını fakat istatistiki olarak önemli ve uygun dozun 12 kg/da olduğu belirlenmiştir. Çalışmamızda kullanılan Agria çeşidinde parmak patates için en uygun potasyum dozu 8 kg/da iken cips için 8 ve 12 kg K/da olduğu sonucuna erişilmiştir. Sonuç olarak uygulanan potasyum dozlarının incelenen özellikleri etkiledikleri ve uygulanacak uygun potasyum dozunun cips ve parmak patates kızartma kalitesi için 8 kg K/da, kuru madde miktarı, özgül ağırlık ve nişasta miktarı için 12 kg K/da olduğu belirlenmiştir. Araştırma sonuçlarına göre, potasyum gübrelemesinin yumru kalite özellikleri üzerine etkili olduğu ancak, yüksek oranlarda uygulanan potasyumun parmak patates ve cips kızartma kalitesini olumsuz etkilediği sonucuna varılmıştır.

**Anahtar Kelimeler:** Solanum tuberosum, potasyum, kuru madde, özgül ağırlık, cips,

## Farklı Somatik Hücrelerle Kültüre Edilerek İn Vitro Koşullar Altında Üretilen Sığır Embriyolarının Dondurulması

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**Özet:** Bu çalışmada amaç, in vitro koşullarında yüksek kriyotoleransa sahip embriyoların üretilmesi suretiyle dondurulabilir embriyo üretimi olanaklarını araştırmaktır. Çalışmada mezbahada kesilen sığırların ovaryumları kullanılmıştır. Aspirasyon yöntemi ile elde edilen oositler (1632 adet) TCM-199 da 24 saat süreyle %5 CO<sub>2</sub>, %5 O<sub>2</sub>, %90 N<sub>2</sub> gaz atmosferinde 38,5 °C de in vitro olarak mature edilmiştir. Bu amaçla sırasıyla 4 grup oluşturulmuştur. Her bir İn Vitro Maturasyon ortamında mature edilen Kümüls Oosit Kompleksler rastgele bir biçimde 4 farklı İn Vitro Fertilizasyon ortamının içine konularak rastgele blok tasarımı oluşturulmuştur. Olgun oositler 24 saat süreyle fertilize edilmiştir. Fertilizasyon sonrası 48. saatte cleavage % 67,05 (865/1290) saptanmıştır. Embriyolar 7 gün süreyle %5 CO<sub>2</sub>, %5 O<sub>2</sub>, %90 N<sub>2</sub> gaz karışımında blastosist (% 34,91; 302/865) aşamasına kadar inkübe edilmiştir. Zigot ve embriyolar taşıma ortamından (TCM199) 500 µL vitrifikasyon solüsyon 1'in (VS<sub>1</sub>) (5 M etilen glikol içeren taşıma ortamı) içine aktarılıp 3 dk sonra VS<sub>2</sub>'nin (7 M etilen glikol, %18 fikol 70 ve 0.5 M galaktoz içeren taşıma ortamı) içine aktarılarak payete doldurma zamanı dahil 45 sn'lik süre boyunca bu ortamda tutulmuştur. Erken blastosist-blastosist aşamasına ulaşan 302 adet embriyodan 254 tanesi vitrifikasyon solüsyonunda maruz bırakılarak donduruldular. Zigot ve embriyolar dondurma payetine yüklendikten sonra sıvı nitrojen içine daldırılıp dondurulmuştur. Çalışmada istatistiki analizde ki-kare testi kullanılmıştır. Çözdürme sonrası, genişlemiş blastosist-zonadan çıkma safhasında en iyi gelişim %52,2 (35/67) ile Grup 1 (Ovidukt hücresi) de saptanırken, bunu %45,3 (29/64) ile Grup 2 (Granüloza hücresi), %22,2 (14/63) ile Grup 3 (Kümüls hücresi) ve %5 (3/60) ile Grup 4 (Hücresiz) takip etmiştir. Grup 1 ve 2 arasında istatistiksel bir fark bulunmamıştır. Grup 1 ile Grup 3 arasındaki istatistiksel fark P<0,01, Grup 1 ile Grup 4 arasında ise P<0,001 düzeyinde anlamlı bulundu. Ovidukt hücreleri ile ko-kültüre tabi tutulan ve dondurulup çözdürülen zigotlarda maturasyon, fertilizasyon, blastosist oluşum oranı ve blastosistlerin diğer özellikleri iyileşmiştir.

**Anahtar Kelimeler:** Embriyo, Vitrifikasyon, Sığır, Somatik hücre

## **Roles of Fish Skin Mucus as Antibacterial in Fish Culture**

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**Abstracts:** The fishes cultured in extensive enclosed structures are usually prone to infection, rearing of fish in a confined enclosure is expanding as animal protein source requirement is continuously on the high side. However, several existing ways to impede these diseases, the mode of treatment are usually dangerous to the well-being of aquatic organisms and the surroundings of the farm or seas. Mucus from fish skin are suitable origin of antimicrobial techniques to counter infection of fish and people, because of the interest for several fish species which is on the high side, several studies have been documented on antimicrobial properties of natural products from aquatic origin. Several roles are imbedded in the slimy substance recovered from fish skin for their protection and continuity being from a natural source. The roles of the secretion are as follows: safeguarding from abrasion, reduction of body abrasion over water, oxygenation, procreation, elimination of waste, ionic and balancing of osmotic, nest development, signaling information and specifically, applied as first means of protection over microorganisms found in the fish culture surroundings. Fish skin secretion was seen to display several antibacterial particles like sweat gland assemblage of glycoproteins, enzymes such as chitin together with antimycotic actions, proteins such as apolipoprotein-1, warm temperature acclimation protein. Saltwater surrounding prove to have potential for the development of alternative antibacterial that are reliable and significant resources for fish culture system. In view of the potency of fish skin mucus as a noticeable and effective antibacterial for the prevention and treatment of fish disease in culture system, This review unfolds the feasible antibacterial potency of fish skin mucus from marine and fresh water fish mucus derived from fish skin as an alternative for the inhibition of infections and likely cure.

**Key words:** Antibacterial activity; Fish skin mucus; fish disease; marine water fish; fish Teleost fish; Elasmobranchs

## Tomato: Source of Natural Bioactive Compounds and Medicines

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**Abstracts:** Tomato (*Solanum lycopersicum* L.) is one of the most eaten and favorite garden vegetables of the world. Today a vast number of tomato cultivars with various morphological and sensorial characteristics, as well as tomato-based products, which are significant sources of nutrition for the global population. Tomato is also considered as a dynamic crop to study the biology and plant behavior, ecology, biotic stress factors, fruit biology and plant-microbe interaction. Its intake has health advantages due to the high amounts of bioactive ingredients it contains. Carotenoids such as carotene, a precursor to vitamin A, and mainly lycopene, which is responsible for the red color, vitamins such as ascorbic acid and tocopherols, phenolic compounds such as hydroxycinnamic acid derivatives and flavonoids, and lectins are the most important compounds in tomato. Tomatoes and their derivatives have a high nutritious benefit, as well as antioxidant, anti-inflammatory, and anticancer properties. Tomatoes are usually considered healthy to consume. However, total intake varies from person to person. Undoubtedly, the beneficial or detrimental effects of plants or their derivatives are closely linked to quality, which includes the existence of biologically active compounds. However, the synthesis and aggregation of these bioactive molecules is influenced by a variety of other influences, including environmental conditions. Possible industrial uses for tomato bioactive compounds may also be discussed.

**Keywords:** Tomato, Bioactive compounds, Nutrients, Industry.

## Role of Prebiotic Inulin in Ruminants Nutrition

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**Abstracts:** In 2006, the European Union (FDA) food and drug administration restricted the usage of antibiotic growth promoters. Since, natural feed additives which enhance ruminants health and production have become an important research area for animal nutritionists. Among the feed additives Prebiotics (a non-digestible fructo-oligosaccharide that constructively imparts the host by growth stimulation) are progressively studied because of their ability to modify the neonate gut microbiota of livestock (pre ruminant), playing role in digestion, pathogen elimination, immune modulation, fat replacer, nutrients utilization, gene expression progression, carcinogenesis, methanogenesis, and animal products. Inulin (prebiotic) is a storage dietary fiber, a heterogeneous blend of fructose polymers is mainly found in plants chicory, artichoke etc. Inulin modulates gut ecosystem both in ruminants and non-ruminants. Inulin effects the immune system of ruminants vice versa as a outcome of large intestine fermentation and reduces rumen ammonia nitrogen. Also, it has been revealed the influence in methane production, weight gain in pre ruminants and increase microbial protein synthesis. Additionally, it improves health and reduce the risk of many existential diseases. There is less data available about the use of inulin in adult ruminants, reasons are still unknown. The aim of this review is to describe the possibly effect of inulin prebiotics on the GI microbial ecosystem in ruminants and overall performance of animals in multiple ways. In future challenges, it is expected that prebiotics could be the part of diets in both ruminants and non-ruminants for empowering variation of gut microflora in ecological behaviors.

**Key words:** Prebiotics, Inulin, Ruminants, Microbiota, Metabolism

## Sürdürülebilir-İzlenebilir Tarım: Tarım 4.0

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**Özet:** Dijital teknolojileri, endüstriyel ürünleri ve lojistiği birbiriyle bağlantılı kılan sistemlerden oluşan 'Endüstri 4.0' ilk olarak 2011 yılında dünyanın en büyük endüstri fuarı Hannover Fair'de kullanılmıştır. İnsan kas gücüne ihtiyacı minimize eden ya da ortadan kaldıran, gerçek zamanlı sürekli data erişiminde bulunan, kontrol, iyileştirme, iletişim ve koordinasyonu kesintisiz sağlayan makine ve üretim sistemlerinin veri toplama, üretim ve dağıtım faaliyetlerini gerçekleştirmesi olan Endüstri 4.0'ın tarımsal faaliyetler kapsamında kullanılmasıyla 4. tarım devrimi denilen Tarım 4.0 dönemi başlamıştır. Tarım 4.0, veri toplama teknolojileri, data analizi ile anlamlandırmasını içeren büyük veri işleme ve karar verme algoritmaları, dijital ve mekanik uygulama aşamalarını içermektedir. Tarımsal faaliyetlerin gerçekleştirilmesi ve devamlılığının sağlanmasında; verimlilik, etkinlik, hız, takip edilebilirlik, sürdürülebilirlik, kaynak optimizasyonu, gıda güvenliği, rekabet gücü vb. avantajları sağlamaktadır. İnsanlık tarihinin her zaman hayati konusu olan "gıdanın önceliği, erişimi, paylaşımı, güvenliği ve güvencesi" kriz ve kaos dönemlerinde önemini daha fazla hissettirmektedir. Gıdanın üretim aşaması olan tarımda kaynak ve ürün kayıplarının tolere edilemez zararlara neden olduğu bu pandemi günlerinde Tarım 4.0'ın önemi ve gerekliliği kendini daha da hissettirmiştir. Bu çalışmada, planlama, değerlendirilme, işleme ve uygulama aşamalarında Tarım 4.0'ın önemi ve gerekliliği işlenmiştir.

**Anahtar Kelimeler:** Dijital tarım, veri işleme, yapay zeka, verim, kalite,

## Nutritive values and methane emission from summer grass species from Northern Pakistan

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**Abstract:** The livestock production and the small scale, and extensive (transhumant, nomadic, and sedentary farming) livestock production systems in Pakistan lack long-term sustainability due to declining quantity and quality green forages and pastures. Development of good quality forage and pasture resources for the entire year in the major issue to be researched and addressed. The first step in this regard is to evaluate the locally grown forage and pasture species for their nutritive value. The present study was therefore designed to: (i) to quantify the nutrient composition of commonly available summer grasses; (ii) to measure the methane (CH<sub>4</sub>) production potential of the grass species; and (iii) to examine the variation between species in their CH<sub>4</sub> production and feeding values. Ten grass species, namely, Sudex (*Sorghum × sudangrass*), Jumbo grass (*Sorghum bicolor* × *Sorghum sudanese*), *Sorghum alatum*, *Pennisetum purpureum*, *Vetiveria zizanioides*, *Pinicum colaratum*, *Condon dactylon*, *Bothriochloa pertusa* and *Desmostachya bipinnata* were evaluated under uniform agronomic and environment conditions. The results showed that the contents of all measured chemical components, in vitro organic matter digestibility (OMD), in vitro gas production (GP) and CH<sub>4</sub>-emission had large variation ( $P < 0.05$ ) among the grass species. Among the grasses, Jumbo grass and *P. purpureum* had relatively high ( $P < 0.05$ ) contents of CP (14.5, 12.1% DM) and in vitro OMD (59.7, 54.2%), and produced high amount of total gas, that contained the least proportion of CH<sub>4</sub> (Figure 1a&b). In contrast *D. bipinnata* produced the least amount of total gas and had highest CH<sub>4</sub> in total GP. Next to *D. bipinnata*, *V. zizanioides* had lower degradability/GP and highest proportion of CH<sub>4</sub> in total gas (Figure a&b). The large variation in chemical composition, OMD and CH<sub>4</sub>-emission potential of the summer grass presents an opportunity to select forage species that have high nutritional quality and lower CH<sub>4</sub>-emission potential.

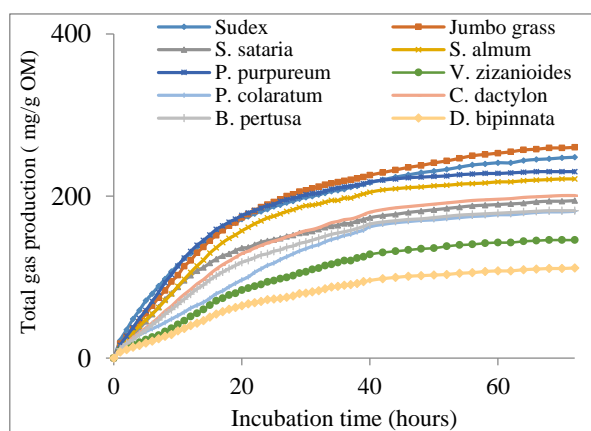


Figure 1a

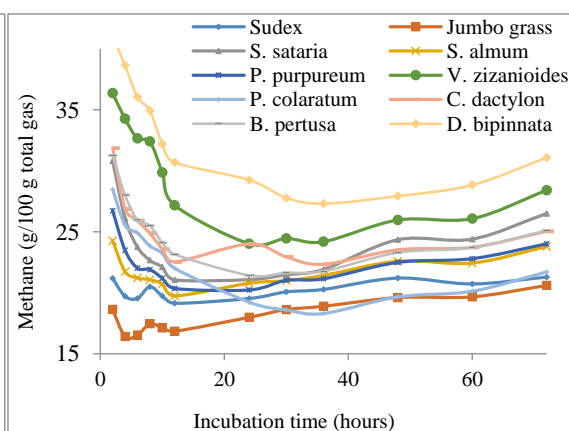


Figure 1b

**Key words:** Grasses, nutritive value, methane emission, rumen fermentation, in vitro gas production

## The Effects of Rapeseeds Inclusion in the Diets of Dairy Cows on Milk Quality

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**Abstract:** Inclusion of oilseeds in ruminants' diets is an important tool to improve the milk quality, by changing the content of both primary and secondary constituents. Whereas many studies focus on fat content or fatty acids profile, the effects on protein content and protein fractions are less studied and understood. This is also the case of rapeseed, an important oilseed worldwide. The current study presents an overview of the effects of oilseed on milk protein content and fractions, which highlights their potential to influence the milk quality. Also, the results of a feeding trial assessing the effects of the inclusion of rapeseeds on dairy cows diets on milk quality are presented. Of these effects, the most relevant are the decrease of protein content, from 3.73 to 3.58% and the insignificant effects on the fat content and other milk parameters. Also, the inclusion of rapeseeds led to significant changes in the relative proportions of some protein fractions:  $\kappa$  – CN,  $\beta$  – Lg, BSA, and Ig. This has potential effects on the consumers' health and potential application of tailored feeding strategies.

**Keywords:** Rapeseeds, Dairy cows, Milk quality, Protein fractions

## **Yield Based Nitrogen Fertilizer Management in Potato**

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**Abstract:** Tuber yield in potato depends on many factors including variety, environmental factors and applied cultural methods. Plant nutrient applications are the most important cultural practices and have significant effects on yield. For this reason, the plant nutrient needed by the potato should be given at the appropriate time and in appropriate amounts, depending on the growth period of the plant. In order to achieve this, soil analysis must be done in the production area. However, in the areas where potato farming is carried out, farmers use more chemical fertilizers than needed due to wrong practices. The nutrient that potatoes most need is nitrogen. Therefore, when nitrogenous fertilizers are applied in the most appropriate form, amount and period, they have a positive effect on both plant growth and tuber yield. However, when nitrogenous fertilizers are applied excessively, resistance against diseases and pests decreases, as well as a decrease in storage resistance. Nitrogen deficiency decreases the growth of the plant and also reduces the tuber size and yield. Nitrogen fertilizer management in potatoes is very important both economically and environmentally. However, the efficiency of nitrogen fertilization and optimum nitrogen use may vary between fields and over the years. This variability is due to both the product-nitrogen requirement and the change in the soil-nitrogen amount. As a result, the development of tools that more precisely estimate the nitrogen requirement on the basis of individual area in potato production will make the tuber yield and quality at the desired level and can be used as a strategy to minimize nitrogen loss and damage to the environment. In this study, research results on nitrogen fertilization and tuber yield in potatoes will be discussed and information will be presented as recommendations for future studies.

**Keywords:** Nitrogen, Plant nutrition, *Solanum tuberosum*, Yield.

# **ARCHITECTURE-CIVIL ENGINEERING**

## **Көбікті шыны алу технологиясын оптимизациялау әдістерін тәжірбиелік зерттеулерді салыстыру.**

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**Реферат:** Бұл статьяда қолданыстағы және жаңадан салынатын кәсіпорындардың энергия тиімділігін арттыру жөніндегі іс-шараларды жүзеге асыру құрылыс нысандарын жылу оқшаулау үшін бәсекеге қабілетті жылу оқшаулағыш материал - шыны қалдықтары мен тау жыныстары негізінде алынған көбікті шыны туралы айтылады. Қазіргі уақытта барлық дамыған елдерде көбікті шыны өте танымал құрылыс және техникалық материал болып табылады, оған деген сұраныс тек азаматтық құрылыста ғана емес, сонымен қатар өнеркәсіптік құрылыстың барлық салаларында құрылыс-монтаждау жұмыстарының көлемінің артуымен бірге артып келеді.

Қазақстанда жылу оқшаулау үшін негізінен әкелінетін минералды мақта және тақтайша бұйымдары және көбіктенетін синтетикалық материалдар, мысалы, полистирол, пеноизол және басқа да жергілікті өндірістік материалдар көрші аймақтардан әкелінеді. Бұл арзан материалдар мен бұйымдар жақсы жылу оқшаулағыш қасиеттерімен және төмен тығыздығымен ерекшеленеді, бірақ қысқа мерзімді және өртте қауіпті, әсіресе ағаш ғимараттарды жылыту үшін немесе желдетілетін қасбеттерде қолданған кезде.

Статья барысында Россомагина А.С., Китайгородский И.И., Кешишян Т.Н., Кетов А.А., Пузанов И.С., Дамдинова Д.Р. ғылыми зерттеу жұмыстары қарастырылды. Олардың жасаған тұжырымдамаларын салыстыра отырып, А.С. Россомагина-ның шыны сортының немесе сортталмаған шыны қолданудың алынатын көбікті шыны қасиеттеріне айтарлықтай әсер етпейтін эксперимент нәтижелеріне, сондай-ақ Д.Р. Дамдинова мен П.К. Хардаева-ның көбікті шыныға эффузивті тау жыныстарын қолдану тиімді әрі энергия шығынының аз болуына байланысты статьяларына сүйене отырып, осы әдісті Қазақстанда жүзеге асыруға болатындығы айтылды. Біріншіден, қазіргі кезде қолданатын материалдардан бірқатар қасиеттері бойынша (беріктігі, отқа төзімділігі) экологиялық таза өнім; екіншіден, энергияны үнемдеу талаптарына сай сенімді жылу қорғанысын қамтамасыз ету үшін бәсекеге қабілетті жылу оқшаулағыш материал; үшіншіден, шыны қалдықтарын кәдеге жарату және экологиялық жағдайды жақсарту бойынша мәселелер қатарын шешеді.

**Ачкыч Сөздер:** Шыны қалдықтары, Эффузивті тау жыныстары, Көбікті шыны, Термоөндеу, ұнтақтау

## Factors Affecting the Properties of Hemp Concretes Produced Using Industrial Hemp Stems Cultivated In Turkey

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**Abstract:** Environmental problems related to the use tremendous amounts of construction materials have accelerated the search low-environmental impact construction materials. One such material is hemp concrete which is a mixture of hemp shives (the wooden part of the hemp stem) and mineral binder. Hemp concrete which has been subject of several research, is an environmentally friendly material with exceptional properties. It is widespread in Europe and several other countries, but not in Turkey. The importance of industrial hemp cultivation has become more pronounced with the new regulations made in 2016. The aim of this study is to produce hemp concretes with utilizing waste industrial hemp stems cultivated in Turkey.

This study investigated the production and various properties of hemp concretes produced using Turkish industrial hemp stems. Hemp shive aggregates were obtained through chopping the bast fibers removed hemp stems at laboratory conditions. Twelve mixtures were prepared to explore the influence of hemp size, hemp: cement and hemp water ratios on the physical, mechanical and microstructure of samples. Tests were performed on ambient cured samples at the age of 28 days. Compressive strengths of hemp concretes varied from 0.28 to 1.24 MPa in the apparent density range of 312-928 kg/m<sup>3</sup>. The effectiveness of hemp size, hemp: cement and hemp:water ratio were quite different on the apparent density and compressive strength of hemp concretes. Furthermore, the results obtained from the experimental study was found to be relatively within an acceptable range when compared to the prior literature.

**Keywords:** Hemp concrete, Turkish hemp stem, Sustainable materials, Apparent density, Compressive strength

## Asidik Pomza İle Üretilen Alkali İle Aktive Edilmiş Hafif Harçların Fiziksel Ve Mekanik Özellikleri

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**Özet:** Bu çalışmada, alkali ile aktive edilmiş yüksek fırın cürufu hafif harçların fiziksel ve mekanik özellikleri araştırılmıştır. Harçlarda aktivatör olarak %98 saflıkta katı formda NaOH kullanılmıştır. Tüm karışımlarda, bağlayıcı miktarı 500 kg/m<sup>3</sup> ve su-bağlayıcı oranı 0.5 olarak alınmıştır. Kapadokya bölgesinden temin edilen asidik pomza agregası ile üretilen hafif taze harç özelliklerinden yayılma ve taze birim ağırlık deneysel olarak belirlenmiştir. Daha sonra kalıplara yerleştirilen taze harç numuneleri bir gün sonra kalıptan çıkartılmıştır. Kalıplardan çıkarılan numuneler 105 °C sıcaklıktaki etüvde 48 saat süre bekletildikten sonra poşet içerisinde deney gününe kadar kür edilmiştir. Bu numuneler üzerinde 7, 28, 56 ve 91 gün sonra sertleşmiş hafif harç özelliklerinden sertleşmiş birim ağırlık, eğilme dayanımı ve basınç dayanımı değerleri deneysel olarak belirlenmiştir. Deney sonuçları, alkali ile aktive edilmiş hafif harç üretililebileceğini göstermiştir. Ayrıca, en yüksek mekanik özellikler en düşük NaOH içeriği ile üretilen harçlarda görülmüştür.

**Anahtar Kelimeler:** Alkali, Hafif harç, Yüksek fırın cürufu, Asidik pomza

## **Tekerlek Basıncına Maruz Homojen Zeminlerde Gerilme Ve Deplasman Dağılımlarının Sınır Eleman Yöntemi İle Belirlenmesi**

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**Özet:** Bu çalışmada, esnek üstyapıların davranışının sayısal olarak belirlenmesi için sınır eleman yöntemi kullanılmıştır. Zeminin malzeme davranışının doğrusal elastik olduğu varsayılan çalışmada sınır eleman yöntemi, Fourier dönüşüm uzayında ele alınmıştır. Bu çalışmada, elastik yarım uzaydaki iç noktalarda oluşan gerilme ve deplasman dağılımlarının belirlenmesi amaçlanmıştır. Bu amaçla çalışmada, üç boyutlu elastik problemler için bir bilgisayar programı geliştirilmiştir. Sınır eleman formülasyonu kullanılarak belirlenen esnek üstyapılarda oluşan gerilme ve deplasman dağılımlarının sonuçları, literatürde verilen Boussinesq denklemlerinin kullanılmasıyla elde edilen değerler ile karşılaştırılmıştır. Sınır eleman yöntemi ve Boussinesq formülünden elde edilen sonuçların birbiriyle mükemmel bir uyum içinde olduğu sonucuna varılmıştır.

**Anahtar Kelimeler:** Sınır eleman yöntemi, Fourier dönüşüm uzayı, Esnek üstyapı davranışı, Sabit sınır eleman

## Investigation of Compressive Strength of Concrete Added Accelerator

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**Abstract:** In prefabricated structures, column and foundation are produced in the factory and assembled on the construction site. During the assembly, the space between the column and the socket is filled with concrete. The setting time of the filled concrete and the mistakes made during the assembly are in contradiction to the low-cost production and rapid assembly, which are the advantages of prefabricated structures. Therefore, the use of rapid-setting concretes is increasing. By using accelerators, the setting-time of the concrete is shortened. However, high activity anions and cations in the accelerators used in the past cause corrosion. In recent years, the use of accelerators containing ions with low activity that do not cause corrosion has become widespread. These accelerators are known to increase early strength. However, strength development in concretes using accelerators increases compared to conventional concretes without accelerator.

In this study, concrete samples with varying proportions of accelerator admixture were produced. Compressive strengths of samples for 1 day, 7 days and 28 days were examined. As a result, it is seen that the increase in the amount of accelerator has a negative effect on the final strength.

**Keywords:** Early strength development, Accelerators, Compressive strength

## **TMD and PID Control of a Multi-Degree of Freedom Structure against Kocaeli Earthquake**

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**Abstract:** During the Kocaeli earthquake that took place on 17 August 1999, many buildings suffered structural damage and many people lost their lives. This situation once again brought the importance of taking safety measures against earthquakes in buildings. One of the most important measures that can be taken against earthquakes in buildings is to reduce the vibration of the building. In this study, a tuned mass damper (TMD) and proportional – integral – derivative (PID) controller were designed to reduce the vibrations caused by the Kocaeli earthquake on a 6-storey building model with multiple degrees of freedom. The mathematical model governing the vibration of the building is obtained by Lagrange Equations. TMD is located on the 6th floor of the building and the PID controller is placed between the 5th and 6th floors, and vibration control is aimed at the top floor. The analysis of the TMD and PID controller applied structure during the simulation process was made numerically and the optimal parameters were found. In the study, the behaviors of the structure without controller, TMD, TMD and PID controller are presented. According to the results, the vibration of the structure decreased by 30% with the applied method, it was decreased by 10% when only TMD was used.

**Keywords:** Tuned mass damper (TMD), proportional – integral – derivative (PID) controller, Multi degree of freedom structure, Structural control, Kocaeli earthquake

## **The Influence of Magnitude Recurrence Models of Fault Sources over the Seismic Hazard, Case for Marmara Region**

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**Abstract:** It is widely accepted that the faults or fault segments have a pattern in releasing the accumulated stresses. The regularity of seismic events within a range of magnitudes initiated the development of magnitude recurrence models for faults. Among the several proposed methods, the characteristic earthquake model is still widely utilized since its first appearance in the literature. The alternative models are also available which mostly require more justification before put into the practice. In this study, various fault magnitude recurrence models are investigated and influence of the pure and full characteristic models over the seismic hazard are compared. The pure characteristic model yielded highest seismic hazard while the sensitivity of the hazard over the magnitude distribution characteristics is demonstrated. As the magnitude range becomes wider, the seismic hazard becomes smaller. Considering the variation between the seismic hazards computed by different characteristic models, it is shown that selection of the right fault magnitude recurrence model is an important issue.

**Keywords:** Spatially smoothed seismicity, Fault magnitude recurrence models, Pure characteristic earthquake model, Full characteristic earthquake model

## **Farklı Oranlarda Diatomit İkamemesinin 75 °C’de Isıl Kür Uygulanan F Sınıfı Uçucu Kül Tabanlı Geopolimer Harçlara Etkilerinin İncelenmesi**

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**Özet:** Bu çalışmada F sınıfı uçucu kül tabanlı geopolimer harçlara diatomit ikamesinin etkileri araştırılmıştır. Diatomit ikameli geopolimer harçların ısı iletkenlik katsayısı, yarmada çekme dayanımı ve aşınma direnci özellikleri incelenmiştir. Ayrıca geopolimer hamur numunelerin mikro yapısı üzerinde FESEM incelemeleri yapılmıştır. Üretilen numunelerde ağırlıkça su/bağlayıcı oranı 0,31 ve kum/bağlayıcı oranı 3,0 olarak belirlenmiştir. Aktivatör olarak sodyum hidroksit (NaOH) seçilmiş olup, bağlayıcı malzemeye göre ağırlıkça %10 oranında Na<sup>+</sup> içerecek şekilde kullanılmıştır. Karışımlarda uçucu küle ağırlıkça %1, %2, %3, %4 ve %5 oranlarında diatomit ikamesi yapılmıştır. Aşınma direnci tayini için 71x71x71 mm boyutlarında, ısı iletkenlik ve yarmada çekme dayanımı tayinleri için 16x16x4 cm boyutlarında numuneler üretilmiştir. Karışımlar 75°C sıcaklıkta 48 saat ısıl küre tabii tutulmuştur. FESEM görüntüleri incelendiğinde %1, %2 ve %3 oranında diatomit ikamesinin geopolimer numunelerde NASH jeli oluşumunu desteklediği ve kontrol numunesine göre daha yoğun, boşluksuz bir yapı oluşturduğu görülmüştür. Ancak %4 ve %5 oranında diatomit ikamesi yapılan geopolimer numunelerde, reaksiyona katılmayan taneciklerin arttığı ve geopolimer sistemde boşluklu bir yapı oluşmasına sebep olduğu görülmüştür. Buna paralel olarak en düşük ısı iletkenlik katsayısının (0,4191 W/mK) %5 oranında diatomit ikamesi yapılan numunelerde, en yüksek yarmada çekme dayanımının (1,27 MPa) %3 oranında diatomit ikamesi yapılan numunelerde ve aşınmaya karşı gösterilen direncin en yüksek (21325 mm<sup>3</sup>/5000 mm<sup>2</sup> en düşük hacim kaybı) %3 oranında diatomit ikamesi yapılan numunelerde olduğu belirlenmiştir. Ayrıca geopolimer harçlarda ısı iletkenlik katsayısı ile yarma dayanımı (R=0,9726) ve aşınma direnci (R=0,8485) değerleri arasında yüksek oranda doğrusal ilişki olduğu sonucuna ulaşılmıştır.

**Anahtar Kelimeler:** Uçucu kül, Diatomit, Isıl kür, Isı geçirimsizlik

## **Estimating the Discharge Coefficient of Trapezoidal Weirs with Multivariate Adaptive Regression Splines (MARS) and Multiple Linear Regression (MLR) Methods**

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**Abstract:** Weirs, used to regulating and controlling etc. of flow, are hydraulic structures constructed by completely covering the cross section of the rivers. With the construction of these structures in the flow field, changes occur in the flow field and turn into a complex flow problem with water-structure interaction. Some simplification procedures are done to express the complex flow problem theoretically. There are differences between the actual and theoretical flow rates depending on these simplification processes. The ratio between the actual and theoretical value of the flow is defined as the discharge coefficient. In this study, the discharge coefficient of the trapezoidal broad crested weir with different upstream and downstream slopes is calculated based on the flow characteristics obtained in the laboratory experiments under different flow conditions. Multivariate Adaptive Regression Splines (MARS), which is nonparametric and does not have functional relationship assumptions between dependent and independent variables, is used as the estimation method. The results of the MARS method are compared with the results of the Multiple Linear Regression (MLR) method, which is a classical method. Different combinations of weir geometry and flow properties are used as input parameters. The success of the models is assessed according to the coefficient of determination ( $R^2$ ), Mean Absolute Percentage Error (MAPE) and Root Mean Square Error (RMSE). As a result of the study, it is determined that the MARS method give very successful results compared to the CDR method.

**Keywords:** Discharge coefficient, MARS, MLR, Open channel flow

## **Farklı Uçucu Kül, Alkali Aktivatör ve Kür Sıcaklığının Geopolimer Kompozit Malzeme Üretimine Etkisi: Ön Sonuçlar**

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**Özet:** Uçucu kül (UK), termik santrallerin enerji üretmek için kullandıkları öğütülmüş kömürün yanmasıyla ortaya çıkan bir atık/yan üründür. Bu endüstriyel katı atığın hammadde olarak uygun kullanımı ile üstün çevresel yeniden değerlendirme performansı elde edilebilmektedir. Geopolimer kompozit malzeme üretiminde Zonguldak Çatalağzı ve Adana İskenderun Termik Santrali'nden temin edilen UK dolgu ve alkali aktivatörler (NaOH ve Na<sub>2</sub>SiO<sub>3</sub>) bağlayıcı olarak kullanılmıştır. İki farklı kürleme sıcaklığında (70 ve 100 °C) üretilen geopolimerlerde temel fiziksel ve mekanik özellikleri ortaya koymak için (i) birim hacim ağırlığı, (ii) eğilme dayanımı, (iii) basınç dayanımı, (iv) su emme ve (v) porozite testleri gerçekleştirilmiştir. Bu çalışmada üretilen geopolimer kompozit malzemeler -BHA'ları 2000 kg/m<sup>3</sup>'den az olduğundan hafif yapı malzemesidir, çimento içermediklerinden sera etkisine neden olmaz ve inşaat sektöründe kullanmaya uygundur.

**Anahtar Kelimeler:** Atık kül, çevre, Geopolimer kompozit malzeme, Yeniden kullanım

## Effect of Alumina Sand Proportion on Strength Properties of Fly Ash Based Geopolymer Mortar

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**Abstract:** Geopolymers are a group of inorganic, synthetic and amorphous polymeric materials (aluminosilicates). The objective of the following study was to determine the effect of the proportion of brown electrocorundum (alumina sand) on the strength properties of the finished fly ash based geopolymer mortar. Brown alumina, river sand and fly ash were used as the basis for the samples. The whole dry mixture was activated with 10M NaOH solution and aqueous sodium silicate solution. Strength tests included static compression testing and three-point bending of the material. The microstructure of the geopolymers was analyzed using a scanning electron microscope with EDS overlay. The results show the possibility of replacing the river sand aggregate with brown alumina. This is an important appetite in view of the increasing scarcity of suitable sand used in the construction industry.

**Keywords:** Geopolymers, Fly ash, Corundum

## Kalker Kumu İle Üretilmiş Diatomitli Harçların Özellikleri

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**Özet:** Deneysel çalışmada, diatomit içeren kalker kumu kullanılmış harçların 14 günlük mekanik özellikleri araştırılmıştır. Üretilen harç karışımlarında çimento yerine ağırlığınca %0, %5, %10, %15 ve %20 oranlarında diatomit kullanılmıştır. Üretilen tüm karışımların su/bağlayıcı oranı 0.35 olarak belirlenmiştir. Diatomit ve kalker kumu ile üretilen harçların yayılma değerleri belirlendikten sonra 4×4×16 cm boyutlu numune kalıplarına yerleştirilmiş ve taze birim ağırlık değerleri belirlenmiştir. Numuneler 24 saat sonra kalıplarından çıkarılarak 14 gün boyunca kür havuzunda küre tabi tutulmuşlardır. Kür işleminden sonra numuneler üzerinde sertleşmiş birim ağırlık, eğilme dayanımı ve basınç dayanımı deneyleri gerçekleştirilmiş ve harçların mikroyapılarını incelemek için polarize ışık mikroskopu (PLM) ve taramalı elektron mikroskopu (SEM) analizleri yapılmıştır. %15 oranında diatomit içeriğinin harçların mekanik özelliklerinde daha iyi sonuçlar sağladığı belirlenmiştir.

**Anahtar Kelimeler:** Kalsine diatomit, Kalker kumu, Eğilme/basınç dayanımı

## **BIOLOGY AND BIOTECHNOLOGY**

## Effective Concentrations of Coragen® On Larval Stage of Archips Rosana (Linnaeus, 1758) (Lepidoptera: Tortricidae)

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**Abstract:** This study aims to determine the effects of the insecticide Chlorantraniliprole (trading name Coragen®) on larvae of the moth species *Archips rosana* (Linnaeus, 1758) (Lepidoptera: Tortricidae). *A. rosana*, known as the European leaf roller (ELR), is a nocturnal member of the Tortricidae family of Lepidoptera. It is a species that is native to the Palearctic region, but it is found all over the world, with the exception of the Far East and Siberia. *A. rosana* is of paramount importance in plant protection as it leads to great economic losses in various plant cultivations.

Larvae were collected in the field from April to June 2020 from insecticide-free members of Rosaceae in Edirne province with minimum direct contact and brought to the laboratory. The larvae were exposed to agricultural application (recommended dose) and diluted doses ( $1.10^{-1}$ ,  $1.10^{-2}$ ,  $1.10^{-3}$  and  $1.10^{-4}$ ) of Coragen® to determine the LC<sub>50</sub> values. It was found that LC<sub>50</sub> concentrations were 25,751 µg/ml (48h), 1,715 µg/ml (72 h), 0,499 µg/ml (96 h).

This study was performed to determine the effects of various doses of Coragen®, an insecticide widely used in agricultural fields, on *A. rosana* larvae. Decreased insecticide applications means decreased exposure to chemicals hazardous to environment and human health. This study, therefore, can provide contributive data to be used in Integrated Pest Management methods. The most important reason for selecting this topic is to minimize the excessive and unconscious use of insecticides against pests. In this sense, diluted application doses of the insecticide Coragen® are important in terms of environmental pollution and human health.

**Keywords:** Coragen®, insecticide, *Archips rosana*, LC<sub>50</sub>, larva

**Acknowledgements:** This research is a part of master thesis study, and was supported by Scientific Research Project Unit of Trakya University (TUBAP) - 2020/57 [Toxic Effects of Coragen® on Larvae of *Archips rosana* (Linnaeus,1758) (Lepidoptera: Tortricidae)].

## Taxonomic Studies of Insect Pests Associated With Cotton Crop from Punjab, Pakistan

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**Abstract:** The present study was aimed to observe the diversity of insect pests associated with cotton crop from Punjab, Pakistan during the year 2017-18 and morphological studies was performed in taxonomy lab, Department of Entomology, University of Agriculture, Faisalabad. The results of this study comprises chewing complex like *E. vitella*, *H. armigera*, *P. gossypiella*, *S. frugiperda* and *M. undecimpustulatus undatus*. The sucking insect pests were *A. biguttula*, *A. gossypii*, *B. tabaci*, *D. cingulatus*, *O. hyalinipennis*, *P. solenopsis* and *T. tabaci*, also recorded the maximum infestation of whitefly and pink bollworm. The morphology of head, antennae, mouthparts, thorax, wings, legs and abdomen was provided. This study was helpful in studying the taxonomic position of these insects and provides an important aspect about the pest management. The samples were collected from different core areas during the cotton season at multiple times such as Multan, Vehari, Bahawalpur, Sargodha, Sahiwal, Faisalabad, Rahim-yar-Khan, Sialkot, Lodhran and Jhang using appropriate entomological tools. The insects were identified on the basis of morphological characters and study was further confirmed through microscopy of different morphological organs of these species in experimental lab. The collected specimens were identified upto the species level and taxonomic keys was also prepared. Cotton is an important crop that is placed in the genus *Gossypium*. It strengthens the economy by adding revenue in the GDP of the country, and also provides raw fiber to the textile industry of Pakistan. In Punjab, Pakistan it is cultivated on a large sector but there is decline in the yield due to the attack of these insect pests.

**Keywords:** Cotton, taxonomic, Pink bollworm, Chewing, Whitefly, Sucking, Punjab, Pakistan

## **A Neuroprotective Effect of the Complex Extract of Medicinal Mushroom and Herbal Medicin Curcumin against the Development of Alzheimer's Disease**

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**Abstract:** Alzheimer disease is a neurodegenerative disease that is signified by cognitive decline, memory loss, and erratic behavior. Till up to date, no cure for Alzheimer exists and the current Alzheimer medications have limited effectiveness. However, Plant natural compounds have great potential as alternative medicines for preventing and treating diseases. The aim of this study is the search of new natural neuroprotectors against development of Alzheimer's disease by a natural complex is Bioglucumin; mixture of two extracts of medicinal mushroom(*Hericiumerinaceus*) and curcumine from medicinal plant *Curcuma longa*L. In our experiment, Alzheimer's disease was induced for 45 days (mice Alzheimer's model), followed by a phytotherapeutic treatment by this powder for 45 days in young mice (NMRI). Results obtained show that the preventive treatment by Bioglucumin managed to solve some problems and behavioral changes (locomotor activity, anxiety test, forced swimming test), memory tests as Morris water maze test, thus the storage capacity is improved during the Morris test and even tissue improvement in the histological study.

**Keywords:** Alzheimer's disease, Medicinal Mushroom, Curcumin, Herbal medicine, Mice

## **Bioinformatics Applications in Plant Genome and Proteome Analysis**

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**Abstract:** Bioinformatics is an emerging science that combines the power of computers, mathematical algorithms and statistical concepts in the life sciences to solve biological problems. The computational biology and bioinformatics has critical importance in many areas of research in modern biology, especially when large genome size data is being studied. To be able to deal with large data and genetic information, scientists need to store information in databases, which is easily accessible. They also need tools such as software, information management, and algorithms to analyze the data and use it to answer specific questions. Bioinformatics helps researchers in this regard. It has a central role in plant sciences today. The amount of genomic data is growing exponentially, and there is a parallel growth in the demand for tools and methods of data management, visualization, integration, analysis, modeling and prediction. This presentation will generally deal to the important biological data related to: (1) DNA, RNA, and protein sequence analysis, (2) to predict molecular structures, (3) the protein – protein analysis and (4) literature related data mining to use the data for easy access. Here, some of the concepts, methods, key milestones and databases used in bioinformatics will be discussed with a special focus on plant sciences.

**Keywords:** Bioinformatics, Plants sciences, Structure prediction, Sequence analysis, Databases

## Receptor Like-Kinases in Plant Defence

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**Abstract:** Abiotic stresses have several effects on plants, resulting in growth retardation and crop production reduction. To cope with abiotic stress, plants have developed different mechanisms to respond and adapt to continuously changing environmental factors. In recent years, research on the Receptor like-kinases (RLKs) have focused on the reveal molecular mechanism of RLKs in response to abiotic stress, disease resistance and signal transduction in plants. RLKs are serine/threonine protein kinases -which include an extracellular domain recognizing specific ligands, a membrane-spanning domain, and a conserved cytoplasmic kinase region- transduce signals from the environment and other cells. Several RLKs have been studied to be involved in response to abiotic stresses, such as drought, salt, cold, toxic metals/metalloids. In this study, recent studies on RLKs involved in plant responses to abiotic stress, including drought, salt, cold, toxic metals/metalloids will be discussed.

**Keywords:** Receptor like-kinases, Abiotic stress, Biotic stress

## **Effects of Exercise Test on Oxidative Stress and Inflammatory Biomarkers in Patients with Metabolic Syndrome**

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**Abstract:** The metabolic syndrome is a cluster of common factors: hypertension, hyperglycaemia, excess of visceral fat, altered cholesterol and/or triglyceride levels that occur together, increasing cardiovascular risk and diabetes. This pathology is characterized by an increase in the degree of oxidative stress and is associated with an imbalance in adipocytokine production by adipose tissue promoting chronic inflammatory status and vascular endothelial dysfunction. This situation is exacerbated by the high degree of sedentary lifestyle of the population in general. The aim of this study was to evaluate the effects of an exercise test at 60-70% of maximum capacity on the inflammatory and antioxidant response in older people suffering from metabolic syndrome. Blood samples from the subjects were taken before and after having performed an exercise test on a treadmill controlling the time and intensity. Antioxidant and inflammatory parameters were measured in plasma and mononuclear immune cells (PBMCs). The results evidenced statistically significant increases in plasma levels of the intercellular adhesion molecule 1 (ICAM-1), interleukin 6 (IL-6), malondialdehyde (MDA) and the expression of the antioxidant enzymes catalase (CAT) and glutathione peroxidase (GPx) in PBMCs after the exercise test respect of the pre-exercise values, whereas the plasma levels of tumour necrosis factor (TNF $\alpha$ ) remained unchanged. In conclusion, it has been shown that the exercise test induces a situation of oxidative stress that promotes the activation of a pro-inflammatory cytokine cascade different from what occurs in the face of an infectious process.

**Keywords:** Metabolic syndrome, Physical activity, Aging, Inflammation, Oxidative stress

## Developing Mutants of Negative Regulator of Immune Response Gene in Tomato Using CRISPR-Cas9

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**Abstract:** Crop diseases play a significant role in the reduction of yield annually. There is a decrease in crop production worldwide 20-40 % due to biotic stresses. Tomato (*Solanum lycopersicum* L.) is one of the important vegetable crops in the world. Turkey is the fourth-largest producer of tomatoes. It is a rich source of several important health-promoting nutrients such as Vitamin C and E, minerals and carotenes including  $\beta$ -carotene and lycopene. However, tomato faces huge yield losses due to several infectious diseases caused by *Pseudomonas syringae* Pv. tomato (Pst). Several genes of tomato plants have been identified related to a positive and negative regulator of the immunity gene. Among those negative and positive regulators of defense genes of tomato, there is a negative regulator of an immune gene, which suppresses the disease resistance genes, C- Terminal domain phosphatase Like 3 known as CPL-3 involved in the suppression of immune gene which causes resistance against several pathogenic diseases. In this study, we identified CPL-3 gene in tomato. Further, we are trying to knock out the CPL-3 (RNA polymerase II C-terminal domain phosphatase) gene using Crispr-Cas9 that is involved in downregulating immune responsive genes of crop plants under biotic stress conditions. By knocking out CPL-3, tomato plants will continue to express immune-related genes in response to biotic stresses, hence immunity against a pathogen will be achieved.

**Keywords:** Tomato, Diseases, Quality, Immunity, Crispr-Cas9, CPL-3

## **Antimicrobial and Antioxidant Potential of Methanolic Extracts of Some Seaweeds from Iskenderun Bay, Turkey**

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**Abstract:** Seaweeds are a rich source of bioactive compounds that have antimicrobial, antioxidant, anti-inflammatory, and anticancer properties. In the current study, methanolic extracts of *Cystoseira elegans* Sauvageau 1912, *Cystoseira amentacea* (C.Agardh) Bory 1832, *Padina crassa* Yamada 1931, and *Corallina elongata* J. Ellis & Solander 1786 species from Iskenderun Bay were tested for antioxidant and antimicrobial activity. Microdilution assay was used to evaluate the extracts' antimicrobial activity against various pathogenic bacteria. The minimum inhibitory concentration and minimum bactericidal concentration values range from 0.78 to 50 mg/mL, depending on the results obtained. Extracts had the highest antimicrobial effect on *B. cereus* NRRL B-371 of all the bacteria studied. The antioxidant capacities of the extracts were assessed using total phenolic and flavonoid content determination, DPPH radical scavenging activity, and ferrous ion chelating activity assays. Among the four seaweed extracts tested, *Cystoseira elegans* had the best free radical scavenging potential, with the highest flavonoid content and a relatively high total phenolic content. The findings show that the extracts used in this study are a valuable source of antimicrobial and antioxidant content.

**Keywords:** Seaweed extracts, Antimicrobial activity, Antioxidant activity, Total phenolic content, Total flavonoid content

## COVID-19 and Cardiovascular Involvement Physiopathology

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**Abstract:** Coronavirus Disease 2019 (COVID-19) has progressed to a global health problem. Respiratory illness is the major cause of morbidity and mortality. Disease spectrum is vary from asymptomatic to pneumonia progressing to acute respiratory distress syndrome. In addition to damaging the respiratory system, COVID-19 also has effects on the cardiovascular system. Angiotensin Converting Enzyme-2 (ACE2) receptors play a major role in the pathogenesis of the virus. This receptor is associated with possible cardiovascular involvement. Hypertension, arrhythmia, cardiomyopathy and coronary heart disease are major cardiovascular disease seen in severe cases of COVID-19. In fact, the exact mechanism for the association between cardiovascular system damage and COVID-19 is still unknown. Possible mechanisms of action; direct damage to cardiomyocytes, systemic inflammation, myocardial interstitial fibrosis, interferon mediated immune response, exaggerated cytokine response, coronary plaque destabilization and hypoxia. Cardiovascular involvement affects prognosis in patients with COVID-19. For this reason, mortality can be reduced with appropriate treatment strategies applied in the early period. Thus, early measurements of cardiac damage via biomarkers following hospitalization for COVID-19 infections in patients are recommended, together with careful monitoring of any myocardial injury that might be caused by the infection. More research is needed to understand the incidence, mechanisms, clinical presentation and consequences of CV symptoms in COVID-19 patients.

**Keywords:** Angiotensin-converting enzyme 2; Cardiovascular disease; Cardiac injury; COVID-19; Physiopathology of myocardial injury

## Study of Monomer and Crowding Agents on Structure and Stability of Myoglobin

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**Abstract:** In present study, the structural dynamics of protein (myoglobin) on crowding agents and osmolytes has been examined by using urea as a denaturing agent, the protein underwent, unfolding through the process of denaturation. Osmolytes and crowding agents applied to counteract the stability of myoglobin and compensated for the effects of protein stability. Glucose and sucrose were the osmolytes while their polymers dextran 70 and ficoll 70, respectively, used as a crowding agent. The constructive dynamics of myoglobin (Horse heart) examined in the absence and presence of both. The protein could undergo unfolding via the process of denaturation using urea as a denaturing agent. This denaturation caused protein unfolding and thus destabilization of the same. To recompense the effects of protein stability, we analyzed the counteracting activity of osmolytes. Analysis of their effect on myoglobin was done by using UV visible spectroscopy and far-UV CD spectroscopy to record the effect of different concentration of osmolytes and crowding agents. We asked whether the impression of crowding agent on the stability of myoglobin (protein) is better than the impression of osomolytes? The results show that stabilization of myoglobin was greater due to sugar osmolytes i.e., sucrose and glucose as compared to crowding agents' dextran 70 and ficoll 70.

**Keywords:** Study of Monomer and Crowding Agents on Structure and Stability of Myoglobin

## Therapeutic Effects of Ethanolic Extract of a Folk Herbal Plant *Conyza Boneriensis* in High Sucrose and NI-STZ Induced Type 2 Diabetic Model of Rats

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**Abstract:** The current study was designed to investigate the antidiabetic, antioxidant and metabolic effects of the ethanolic extract of *Conyza bonariensis*, in the rat of type 2 diabetic model. In male wistar rats, diabetes was induced by giving them 5 percent sucrose in drinking water and a high caloric diet, and nicotinamide and streptozotocin. Positive control (PC; no treatment), standard control (SC; Metformin @ 55mg/kg), treatment 1 (plant extract @ 200mg/kg) and treatment 2 (Plant extract @ 400mg/kg) were divided into four classes (n=8) for diabetic rats. Whereas 8 healthy rats were taken as negative control group (NC). All the rats were decapitated for blood collection following treatment for 21 days. The serum was isolated for the assessment of antidiabetic, antioxidant, lipid profile, thyroid hormones, amylin, leptin, and carbohydrate metabolic enzymes. The data were statistically evaluated by one-way variance analysis (ANOVA). Serum insulin level was decreased significantly ( $P \leq 0.05$ ) in CB1 ( $15.37 \pm 0.38a$  ng/ml) and CB2 ( $19.36 \pm 0.56a$  ng/ml) groups as compared to PC ( $26.88 \pm 3.70b$  ng/ml) group. The same pattern was seen in serum glucagon, glucose and C-peptide concentrations. The findings also showed that the plant's ethanol extract effectively decreased the serum levels of thyroid hormones, hyperlipidemia and oxidative stress. The function of the various carbohydrate metabolic enzymes, was also restored by the plant extract. The current study clearly shows the antioxidant and antidiabetic ability of *Conyza bonariensis* ethanolic extract by normalizing oxidative stress and hyperglycemia along with carbohydrate metabolic enzymes in the type 2 rat diabetic model.

**Keywords:** *Conyza bonariensis*, Type 2 diabetes, Thyroid hormones, Carbohydrate metabolic enzymes

## Reactions of some Red Bread Wheat Genotypes in Yield Trials to Rusts and Bunt

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**Abstract:** Rusts (*Puccinia* spp.) and bunt (*Tilletia* spp.) can cause severe yield and quality loss when susceptible cultivars are grown and suitable climate conditions are favorable for the diseases. The aim of this study 24 bread wheat genotypes (20 Advance lines and 4 cultivars) were sown for adult plant reactions/field stage, Ankara (İkizce location-YR/Pst; Yellow Rust and BT/Bt; Bunt ), Edirne (Merkez location-LR/Pt; Leaf Rust), Kastamonu (Seydiler location- SR/Pgt; Stem Rust) in October 2014.

All materials were sown in a one-meter row with 3 replications. The research was conducted under artificial epidemic condition to YR (virulent on; Yr2,6,7,8,9,25,27,Sd,Su and A resistance genes) and BT (virulent on Bt0,2,3,4,6 and Bt-7 resistance genes). The genotypes were screened under natural epidemic condition for Pgt (virulent on; Sr5,6,7b,8a,8b,9b,9g,10,30,Tmp and Mcn resistance genes) and Pt (virulent on; Lr1,2c,3a,16,26,3ka,11,17a,30,B,10,14a,18,3bg and 14b resistance genes). For rust diseases; Infection was succeeded and the susceptible control check had 80-100S rust diseases severity in June-August 2015. Coefficient of infections under 20 was considered to be resistant. Infection was succeeded and the susceptible control check had 80-100% bunt disease in August 2015. For bunt disease; the infection was successfully occurred and disease severity was observed as 90-100% on the susceptible check cv. Yakar99. Below 25% were considered to be resistant.

Eighteen (75%), 6 (25%) and 3 (13%) and 5 (21%) genotypes were resistant to YR, LR and SR and BT at the adult plant stage, respectively. As a result of this research resistant lines have been selected as resistant both diseases for breeding programme.

**Keywords:** Bread wheat, rusts (*Puccinia* spp.), bunt (*Tilletia* spp.), reaction test, adult plant reaction

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## Gallic Acid as a natural protease inhibitor in fungal pathogenesis

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**Abstract:** Fungal protease dependent processes are important virulence attributes. We explore *Aspergillus saitoi* protease as a direct target of gallic acid through spectroscopic techniques and compare results to Bovine Serum Albumin and lysozyme to comment on selectivity of gallic acid towards protease. In activity assays 50% inhibition of protease was obtained at 0.913 mmoles/litre gallic acid. UV-vis spectroscopy shows formation of protease-gallic acid, Bovine Serum Albumin-gallic acid and lysozyme-gallic acid complex well below this concentration of gallic acid. Gallic acid binding caused blue shift with Bovine Serum Albumin and lysozyme suggestive of compaction, and red shift with protease. Negative ellipticity decreased with protease but increased with Bovine Serum Albumin-gallic acid and lysozyme-gallic acid complexes suggesting loss of helical structure for protease and compaction for Bovine Serum Albumin and lysozyme. Binding of gallic acid to protease was strong ( $K_a = 4.7 \times 10^6 \text{ M}^{-1}$ ) as compared to Bovine Serum Albumin and lysozyme. Number of stoichiometric gallic acid binding sites on protease is found to be 2 as compared to 1.37 (Bovine Serum Albumin) and 0.32 (lysozyme). Docking results also suggest strong binding of gallic acid with protease followed by Bovine Serum Albumin and lysozyme. To conclude, gallic acid is found to be good inhibitor and disruptor of secondary and tertiary structure of protease, whereas its binding to Bovine Serum Albumin and lysozyme is found to be weak and less disruptive of structures suggesting selectivity of gallic acid towards protease.

**Keywords:** Gallic Acid; Protease; Bovine Serum Albumin; Lysozyme, Binding etc.

## О НЕОБХОДИМОСТИ СТРОИТЕЛЬСТВА ГОРНОГО ТУННЕЛЯ АЛМАТЫ – ИССЫК-КУЛЬ

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**Аннотация:** в статье говорится о возможности сокращения расстояния от Алматы до Иссык-куля путем построения горного туннеля. Строительство туннеля позволит объединить бизнес, общество, власть с целью обеспечения занятости населения, стабильного роста доходов Казахстана и Кыргызстана, а также позволит обеспечить постоянную скорость движения транспортного потока круглый год, значительно сократить расстояние между указанными пунктами назначения, избежать взаимного пересечения транспортных потоков, также создаст комфортную для водителей среду, тем самым повышая безопасность движения.

**Ключевые слова:** туннель, туризм, строительство, новые рабочие места, пропускная способность грузов, пассажирский поток.

## DNA Separation via Fe<sup>3+</sup>-Bound Extracellular Biopolymeric Composite Cryogels

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**Abstract:** In present study, Immobilized Metal Affinity Chromatograph (IMAC) involving a wide area of implementation among affinity chromatography methods was conducted effectively for separation of DNA from aqueous solutions. For this aim, Fe<sup>3+</sup> bound EPS-PHEMA hybrid cryogels was synthesized via radical polymerization by using poly(2-hydroxyethyl methacrylate) as monomer, extracellular polymeric substances (EPS) as functional materials, N,N'-methylene-bis-acrylamide (MBAAm) as cross-linker. Polymerization mixture prepared with certain amount was poured into a plastic syringe of 2.5 mL and left for polymerization in -12°C. After binding of Fe<sup>3+</sup> ions, obtained Fe<sup>3+</sup> bound EPS-PHEMA composite cryogels were analyzed by FT-IR, SEM, swelling tests measurements. The effect of pH, initial DNA concentration, ionic strength, flow rate and temperature on adsorption were conducted. The highest amount of DNA adsorption from aqueous solution was 39.66 mg/g particles in acetate buffer of pH 6 with an initial DNA concentration of 2 mg/mL with the 0.5 mL/min flow rate, at 25 °C temperature. It was also made observation that DNA could be over and over adsorbed and desorbed on the Fe<sup>3+</sup> bound EPS-PHEMA composite cryogels.

**Keywords:** Affinity, DNA, Cryogel membranes, IMAC, Adsorption

## **Covid-19 Vaccination, Homologous, Heterologous Prime Boosting or Enhanced Heterologous Immunoboosting**

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**Abstract:** Our concerns about this issue; there are SARS-CoV2 variants and some vaccines have reduced efficacy against infection due to these variants. Secondly the strength and the type of the immune response. Thirdly length of the time that humoral response lasts and when one has to take the booster. To address above concerns we recommend having heterologous vaccination with two different types of vaccines and there is strong possibility that above concerns can be addressed. For this we have selected mRNA (Pfizer) and Inactivated Virus (Sinopharm) vaccines. There are several animal studies where immune response with heterologous vaccines was much stronger and lasting as compared to single vaccines but no human study. Currently Homologous Prime Boosting and Heterologous Prime Boosting strategies are being followed but we recommend third strategy which is Enhanced Heterologous Immunoboost Vaccination. We strongly believe that with our Covid-19 vaccination strategy there will be much stronger and longer lasting immune response and may be more effective against the variants. Considering lack of human studies, therefore, to get both Sinopharm and Pfizer vaccines and will be monitored humoral immune response.

**Key words:** Heterologous, Homologous, Cytokine Storm, CD4+ Cells, CD8+ Cells, Pfizer (mRNA), Sinopharm (inactivated Virus Vaccine)

## **Радон-индукцияланған өкпе ісігі бар науқастардағы miR-19b-3p экспрессия деңгейін талдау**

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**Түйіндемe:** Өкпенің қатерлі ісігінің дамуына эндогенді, сонымен бірге экзогенді факторлар әсер етеді. Экзогенді фактордың бірі радон - темекіден кейінгі өкпе қатерлі ісігінің дамуының екінші кең таралған себептерінің бірі болып табылады. Мақсаты. Радон мөлшері жоғары аумақтарда тұратын Қазақстан Республикасының тұрғындарында радонның жоғары деңгейі мен өкпе ісігінің дамуы арасындағы өзара байланысын және осы ауруды ерте диагностикалаудың оңтайлы әдісін жасау үшін miR-19b-3p экспрессиялық профилінің өзгеруін зерттеу.

Материалдар мен әдістер: радиометр көмегімен радонның белсенділігі өлшенді. miR-19b-3p профилін талдау сандық нақты режимдегі ПТР көмегімен жүргізілді. Нәтижелері. Радон деңгейі жоғары аймақта тұратын өкпе ісігімен ауыратын науқастарда еркін айналымдағы miR-19b-3p экспрессия деңгейі бақылаумен салыстырғанда 6,5 есе жоғарлауымен сипатталғанын көрсетті.

Қорытынды. Осылайша, еркін айналымдағы miR-19b-3p өкпенің радон-индукцияланған қатерлі ісігі бар пациенттерде болжамды биомаркерлер ретінде қызмет ете алады.

**Түйінді сөздер:** Радон, miR-19b-3p, радон-индукцияланған өкпенің қатерлі ісігі

## Synthesis and functionalization of ferrite magnetic beads for bioseparation and biosensing applications

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**Özet:** The biosensing platforms have potential applications in the diagnosis of disease as sensitive, durable, portable and inexpensive systems. The use of Ferrite Magnetic Beads (FMBs) in biosensors for high-performance clinical diagnosis is gaining popularity due to their low toxicity and ability to be manipulated by an external magnetic field. FMB-based biosensors necessarily involve well-tuned magnetic beads, which consist of a ferrite core, as biolabeling, bioseparation, and biodetection probes in order to generate significant and precise biological signals and also separate analytes for further detection of diseases. In this study, FMBs will be synthesized through chemical routes and functionalized as a bioseparation material. Functionalization of MNPs not only ensures the integrity of FMBs in solution but also prevents interparticle reactions and agglomeration. For producing functionalized MNPs, silica will be used, which allows the binding of biological or other ligands to the surface of NPs. We'll make particles with a variety of sizes, surface charges and coatings, then evaluate their biomolecule binding affinity. The aim of the project is to isolate blood-borne pathogens from human plasma via using aptamer-modified and silica-coated FMBs integrated into a biosensor system that integrates processes such as separating, mixing, detecting biomolecules in a single piece of platform. The proposed project would build on previous studies in this area by evaluating the properties of FMBs that would maximize iron oxide nanoparticle stability. Finally, we also aim to eliminate the stability problems by effectively functionalizing iron oxide nanoparticles and developing effective and orderly magnetic micro/nano-assembly structures.

**Anahtar Kelimeler:** Magnetic Nanoparticles, Surface functionalization, Synthesis, Biosensors

## **Coprotus Korf & Kimbr: A New Coprophilous Genus Record for the Mycobiota of Turkey**

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**Abstract:** The genus *Coprotus* is represented by 28 species worldwide and does not have any record in Turkey considering the checklist publications on fungal diversity of Turkey. The genus *Coprotus* Korf & Kimbr, was given as new record for the mycobiota of Turkey based on the collection and the identification of *Coprotus ochraceus* (P. Crouan & H. Crouan) J. Moravec from Şirvan district of Siirt province in Turkey. A brief description of the taxon is given together its photographs related to its macro and micro morphologies. As a result of this study, added a new coprophilous genus to mycobiota of Turkey and provided contribute to the biological richness of the country.

**Keywords:** *Coprotus*, New genus record, Macrofungi, Turkey

## **A Neuroprotective Effect of the Complex Extract of Medicinal Mushroom and Herbal Medicine Against the Development of Alzheimer's Disease**

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**Abstract:** Alzheimer disease is a neurodegenerative disease that is signified by cognitive decline, memory loss, and erratic behavior. Till up to date, no cure for Alzheimer exists and the current Alzheimer medications have limited effectiveness. However, Plant natural compounds have great potential as alternative medicines for preventing and treating diseases. The aim of this study is the search of new natural neuroprotectors against development of Alzheimer's disease by a natural complex is Bioglucumin; mixture of two extracts of medicinal mushroom (*Hericium erinaceus*) and curcumin from medicinal plant *Curcuma longa*. In our experiment, Alzheimer's disease was induced for 45 days (mice Alzheimer's model), followed by a phytotherapeutic treatment by this powder for 45 days in young mice (NMRI). Results obtained show that the preventive treatment by Bioglucumin managed to solve some problems and behavioral changes (locomotor activity, anxiety test, forced swimming test), memory tests as Morris water maze test, thus the storage capacity is improved during the Morris test and even tissue improvement in the histological study.

**Keywords:** Alzheimer's disease, Medicinal Mushroom, Curcumin, Herbal medicine, Mice

## **ВЛИЯНИЕ ЭКЗАМЕНАЦИОННОГО СТРЕССА НА ПОКАЗАТЕЛИ ГЕМОСТАЗА УЧАЩИХСЯ 9-Х И 11-Х КЛАССОВ**

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**Аннотация.** Целью нашего исследования явилось изучение влияния экзаменационного стресса на показатели гемостаза старшеклассников. В качестве модели эмоционального стресса в работе был выбран экзаменационный стресс. Исследования проведены на 60 учащихся 9-х и 11-х классов в возрасте 15-17 лет, из них 4 - юноши и 56 - девушки. Во время обычного учебного процесса (контроль) и непосредственно перед экзаменом у них обследовали состояние системы гемостаза. В ходе исследований мы использовали методы, характеризующие общую коагуляционную активность крови, отдельные фазы процесса свертывания крови и фибринолитическую активность крови. В работе изложены влияние экзаменационного стресса на показатели гемостаза старшеклассников. Показано, что экзаменационный стресс в организме учащихся 9-х и 11-х классов вызывает гипо- и гиперкоагуляцию. Установлено, что в крови учащихся 9-х и 11-х классов содержание фибриногена повышается и увеличивается активность естественного антикоагулянта антитромбина III. Антикоагулянтное звено гемостаза было угнетено, о чем свидетельствовало укорочение тромбинового времени. Установлено, что в крови учащихся регистрировалась выраженная активация тотального эуглобулинового и Хагеман-зависимого фибринолиза. Экзаменационный стресс по-разному влиял на показатели гемостаза старшеклассников. Экзамены в организме учащихся 9-го класса вызвали чрезвычайно резко выраженную гиперкоагуляцию. В организме учащихся 11-го класса экзаменационный стресс также формировал гиперкоагуляцию, но степень её выраженности была гораздо меньше. Показано, что в организме старшеклассников разнонаправленные сдвиги гемостаза обусловлены действием экзаменационного стресса.

**Ключевые слова:** экзаменационный стресс, показатели гемостаза, старшеклассники, гипокоагуляция, гиперкоагуляция.

## **Taşeli Platosu Ve Ermenek Vadisi (Antalya-Karaman-Mersin)'Den C12 Karesi İçin Yeni Kayıt Briyofitler**

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**Özet:** Bu çalışmada, Taşeli Platosu ve Ermenek Vadisi (Antalya-Karaman-Mersin)'nde yapılan arazi çalışmaları sonucunda toplanan briyofit örneklerinin teşhisleri yapılmış, ciğerotlarından 5 ve yapraklı karayosunlarından da 58 olmak üzere toplam 63 taksonun Türkiye briyofit kareleme sistemine göre C12 karesi için yeni kayıt olduğu saptanmıştır. Ayrıca, tespit edilen yeni kayıt taksonların ekolojik özellikleri ve Türkiye yayılışları da verilmiştir.

**Anahtar Kelimeler:** Antalya, Briyofit, C12, Karaman, Mersin

## **Bitki Biyoçeşitliliğinin Ex-Situ Korunmasında Biyoteknolojik Yaklaşımlar**

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**Özet:** Biyoçeşitliliğin sürekli azalması insanlığın devamlılığı için giderek artan bir tehdit oluşturmaktadır. Tüm dünya bitki biyoçeşitliliğinin üçte biri çeşitli nedenlerle tehdit altındadır. Biyoçeşitliliğin korunması küresel bir endişe oluşturduğu için dünya genelinde bitki çeşitliliğini anlamak ve sürdürülebilir şekilde korumak amacıyla çeşitli stratejilerin uygulanabilirliğine karar verilmiştir. İn situ ve ex-situ koruma yöntemleri bitki biyoçeşitliliğinin korunmasında eşit öneme sahip koruma teknikleridir. Biyoteknolojinin bitki biyoçeşitliliği üzerinde olumsuz etkilere sahip olduğuna ilişkin çeşitli düşünceler mevcut olmasına rağmen aslında biyoteknoloji bitki biyoçeşitliliğini iyileştirmek için yeni araçlar sunmaktadır. Ex-situ koruma yöntemlerinden olan in-vitro mikroçoğaltım tekniği, tek bir eksplant kaynağı kullanarak ve bitki materyali stoğunu koruyarak Uluslararası Doğayı Koruma Birliği (IUCN) kategorisindeki her bitki (endemik, kritik tehdit altındaki ve nesli tükenmekte olan bitkiler dahil) türünün hızlı ve güvenilir bir şekilde çoğaltılmasında ve korunmasında oldukça etkilidir. Bu derlemede bitki biyoçeşitliliğinin korunmasında kullanılan ex-situ koruma yöntemleri ve ilgili sürece entegre olabilecek biyoteknolojik yöntemlerden olan in-vitro koruma tekniği ile ilgili yapılan çeşitli çalışmalar irdelenecektir.

**Anahtar Kelimeler:** Biyoteknoloji, Bitki doku kültürü, Koruma, İn-vitro propogasyon, Endemik.

## **Karınca Dağı (Pozantı-Adana)'ndan Adana Bölümü (6b) İçin Yeni Kayıt Damarlı Bitkiler**

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**Özet:** Bu çalışmada, Karınca Dağı (Pozantı-Adana)'nda yapılan arazi çalışmaları sonucunda toplanan damarlı bitki örneklerinin teşhis çalışmaları yapılmış olup 18 familyaya ait 28 cins ve bu cinslere ait toplam 32 taksonun Türkiye Bitki Coğrafyası haritasına göre Akdeniz Bölgesi, Adana Bölümü (6b) için yeni kayıt olduğu saptanmıştır. Ayrıca, saptanan taksonların familyaları, lokaliteleri, Türkiye ve Dünya'daki yayılışı, fitocoğrafik bölgeleri ve endemizm durumları da verilmiştir.

**Anahtar Kelimeler:** Karınca dağı, Adana, Pozantı, 6b bölümü, Türkiye

## **A Karyological Study on Nannospalax Ehrenbergi (Nehring, 1898) in Adana Province**

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**Abstract:** This study was aimed to explain karyological characteristics of Nannospalax ehrenbergi in Adana province in Eastern Turkey. The chromosomes of the specimens were traditionally stained and examined according to standard procedures. The chromosomes were defined according to centromere positions by processing photographs of metaphase cells. The karyotype contained 60 chromosomes ( $2n=60$ ), including 23 acrocentric pairs, and 7 heteromorphic pair with a submetacentric and an acrocentric homologue in the autosomal complement ( $FNa=70$ ). The X chromosome was submetacentric and the Y chromosome small-sized acrocentric.

**Anahtar Kelimeler:** Nannospalax, Karyotype, Blind mole rat

## Bacteriophages as an Alternative Method for the Removal of Bacterial Biofilms

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**Abstract:** Today, although modern production techniques and food monitoring programs are used effectively, the rate of foodborne infectious diseases is increasing in many countries. Accordingly, the awareness of hygiene in food production has increased significantly. One of the most important problems in the food industry and medicine is that foodborne pathogen bacteria adhere to living and non-living surfaces and form biofilms by living embedded in the exopolysaccharide they produce. Many spoilage and pathogenic microorganisms can form biofilms on the surface of food and food processing equipment. Many biofilms cause serious problems in the food industry as they are resistant to antibiotics, detergents and disinfectants. Many spoilage bacteria and foodborne pathogenic bacteria such as *Salmonella* spp., *Listeria monocytogenes*, *Campylobacter jejuni*, *E. coli* O157:H7 have the ability to form biofilms on the surface of food and food processing equipment. Since biofilms are an important source of contamination, they both make safe food production impossible, threaten public health and cause great economic losses. As an alternative to chemical disinfectants used to remove biofilms, interest in the use of environmentally friendly bacteriophages has increased considerably.

Bacteriophages are viruses that only infect bacteria and can reproduce inside the host bacterial cell. They are abundant in soil, water, fertilizers and foods in nature. Studies on the use of bacteriophages as bioprotective agents in the food industry have increased due to the fact that they only infect target bacteria, do not affect human and animal cells, do not cause a significant change in the sensory properties of foods, are effective at low doses and have low mutation rates. It has been stated by some researchers that bacteriophages can be used against biofilms in both the food industry and medicine. Various studies have shown the reducing effect of bacteriophages *Salmonella* spp., *Listeria monocytogenes*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Staphylococcus epidermis* biofilms. In this paper, a review will be made of studies on biofilm, bacteriophage, bacteriophages' ability to prevent biofilm formation by foodborne pathogenic bacteria and to remove biofilms.

**Keywords:** Bacteriophage, Biofilm, Biopreservation, Foodborne diseases, Pathogen

## Synthesis of Zeolitic Imidazolate Frameworks (ZIF-67) for the Treatment of Brackish Water

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**Abstract:** In this study we have collected brackish water sample from Satluj River near District Bahawalpur, Punjab, Pakistan, having pH, TDS, EC and turbidity in the range of 7.3, 1675 ppm, 1821  $\mu\text{S}/\text{cm}$  and 14 NTU respectively. Further for treatment of this sample Zeolitic Imidazolate Frameworks (ZIF-67) was successfully synthesized using simple hydrothermal method in excellent yield and characterized using FTIR, SEM, BET and XRD techniques. Using adsorption method, sample TDS value reduces to 370 ppm which is according to standard values as recommended by WHO (600 ppm). EC values obtained after treatment was 673  $\mu\text{S}/\text{cm}$  (WHO = max 2500), turbidity values were dropped to almost zero (WHO = max 5 NTU). For confiscation of anionic and cationic dyes solution prepared using brackish water sample and it follows chemisorption and monolayer adsorption as confirmed by kinetic studies. This selective adsorption is mostly due to the presence of electrostatics, hydrogen bonding and  $\pi$ - $\pi$  stacking interactions between MOF and dyes present in water medium. Maximum removal capacities displayed by ZIF-67 were 96.2% and 92.8% for cationic (malachite green) and anionic (methyl orange) dyes respectively. Recycling of ZIF-67 also represent good results up to 95%. From these outcomes it was concluded that ZIF-67 can be used for the removal of dyes from waste water as well as for brackish water treatment and according to previous literature this is the first study to treat brackish water and organic dyes removal from brackish water.

**Keywords:** ZIF-67, Dyes removal, Brackish water, Chemisorption, Monolayer adsorption

## Toxicity and Hypoglycaemic Activity of *Picralima Nitida* (Stapf) T. Durand & H. Durand

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**Abstract:** *Picralima nitida* (Stapf) T.Durand & H.Durand (Apocynaceae), a medicinal plant located in central and western Africa, is frequently used in ethnomedicine to treat diabetes mellitus of type II.

The objective of this study was to conduct the hypoglycaemic preclinical assessment of the *Picralima nitida* fruit decoction used by the Ivorian population.

The aqueous dry extract of the fruit decoction was prepared and give a drug extract ratio DER [20 :1]. The acute toxicity of this extract was evaluated in mice according to the OECD 423, 2001 method. Hypoglycaemic activity of the extract was measured by glucometer in fasted rats after administration of 300, 400 y 500mg/KG.

The results showed an absence of toxicity and the most significativly decrease (30%) of blood glucose at the 500mg/KG dose.

**Keywords:** *Picralima nitida*, diabetes type II, acute toxicity, aqueous dry extract.

## Natural products: a valuable approach for boasting functional restoration in induced Sciatic nerve lesion scenario

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**Abstract:** Injury to the peripheral nerves is becoming one of the most serious health concerns of the modern age and an increasing number of road accidents is considered as a leading cause of this alarming situation. Several other factors such as trauma, congenital anomalies, metabolic disorders, infections, mechanical injuries, and chemical agents can also lead to mild to severe injury to the nerves of both peripheral and central nervous systems. These injuries may perturb sensory, motor, or both types of functions of the body. In the majority of the cases, an everlasting disability or partial functional loss is the ultimate consequence. The main emphasis in such conditions is given to the functional restoration of sensory and motor abilities. The functional recovery of the nerve occurs after regeneration of the injured axon by reinnervation of nerve endings with motor endplates at muscle end, but this rehabilitation depends on both timely and appropriate management. Pharmacological approaches are preferred for surgical procedures due to associated complexities. Pharmacological agents are also impregnated with side effects; therefore, the aim of functional restoration remains unfulfilled. In the present era, natural and herbal products have gained much attention. Several plants are effective against nerve degeneration and help to improve nerve functions. Here, we assess the effects of our indigenous flora with reported effects on our nervous system. Here, we have evaluated *Calotropis procera*, a well-recognized medicinal plant, in a view of accelerating the recovery of functions by using a rodent model of an induced lesion to the sciatic nerve. Here, we explore the regeneration and functions retrieval promoting effects of this common plant of our regions in an induced nerve lesion rodent model. We assessed the restoration of both motor and sensory functions in response to *Calotropis procera* added to the normal rodent diet of the animal at a dose of 100mg/kg BW adjusted in a daily amount of food intake. The treatment lasted from the day of injury to the time of sacrifice. Motor and sensory functions were evaluated by muscle grip strength, Sciatic Functional Index (SFI), and hot-plate tests. Biochemical analyses were performed to gain insight into the effect of treatment on systemic markers.

We noticed an accelerated functional recovery ( $p < 0.05$ ) and a remarkable decrease in the total oxidant status (TOS). Concomitantly, the total antioxidant capacity (TAC) and enzymatic activity of arylesterase and paraoxonase were enhanced in the treated animal. These results demonstrate that *C. procera* effectively accelerates the functional retrieval following a peripheral nerve injury in a mouse model. Further investigations are required for the identification of active constituents and their characterization. The present findings provide an initial idea towards affordable and easily accessible remedies against traumatic brain and nerve injuries that have always been incurable.

**Keywords:** Nerve injury; Oxidative Stress; Functional Recovery; Phytochemicals

## Phytoplankton of Zab River in Northern Iraq

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**Abstract:** In this study, phytoplanktonic algae collected on a seasonal basis in 2018-2019 from the stations selected in Barzan region of Iraq and their seasonal changes were analyzed. During the study, a total of 47 taxa, 7 belonging to Cyanophyta, 12 to Chlorophyta, 2 to Euglenophyta, 3 to Dinophyta and 23 to Bacillariophyta, were recorded. In all stations, algae varied in terms of their frequency of appearance and numbers of individuals.

**Keywords:** Zab River, Iraq, Phytoplankton

## **A Cytogenetic Study on Nannospalax Xanthodon in Adana (Kozan) Province**

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**Abstract:** This study was carried out to explain the karyotypic characteristics of blind mole rat specimens captured from Kozan, Adana in Turkey. The chromosomes of the blind mole rat samples were stained and analyzed using traditional methods and then they were defined according to centromere positions by processing images of metaphase cells. The karyotype of blind mole rats revealed *Nannospalax xanthodon* with  $2n = 46$  chromosomes and fundamental number of chromosomal arms  $NF=68$  and the number of autosomal arms  $NFa = 64$ . X chromosome was found as metacentric and, 10 pairs of the autosomal chromosomes were found metacentric/submetacentric, 12 pairs of autosomal chromosomes were defined as acrocentric. This study revealed the second described karyological record of *N. xanthodon* with  $2n = 46$  chromosome.

**Key words:** *Nannospalax xanthodon*, Adana, Kozan, karyotype

# **CHEMISTRY**

## Chemical Composition and Anti-Inflammatory Activity of Aqueous Extract Of Algerian Ficus Carica.L Fruit

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**Abstract:** Inadequate health infrastructure in developing countries and the high incidence of undesirable effects of synthetic drugs pushes researchers to find natural alternatives and to develop phytomedicines. Ficus carica.L is a plant belongs to the family of Moraceae presents a nutritional and therapeutic value. The aim of this study is to devote the bioactive compounds and evaluate the anti-inflammatory effect of aqueous extract of Algerian Ficus carica.L fruit. The aqueous extract was investigated for his polyphenolic and flavonoid compounds by using the Folin-ciocalteu and the Aluminum chloride assay respectively and the anti-inflammatory activity was evaluated in vivo with paw edema model in mice induced by carrageenan 1% and treated with 3 doses. The results showed that the extract presents a high level of polyphenolic and flavonoids compounds with 951.06mg of GAE/100g and 428.34 mg of QE/100g of lyophilized extract respectively. The aqueous extract also presented a high anti-inflammatory effect at doses of (250mg/kg-350mg/kg and 500mg/kg P.O) give rise to significant and highly significant reduction in the size of edema compared to positive controls. This reduction is dose-dependent.

**Keywords:** Ficus carica.L, Anti-inflammatory, Chemical compounds, Aqueous extract, Mice

## Preparation and Characterization of N,N-Dimethylacrylamide, and Starch-Based Hydrogels, and Evaluation of Sorption Studies

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**Abstract:** In recent years, natural and synthetic biopolymers are being used as alternative sorbing materials for improving the sorption and release performance of slow-release fertilizers [1]. Especially chemically synthesized polymeric hydrogels with functional groups have been used in many sorption studies and agricultural applications due to their high water sorption properties [2]. Herein, p(N, N-Dimethylacrylamide-co-Starch) (p(DMAAm-co-St)) based hydrogel was synthesized via redox polymerization in the presence of N, N-Dimethylacrylamide (DMAAm), Starch (St), N, N-Methylene Bis-Acrylamide (MBA) for sensitive and selective sorption of urea. p(DMAAm-co-St) surface was modified by HCl and was named as p(DMAAm-co-St)/HCl. The prepared p(DMAAm-co-St)/HCl hydrogel was characterized by surface characterization technique (Fourier Transform Infrared (FTIR) Spectroscopy) and Thermogravimetric analysis (TGA) and the results indicated that the modification and polymerization had been carried out successfully on the hydrogel. The swelling behavior of p(DMAAm-co-St)/HCl hydrogel was also investigated in detail in deionized water and at different pH solutions. Finally, urea absorption capacity was determined as a function of initial fertilizer concentration (mg/L), the pH of the media, and temperature (°C) to examine the effects of modified hydrogel on plant growth. In the light of the findings, the maximum adsorption capacity was found to be 112.6 mg/g. The most employed sorption isotherms models like Langmuir, Freundlich, Temkin, and Dubinin–Radushkevich (D–R) were studied to obtain the best-fitted isotherms equation. Furthermore, thermodynamic parameters were investigated. The sorption isotherms were investigated thoroughly and Langmuir isotherm showed the best fit.

**Keywords:** Hydrogel, Modification, Sorption, Urea.

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## Swelling and Urea Sorption Behavior of Cross-Linked p(N,N-Dimethylacrylamide-co-Starch)/NaOH-Based Hydrogels

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**Abstract:** Hydrogels, a polymeric material, are widely used as industrial materials due to their superior properties and their usage areas are increasing. In addition, it has become one of the most preferred materials in absorption applications due to its ability to hold water very well and swell in an aqueous environment [1]. In this study, p(DMAAm-co-St) based hydrogel was prepared by crosslinking N, N-Dimethylacrylamide (DMAAm), and Starch (St) monomers for sorption of urea, which is an important nutrient source in plant development and causes pollution in soil/groundwater. p(DMAAm-co-St) surface was modified by NaOH and was named as p(DMAAm-co-St)/NaOH. These hydrogel was characterized by several instrumental analysis methods (Fourier Transform Infrared (FTIR) Spectroscopy, Thermogravimetric analysis (TGA)). In addition, the effect of the modification on the swelling behavior of hydrogels was investigated. In addition, the effects of various parameters such as initial urea concentration (mg/L), pH, and temperature (°C) on urea absorption were investigated and thermodynamic parameters were determined. Maximum urea sorption of the p(DMAAm-co-St)/NaOH hydrogel after 48 hours capacity was found to be approximately 128.5 mg/g. To describe equilibrium studies, some adsorption equilibrium models which are valid in the literature such as Langmuir, Freundlich, Temkin and Dubinin–Radushkevich (D–R) isotherm models were used. The sorption isotherms were investigated thoroughly and Langmuir isotherm showed the best fit.

**Keywords:** Hydrogel, Sorption, Urea.

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## Synthesize and Modification of Poly(Dimethylacrylamide)/HCl for Controlled Release of Urea

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**Abstract:** Hydrogels have high water adsorption capability and can be used as miniature water holders in agricultural areas [1,2]. However, hydrogels may also be used as controlled release systems if fertilizers are chemically or physically bound or arrested in polymeric structures [3]. In this investigation, in biocompatible p(N,N-Dimethylacrylamide) (p(DMAAm)) hydrogel was successfully synthesized from (DMAAm) and N,N-Methylene Bis Acrylamide (MBA) as a crosslinking agent. p(DMAAm) surface was modified by HCl to obtain p(DMAAm)/HCl, which have positively charged. The morphology and structure of the modified hydrogels were investigated by Fourier Transform Infrared (FTIR) Spectroscopy and Thermogravimetric analysis (TGA). The swelling ratio and water retention property of p(DMAAm)/HCl were investigated at different pH solutions at room temperature. Synthesized and modified p(DMAAm)/HCl hydrogel was utilized for sorption and releasing of urea. As a result, the maximum urea sorption amount by p(DMAAm)/HCl hydrogel was 81 mg/g under optimum conditions. In addition, the release property at different pHs was also studied. In this studied, most common mathematical models such as zero-order, first-order, Higuchi and Korsmeyer-Peppas were processed to determine the kinetics of urea by p(DMAAm)/HCl hydrogel. p(DMAAm)/HCl exhibited the highest percent cumulative urea release of 53.3% at pH 8 within 7 hours and urea release exhibited a very high correlation with the Korsmeyer-Peppas semi-empirical model.

**Keywords:** Hydrogel, Modification, Release, Urea.

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## Application of poly(Dimethylacrylamide-co-Maleic Acid)/HCl hydrogel in controlled urea release

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**Abstract:** Controlled release is a method in which active chemicals are supplied to specified plant species at predetermined rates and times. Here, the purpose of using hydrogels, which is a polymeric material, is to control the distribution rates, mobility, and duration of action of chemicals [1]. In this investigation p(DMAAm-co-MA)/HCl hydrogel was synthesized using N,N-Dimethylacrylamide (DMAAm) and Maleic acid (MA) as monomers. And then was modified by hydrochloric acid (HCl) for utilized for sorption and releasing of urea. Structural characterization of p(DMAAm-co-MA)/HCl hydrogels were investigated by Fourier Transform Infrared (FTIR) Spectroscopy and Thermogravimetric analysis (TGA). The water retention property of p(DMAAm-co-MA)/HCl was investigated at different pH solutions at room temperature. In addition, the release property of p(DMAAm-co-MA)/HCl hydrogel in different pH environments was also investigated. As a result, the maximum urea sorption amount by p(DMAAm-co-MA)/HCl hydrogel was 125 mg/g under optimum conditions. In this study, most common mathematical models such as zero-order, first-order, Higuchi, and Korsmeyer-Peppas were processed to determine the kinetics of urea by p(DMAAm-co-MA)/HCl hydrogel. p(DMAAm)/HCl exhibited the highest percent cumulative urea release of 100% at pH 8 within 40 hours and urea release exhibited a very high correlation with the Korsmeyer-Peppas semi-empirical model.

**Keywords:** N,N-Dimethylacrylamide, Maleic acid, Hydrogel, Release, Urea.

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## Development of Molecular Imprinted Cryogel Membranes for Purification of Naringenin

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**Abstract:** Naringenin that is an important naturally occurring flavonoid belongs to the flavanone subclass, and it is mostly found in citrus species, figs, tomatoes and other fruits belonging to the Smyrna type *Ficus carica*. It is also found in glycoside form.

Naringenin has a wide biological impact on health such as reducing of protein carbonylation and lipid peroxidation biomarkers, promoting of carbohydrate metabolism, increasing of antioxidant defense, cleaning of reactive oxygen species. It should not be forgotten that naringenin modulates the activity of the immune system, and has antioxidant and anti-inflammatory effects. Its anticarcinogenic effects have also been included in the literature regarding its contribution to DNA repair. It has also been included in the research results that Naringenin has an inhibitory effect on dengue virus in connection with the antiviral effect of the molecule.

In this study, a new molecular imprinted cryogel membranes have been developed for the fast and selective purification of the "naringenin" molecule, which has a wide range use in medicine and industry. During the studies, adsorption rates of cryogel at different concentrations and effect of medium pH on adsorption were determined. Maximum adsorption was observed at pH 5, and maximum adsorption amount was found as 28,3 mg/g.

**Keywords:** Naringenin, Cryogel, Molecular imprinting.

## Synthesis of Cerium-Doped Iron Oxide Nanoparticules and Investigation of Photocatalytic Activity

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**Abstract:** As a reflection of the increase in the population in the Globalizing World, the expansion of the industry confronts human beings as environmental pollution.

Dyestuffs in the textile industry take the lead in polluting clean water sources. The wastewater produced by the industry is tried to be disposed with traditional methods. It is not very useful due to reasons such as high cost, not being able to adjust the amount of substance in the applied method, toxin effect of the substances used. Photocatalytic application using semiconductor metal oxide photocatalysts; It has been determined that it is the most effective method applied in recent years due to the treatment without cost, recycling and toxin-free secondary contamination. For this reason, in this study, the photocatalytic method using semiconductor metal oxides was chosen as photocatalyst.

In this study, Cerium doped Iron oxide nanoparticles were combined in different proportions (Pure;  $\text{Fe}_2\text{O}_3$ , 10% cerium doped iron oxide; Fe-10Ce, 20% cerium doped iron oxide; Fe-20Ce) and synthesized using hydrothermal method. In the synthesis of these nanostructured particles, Iron III nitrate nonahydrate and Cerium III nitrate hexahydrate were used and produced at 180 °C for 8 hours. In addition, these particles were annealed at 500 °C for 1 hour. Structural, morphological and optical properties of nanostructured particles; X-ray diffraction XRD was examined using scanning electron microscopy SEM and UV-visible spectroscopy. In structural analysis, single and double structures were observed. In XRD analysis, the crystal size of the particles was seen in Debye-Scherrer calculations where it was approximately 60 nm. In SEM analysis, lumps due to the magnetic properties of iron were observed. Control of photocatalytic degradation performance of Cerium doped Iron oxide nanostructured particles was investigated by UV-Vis spectroscopy and methylene blue was used to determine its photocatalytic properties. 300W xenon lamp was used in the study. 10mg particle was placed in a 5ppm 50ml dye solution and kept in a dark room for 30 minutes. Then it was placed under the xenon-lamp and measurements were made every 20 minutes. It was measured by recording the absorbance drop at 664 nm in the UV-Vis absorption spectra for methylene blue. In the study, the percentage of photocatalytic effects of the nanostructured particles on methylene blue in 240 minutes is 67%, Fe-10Ce 97%, Fe-20Ce 93%, respectively. It has been observed that the synthesized particles are activated under the xenon lamp and are an effective catalyst in the degradation of methylene blue.

**Keywords:** Cerium Iron Oxide, Hydrothermal method, Methylene blue, Photocatalytic

## Study of Gas Mixed Adsorption Process Based on System Analysis

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**Abstract.** This scientific work is devoted to the study of the process of adsorption of  $\text{H}_2\text{S}$  /  $\text{N}_2$  /  $\text{CO}_2$  gas mixtures at variable pressures on the basis of systematic analysis. Research work has been carried out depending on a certain pressure change limit and the flow rate of the incoming gas, which ensures the full use of the adsorption capacity of natural Azerbaijan (Ay-Dag field) zeolite. A mathematical model of the process of separation of gas mixtures by adsorption has been developed. Tri-amines are impregnated in zeolites to simultaneously adsorb  $\text{H}_2\text{S}$ ,  $\text{CO}_2$  and  $\text{N}_2$  components. Adsorption separation of gas mixtures allows the separation of a three-component gas mixture  $\text{H}_2\text{S}$  /  $\text{N}_2$  /  $\text{CO}_2$ . The initial composition of the gas mixtures were taken:  $\text{H}_2\text{S}$ -80%,  $\text{CO}_2$ -12% ,  $\text{N}_2$ -8%. The pressure change in the stationary layer of clinoptilolite in the adsorber was changed in the range of 0 ÷ 55 kPa. The optimal mode conditions for maximum use of the adsorbent's adsorption capacity in the adsorber apparatus were revealed.

Thus, a dynamic mathematical model describing the adsorption of  $\text{H}_2\text{S}$  /  $\text{N}_2$  /  $\text{CO}_2$  gas mixtures in a stable adsorbent layer by the adsorption method can be used in the design and calculation of industrial adsorbers under variable pressure conditions under unbalanced conditions.

**Keywords:** Gas mixture, adsorption, pressure, model, design

## Investigation of cadmium's sorption ions by chelate sorbents

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**Abstract :** Determination of cadmium ions at very low concentration is the most important analytical issue in ecological monitoring of environmental objects. The extremely low concentration of these ions in the most natural objects and, on the other hand, the barrier effect of the contact matrix components do not allow the reliable determination of cadmium ions by the most modern chemical and physicochemical methods. Therefore, there is a need for initial concentration of Cd (II) ions. It is known that the sorption method of separation and concentration is widely used in the analysis of mineral raw materials and biological objects.

**Keywords:** cadmium, sorbtion, desorbtion, chelate sorbents

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## Enhanced immunosuppressive effects of 3,5-bis[4 (diethoxymethyl)benzylidene]-1-methyl-piperidin- 4-one, an $\alpha$ , $\beta$ - unsaturated carbonyl-based compound as PLGA-b-PEG nanoparticles

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**Abstract:** 3,5-Bis[4-(diethoxymethyl)benzylidene]-1-methyl-piperidin-4-one (BBP), a novel synthetic curcumin analogue has been revealed to possess strong in vitro and in vivo immunosuppressive effects. The aim of present study was to prepare and characterize BBP-encapsulated polylactic-co-glycolic acid-block-polyethylene glycol (PLGA-b-PEG) nanoparticles and to evaluate its in vivo efficacy against innate and adaptive immune responses. Male BALB/c mice were orally administered with BBP alone and BBP- encapsulated nanoparticles equivalent to 5, 10 and 20 mg/kg of BBP in distilled water for a period of 14 days. The immunomodulatory potential was appraised by determining its effects of non-specific and specific immune parameters. The results showed that BBP was successfully encapsulated in PLGA-b-PEG polymer with 154.3 nm size and high encapsulation efficiency (79%) while providing a sustained release for 48 hours. BBP nanoparticles showed significant enhanced dose-dependent reduction on the migration of neutrophils, Mac-1 expression, phagocytic activity, reactive oxygen species (ROS) production, serum levels of ceruloplasmin and lysozyme, immunoglobulins and myeloperoxidase (MPO) plasma levels when compared to unencapsulated BBP. Enhanced dose-dependent inhibition was also observed on lymphocyte proliferation along with the downregulation of effector cells expression and release of cytokines, and reduction in rat paw oedema in BBP nanoparticles treated mice. At higher doses the suppressive effects of the BBP nanoparticles on various cellular and humoral parameters of immune responses were comparable to that of cyclosporine-A at 20 mg/kg. These findings suggest that the immunosuppressive effects of BBP were enhanced as PLGA-b-PEG nanoparticles

**Keywords:** Immunosuppressive, PLGA-PEG polymer, Immunomodulatory

## Optimization method for preparing carboxymethyl cellulose with high viscosity from different factory wastes

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**Abstract:** This study aimed at a sustainable application of the recovery of the world's most abundant cellulose from waste. Firstly, cellulose-containing wastes such as "air particle vacuum dust (APVD)", "towel clippings (TC)" and "cottonseed delintation (CD)" were thoroughly washed separately to remove some organic and inorganic impurities. The slurry cotton was purified by NaOH at 90 °C for about 4 hours and filtered and washed. Then, it was bleached with NaOH and H<sub>2</sub>O<sub>2</sub> and washed with distilled water until neutralized. Secondly, the carboxymethyl cellulose (CMC) was synthesized from this cellulose. In the sample coded TC<sub>CMC3</sub>, a maximum degree substitution (DS) of 1.22, and the highest viscosity with 2520 centipoises (cP) was obtained.

**Keywords:** Wastes, Recycling, Carboxymethyl cellulose

## Effect of carboxymethyl cellulose (CMC) on the consistency and penetration time of cement paste

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**Abstract :** The effect of the synthesized CMCs on the consistency and penetration time of the cement paste was investigated. In the consistency of standard Portland cement (PC) without CMC addition, the needle showed 5 mm in the Vicat test, while the  $TC_{CMC3}$  with the highest value was measured as 36.5 mm, 28.0 mm for  $APVD_{CMC3}$ , and 13.0 mm for  $CD_{CMC3}$ . While the setting time in the standard sample (Portland cement paste (PCP)) was between 2.20-4.10 hours, this time-shifted to 3.30-7.00 hours with a maximum setting time in  $TC_{CMC3}$ . Besides, while the penetration time for  $APVD_{CMC3}$  started at 3.10 hours and was completed at 5.30 hours, for  $CD_{CMC3}$  it expanded between 2.40 and 4.40 hours, leaving it without hydration in a higher time interval than standard Portland cement paste. As a result, it has been found that carboxymethyl cellulose synthesized from the etherification reaction of cellulose obtained from recycled wastes for industrial uses in an aqueous alkali environment can be applied in other fields besides such applications.

**Keywords:** Cement paste, Consistency, Penetration time

## Hidroksil Grupları İçeren Yeni Schiff Bazı Metal Komplekslerinin Sentezi ve Benzil Alkol Oksidasyonunda Katalitik Özellikleri

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**Özet:** Bu çalışmada, iki yeni salisiliden hidroksil ligandı (HL<sup>1</sup> ve HL<sup>2</sup>) ve bunların metal kompleksleri (Cu<sup>2+</sup>, Mn<sup>2+</sup>, Fe<sup>3+</sup>, Ru<sup>3+</sup>, Cr<sup>3+</sup> ve VO<sup>2+</sup>) sentezlenmiş ve spektroskopik ve analitik yöntemlerle karakterize edilmiştir. HL<sup>1</sup> ligandının moleküler yapısı, tek kristalli X-ışını kırınım çalışmasıyla belirlendi. Schiff bazı metal komplekslerinin H<sub>2</sub>O<sub>2</sub> ortamında benzil alkol oksidasyonu üzerindeki katalitik etkileri araştırılmıştır. Bu oksidasyon reaksiyonunda, benzil alkolün benzaldehit ve benzoik aside dönüşüm yüzdesi, gaz kromatografisi (GC) yöntemi ile %benzaldehit ve %benzoik asit olarak belirlendi. Sonuç olarak sentezlenen yeni metal komplekslerinden Co- ve Mn-komplekslerinin % 97-98 dönüşüm ile benzil alkol dönüşümünde en yüksek katalitik etkiye sahip olduğu bulunmuştur. Bunun yanında katalizörsüz ortamda sadece %7 olan benzoik asit oluşumu MnL<sup>1</sup> (% 39) ve VOL<sup>1</sup> (% 58) metal komplekslerinde yüksek oranda gerçekleşmiştir.

**Anahtar Kelimeler:** Schiff bazı; Katalizör; Benzil alkol oksidasyonu

## Hidroksil Grupları İçeren Yeni Schiff Bazı Metal Komplekslerinin Nişasta Oksidasyonundaki Katalitik Özellikleri

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**Özet:** Önceki çalışmalarımızda hidroksil grupları içeren iki yeni Schiff bazı (2,6-diizopropilanilin ile 2,3-dihidroksibenzaldehit (HL<sup>1</sup>) ve 2,4-dihidroksibenzaldehit (HL<sup>2</sup>)) bunların metal kompleksleri (Cu<sup>2+</sup>, Mn<sup>2+</sup>, Fe<sup>3+</sup>, Ru<sup>3+</sup>, Cr<sup>3+</sup> ve VO<sup>2+</sup>) sentezlenmiş ve spektroskopik ve analitik yöntemlerle karakterize edilmiştir. Bu çalışmada, sentezlenen yeni Schiff bazı metal komplekslerinin patates nişastası (PS) oksidasyonu üzerindeki katalitik etkileri H<sub>2</sub>O<sub>2</sub> ortamında araştırılmıştır. Patates nişastasının glikoz halkarındaki karbonil ve karboksil içerikleri titrimetrik yöntemle belirlenmiş ve nişasta oksidasyon derecesi (DS<sub>CHO</sub> ve DS<sub>COOH</sub> değerleri) hesaplanmıştır. Okside edilmiş nisastanın DTA/TG ile termal analizleri, XRD ve SEM analizleri ile morfolojileri incelenmiştir. Sonuç olarak, sentezlenen metal komplekslerinden, PS'nin oksidasyonunda VOL<sup>1</sup> kompleksi, DS<sub>Toplam</sub>=0.96 değeriyle en yüksek katalitik etkiye olup MnL<sup>1</sup> ve CrL<sup>2</sup>ClH<sub>2</sub>O komplekslerinde ise sırasıyla DS<sub>Toplam</sub>=0.86 ve DS<sub>Toplam</sub>=0.80 olarak bulunmuştur.

**Anahtar Kelimeler:** Schiff bazı; Katalizör; Nişasta oksidasyonu

## Metoksi Grupları İçeren Yeni Schiff Bazı Metal Komplekslerinin Nişasta Oksidasyonundaki Katalitik Özellikleri

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**Özet:** Önceki çalışmalarımızda metoksi grupları içeren iki yeni Schiff bazı (2,6-diizopropilanilin ile 2-hidroksi-3-metoksibenzaldehit (HL<sup>3</sup>) ve 2-hidroksi-4-metoksibenzaldehit (HL<sup>4</sup>)) bunların metal kompleksleri (Cu<sup>2+</sup>, Mn<sup>2+</sup>, Fe<sup>3+</sup>, Ru<sup>3+</sup>, Cr<sup>3+</sup> ve VO<sup>2+</sup>) sentezlenmiş ve spektroskopik ve analitik yöntemlerle karakterize edilmiştir. Bu çalışmada ise bu bileşiklerin H<sub>2</sub>O<sub>2</sub> ortamında patates nişastası (PS) oksidasyonu üzerindeki katalitik etkileri araştırılmıştır. Patates nişastasının glikoz halkarındaki karbonil ve karboksil içerikleri titrimetrik yöntemle belirlenmiş ve nişasta oksidasyon derecesi (DS<sub>CHO</sub> ve DS<sub>COOH</sub> değerleri) hesaplanmıştır. Okside edilmiş nisastanın DTA/TG ile termal analizleri, XRD ve SEM analizleri ile morfolojileri incelenmiştir. Ru-metal komplekslerinde oksidasyon reaksiyonlarında katalik etkinin azaltıcı yönde olduğu görülmektedir. En yüksek katalitik etkinin MnL<sup>4</sup> (DS<sub>Toplam</sub>= 0.88) ile metal komplekslerinde oldukça yüksek olduğu bulunmuştur. Karboksilik asit oluşumu katalitik etkisinin en fazla dönüşümü FeL<sup>3</sup> (DS<sub>COOH</sub>=0.21) metal komplekslerinde bulundu. Sentezlediğimiz Schiff Base metal komplekslerinin nişastanın oksidasyonunda Co-, Mn- ve VO-metal kompleksleride genel olarak iyi bir katalitik aktivite göstermiştir.

**Anahtar Kelimeler:** Schiff Bazı; Katalizör; Nişasta Oksidasyonu

## Metoksi Grupları İçeren Yeni Schiff Bazı Metal Komplekslerinin Sentezi ve Benzil Alkol Oksidasyonunda Katalitik Özellikleri

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**Özet:** Bu çalışmada, iki yeni salisiliden metoksi ligandı (HL<sup>3</sup>, HL<sup>4</sup>) ve bunların metal kompleksleri (Cu<sup>2+</sup>, Mn<sup>2+</sup>, Fe<sup>3+</sup>, Ru<sup>3+</sup>, Cr<sup>3+</sup> ve VO<sup>2+</sup>) sentezlenmiş ve spektroskopik ve analitik yöntemlerle karakterize edilmiştir. HL<sup>3</sup> ve HL<sup>4</sup> liganlarının moleküler yapısı, tek kristalli X-ışını kırınım çalışmasıyla belirlendi. Schiff bazı metal komplekslerinin H<sub>2</sub>O<sub>2</sub> ortamında benzil alkol oksidasyonu üzerindeki katalitik etkileri araştırılmıştır. Bu oksidasyon reaksiyonunda, benzil alkolün benzaldehit ve benzoik aside dönüşüm yüzdesi, gaz kromatografisi (GC) yöntemi ile %benzaldehit ve %benzoik asit olarak belirlendi. Sonuç olarak, sentezlenen Co-, Mn- ve Ru- metal kompleksleri benzaldehit dönüşümünde %90'nın üzerinde katalitik etki göstermiştir. Fe-metal kompleksleri ise %68'lik dönüşümün yüzdesi ile en az etkiyi göstermiştir. Ayrıca tüm metal komplekslerde benzil alkolün benzoik aside dönüşümü ise gerçekleşmemiştir.

**Anahtar Kelimeler:** Schiff bazı; Katalizör; Benzil alkol oksidasyonu

## Atık polietilen tereftalat şişesinden elde edilen N- açilhidrazitlerin su ortamında etil asetoasetat ile reaksiyonu

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**Özet:** Polietilen tereftalat (PET) atık ve çevre kirliliği yaratmaktadır. PET'in kimyasal bertaraf işlemleri sayıca yeterli değildir. PET'den şu ana kadar su, amonyak ve genellikle sıvı O, N içeren nükleofilik reaktifler ile bozundurma ürünleri elde edilebilmektedir. Sınırlı sayıda bozundurma ürünleri üzerinden çok çeşitli ürünlerin elde edildiği çalışma sayıda azdır. Bu tür yeni çalışmalar PET'in geri dönüşümüne katkısını artıracaktır. N-Açilhidrazitlerden, çözücü kullanmadan, su, etanol içinde etil asetoasetat (EAA) ile çok az sayıda iki basamaklı halka kapanması tepkimesinden N-Sübtitüe-3-metil-5-pirazolon (azo boyarmadde kenetlenme bileşeni) türevleri sentezlenmiştir. Atık PET şişelerinden literatürlere göre sırasıyla tereftaldihidrazit (N-Açilhidrazit, TPDH) ve dimetil tereftalat (DMTP) elde edildi. DMTP ve 2,5 eşdeğer hidrazin hidrat ile tepkimesinden p-metoksikarbonilbenzhidrazid (TPMEH) elde edildi. Elde edilen TPDH ve TPMEH ayrı ayrı su içerisinde (değişen miktarlarda) EAA ile geri soğutucu altında kaynatıldı (değişen sürelerde). Tepkimelerden elde edilen saflaştırılmış ürünlerinin kimyasal yapıları spektroskopik yöntemler ve element analiz ile aydınlatıldı. Yapısal analizler hem TPDH'nin hem de TPMEH'in sırasıyla EAA ile tepkimesi elde edilmesi hedeflenen N-Açilpirazolon türevlerini (2,2'-(1,4-fenilendikarbonil)bis(5-metil-2,4-dihydro-3H-pirazol-3-on ve metil 4-(3-metil-5-okso-4,5-dihidro-1H-pirazol-1-karbonil)benzoat, tek halka kapanma ürünleri) oluşturmak yerine artan su miktarına bağlı olarak oranca fazla dimerleşme ürünü (TPDHP: N'-[4-(Hidrazinkarbonil)benzoil]benzen-1,4-dikarbohidrazid ve TPMEHP: Dimetil 4,4'-[hidrazin-1,2-diildi(karbonil)]dibenzoat) ve diğer olası ürünlerini içeren bir karışımları oluşturduğunu göstermiştir. Bir denemeden elde edilen tepkime süzütüsünün analiz sonuçları TPDH'nin iki halka kapanma ürünü olan bis(pirazolon) türevi (2,2'-(1,4-fenilendikarbonil)bis(5-metil-2,4-dihydro-3H-pirazol-3-on)'nin izole edildiğini göstermiştir. N-Açilhidrazitlerin su içindeki EAA ile tepkimeleride, su miktarı arttıkça dimerleşme ürünlerinin arttığı, hedeflenen N-Açilpirazolonların ortamda çok az oluşabildiğini ancak, dimer ürünleri yanı sıra tepkimelerin birinci basamağının olası ürünleri gibi karışımlar oluşturduğu ve ayrıca TPDH'den iki halkalaşmanın da gerçekleşebildiği söylenebilir.

**Anahtar Kelimeler:** PET, Etil asetoasetat, Bozundurma, Açilhidrazit

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## **Poli(N İzopropilakrilamid) Hidrojelleri ve Nanokompozitlerinin Gerilme Gevşemesi Karakterizasyonu**

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**Özet:** Bu çalışmada poli (N-izopropilakrilamid) hidrojeninin gerilme gevşeme davranışının çapraz bağlayıcı ve nanopartikül miktarına bağlı olarak değişimi araştırıldı. Bu bağımlılıkları gözlemlemek üzere reaksiyon başlatıcı olarak amonyum persülfat, çapraz bağlayıcı olarak N, N-metilen-bisakrilamid ve nanopartikül olarak grafen oksit kullanılmıştır. Değişik miktarlarda çapraz bağlayıcı ve nanopartikül kullanarak meydana getirilen poli(N-izopropilakrilamid) hidrojenlin yüke karşı makroskopik tepkilerini değerlendirmek sabit gerinim seviyesinde gerilme değerindeki değişimleri gözlemlemek üzere bir kısım deneysel çalışma yürütülmüştür. Basma numuneleri, poli(N-izopropilakrilamid) hidrojenlin gerilme gevşemesi davranışını araştırmak %40 gerinim seviyesine kadar basma yüküne, daha sonra 300 saniye için gerilme gevşemesine tabi tutuldu. Numunelerin tepkileri, poli (N izopropilakrilamid)'in gerilme gevşemesi davranışının büyük oranda nonlineer ve malzeme bileşenlere bağlı olduğunu gösterdi.

**Anahtar Kelimeler:** Poli(N-izopropilakrilamid) hidrojel, Gerilme gevşemesi, Grafen oksit, N-N-metilen-bisakrilamid, Nanobiyopolimer

## 2-Aminofenoksi Birimleri İçeren Yüksek Çözünürlüğe Sahip Çinko(II) Sentezi, Karakterizasyon Ve Spektroskopik Özellikleri

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**Özet:** Kanser, yaşadığımız dünyanın en acılı hastalıklarından ve aynı zamanda en çok ölüme sebebiyet veren hastalıklarındandır. Kemoterapi ve radyoterapi kanser tedavilerinde kullanılan başlıca tedavi yöntemlerinden bazıları olmakla beraber yan etkilerinin ağır olması oldukça büyük bir dezavantaj olmaktadır. Yeni gelişmekte olan Fotodinamik Terapi (PDT) tedavisi ise bu amansız hastalığa büyük bir umut ışığı olmaktadır. PDT'nin, kemoterapi ve radyoterapi gibi tedavilere göre en büyük avantajının ise yan etkilerinin ise neredeyse hiç olmamasıdır. Ftalosiyaninler, PDT tedavisinde singlet oksijen üretim ajanı olarak kullanılmaktadır. PDT'de vücuda enjeksiyonundan sonra kızılötesi ışık ile fotokimyasal reaksiyon sonucunda ftalosiyaninler malignant tümörlü hücrelerde yüksek miktarda singlet oksijen üretimine katkıda bulunmaktadır. PDT uygulamalarının yanı sıra ftalosiyanin bileşikler; boya endüstrisinde, kimyasal sensörlerde, katalizör olarak kullanımları, optik veri depolama uygulamalarında, elektrokromik görüntülemeye ve sıvı kristal uygulamalarında kullanımları oldukça yaygındır. Ftalosiyaninler, dört iminoizindolin molekülünün siklotetramerizasyon tepkimesi sonucunda elde edilen ftalosiyanin kompleksleri tetra ve okta olmak üzere periferik ve non-periferik konumlarına farklı sübstituent gruplar almaktadır. Sübstituentlerin çeşitliliğine göre komplekslerin fiziksel ve kimyasal özellikleri değişmektedir. Bu çalışmada, farklı teknolojik alanlarda özellikle de fotodinamik tedavi için fotoduyarlastırıcı olarak polar ve apolar çözücülerde çok iyi bir çözünebilirliğe sahip, uzun dalga boyunda absorban yapabilen ve agregasyon yapmayan periferik pozisyonlardan tetrakis olarak 4-(2-aminofenoksi) grupları içeren orijinal çinko(II) ftalosiyanin sentezlenip Yapısı ve spektroskopik özellikleri ise FT-IR, UV-vis, <sup>1</sup>H-NMR, MALDI-TOF kütle spektroskopileri ve elementel analiz ile aydınlatıldı.

**Anahtar Kelimeler:** Ftalosiyanin, Çinko(II), 2-aminofenol, Spektroskopi, Agregasyon

## Yeni İndiyum(III) Asetat Ftalosiyanın Sentez ve Spektroskopik Özellikleri

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**Özet:** Ftalosiyaninler, dört tane iminoizindolin moleküllerinin halkalaşması sonucu oluşan mavi ve yeşil renklerine sahip makromoleküllerdir. B12 vitamini, hemoglobinin ve klorofil-a gibi moleküllere yapısal olarak benzemelerine rağmen bu moleküller gibi doğa da bulunmayıp yalnızca laboratuvar ortamında sentezlenmektedir. Ftalosiyaninler ile yapılan ilk çalışmalarda; kalınlığının yaklaşık 3,4 Å olarak ölçülmüştür, iç oyuk çapı ise 1,35 Å olarak hesaplanmıştır. 18 $\pi$  elektron düzenine sahip olan makromoleküller, elektron geçişlerinde oldukça aktif olmaları nedeniyle UV-vis görünür bölgede, şiddetle absorpsiyon pikleri vermektedirler. Ftalosiyanın kompleksleri mavi-yeşil rengi nedeniyle yıllarca boyar madde ve pigment olarak boya endüstrisinde kullanılan bu kompleksler; termal kararlılıkları, asit ve bazlara karşı stabilite ve ışığa karşı dayanıklılıkları nedeniyle gün geçtikçe uygulama alanları, teknoloji ile birlikte çoğalmaktadır. Ftalosiyaninlerin başlıca uygulama alanları ise; fotodinamik terapi, boya endüstrisi, redoks katalizleri, sıvı kristal uygulamalar, kimyasal sensörler, non-lineer optik cihazlarda ve optik veri depolama cihazları söylenebilir. Ftalosiyanın bileşiklerinin fotokimyadaki önemi ve dolayısıyla fotodinamik terapi'de ki uygulamaları nedeniyle hayli fazladır. Ftalosiyaninlerin, metal iyonlarıyla oluşturacağı kompleksler ile fotodinamik terapi uygulamalarında fotofiziksel ve fotokimyasal özelliklerini arttırması, mümkündür. Özellikle In, Al, Ga ve Zn metalli ftalosiyanın türevlerinin fotodinamik terapide fotoduyarlastırıcı olarak kullanılabilirliği araştırılmıştır. Bu araştırma çalışmasında, özellikle fotodinamik tedavi için fotoduyarlastırıcı olarak polar ve apolar çözücülerde çok iyi bir çözünübilirliğe sahip, ve indiyum(III) asetate gibi ağır merkezi metal iyonuna sahip olmasıyla uzun dalga boyunda absorban yapabilmeyen ve aksiyel konumda süstitüe gruba sahip olması amacıyla agregasyon yapmayan periferik pozisyonlardan tetrakis olarak 4-(2-aminofenoksi) grupları içeren orijinal çinko(II) ftalosiyanın sentezlenip Yapısı ve spektroskopik özellikleri ise FT-IR, UV-vis, <sup>1</sup>H-NMR, MALDI-TOF kütle spektroskopileri ve elementel analiz ile aydınlatıldı.

**Anahtar Kelimeler:** Ftalosiyanin, İndiyum(III) asetate, Spektroskopi, Çözünürlük

## Yeni Suda Çözünür İndiyum(III) Metalli Ftalosiyanin Sentezi ve Karakterizasyonu

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**Özet:** Ftalosiyaninler rastlantı eseri bulunan mavi ve yeşil renge sahip makrosiklik yapılar olup dört iminoisoindolinin siklotetramerizasyonu sonucu bir araya gelerek oluşturdukları 18  $\pi$  elektron düzenine sahip yapılardır. Bu yapılar 8 azot ve 8 karbon atomundan oluştuğu gibi orta kısmı boş olup, aromatik kısımlarında sübstitüent bağlanabilecek non-periferal ve periferal kısımlardan oluşur. Orta alandaki boş kısımda bulunan iki hidrojen atomu birçok metalle yer değiştirebildiği gibi aromatik kısımlara bağlanan farklı sübstitüentlerle farklı çözücüler ve farklı özellik gösteren yapılar elde edilebilir. Özellikle bu bölgelere bağlanan -COOH, SO<sub>3</sub>H ve kuaterinize olmuş amonyum gruplarıyla suda çözünmeleri sağlanabilmektedir. Ftalosiyaninler kimyasal sensörlerde, lazer yazıcılarda, gaz sensörlerinde, optik veri toplama alanlarında, güneş pillerinde gibi birçok alanda kullanım alanına sahiptir. Bu yapıların özellikle IR ve UV-visible bölgede ışığı soğurması ve görünür bölgede 680-700 nm dalga boyunda ışıma yapması özellikle ışığa duyarlı fototerapi yöntemlerinde kullanılmasına olanak sağlamıştır. Fotodinamik terapide fotokemoterapinin alt dalı olup ışık ve ışığa duyarlı bir madde (fotoduyarlaştırıcı) kullanılırken aynı zamanda oksijene de ihtiyaç vardır. Fotoduyarlaştırıcı, bu tedavide ışık ile uyarılmasıyla singlet oksijen ve radikal türler üreten etken madde olarak görev yaparken, hasta kişiye enjekte edilerek hasta dokuları bertaraf etmeyi amaçlar. İnsan metabolizması düşünüldüğünde ilaç olarak kullanılan bütün etken maddelerin suda çözünmesi ve etkinliğinin artırılması gerekir. Buna bağlı olarak etken maddelerin tedavi amaçlı kullanılması ve diğer çözücü etkilerinin en aza indirilmesi amaçlı suda çözünen uzun dalga boyunda absorpsiyon yapabilen periferal konumlu sodyum 6- ( $\lambda^1$ -oksidanil) naftalin-2-sülfonat sübstitüentli merkezinde ağır metal iyonu olarak In(III) metalli ftalosiyanin kompleksi sentezlenmiş olup oluşan kompleksin yapısı FT-IR, UV-vis, <sup>1</sup>H-NMR, elemental analiz gibi spektroskopik yöntemlerle aydınlatılmış ve spektroskopik özellikleri belirlenmiştir.

**Anahtar Kelimeler:** Ftalosiyanin, Sodyum 6-oksidonaftalin-2-sülfonat, Suda çözünür, İndiyum(III)

## **Evaluation of Inhibitor Activity of Syringa Vulgaris (Angiospermae) Extract on the Acidic Corrosion of Mild Steel**

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**Abstract:** The inhibition efficiency of Syringa vulgaris extract on the corrosion of mild steel in hydrochloric acid solution was examined by electrochemical impedance spectroscopy (EIS), linear polarization (LPR) and potentiodynamic polarization techniques. The experiments were carried out by immersing mild steel electrodes in acidic solutions containing Syringa vulgaris extract at different concentrations for 1 hour to equilibrate before each electrochemical measurement. As a result of 1 hour electrochemical experiments, Syringa vulgaris extract indicated a strong inhibitory effect and as the extract concentration in acidic solutions increased, the protection effect of mild steel raised. In addition, the surface morphologies of electrodes immersed in 1.0 M HCl solutions without and with inhibitor in 1 h immersion period were examined by optical microscope and it was showed that the metal surface in the inhibited solution had a smoother image compared to the uninhibited surface.

**Keywords:** EIS, Syringa vulgaris, Acidic corrosion, Surface adsorption, Green inhibitor.

## **Araknid Kitinin Bazı Ağır Metallerin Sulu Ortamdan Uzaklaştırılması Üzerine Etkilerinin İncelenmesi**

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**Özet:** Bu araştırmada  $Pb^{2+}$ ,  $Cu^{2+}$  ve  $Cd^{2+}$  iyonlarının kitin biyo-adsorban üzerine adsorpsiyonuna dayalı, eşzamanlı bir katı faz önderiştirilmesi ve alevli atomik absorpsiyon spektrofotometresi ile tayini incelenmiştir. Çalışma, çözelti pH'sı, numune hacmi, eluent hacmi, eluent tipi ve akış hızları bakımından optimize edilmiştir. Yabancı iyonların, geliştirilen yöntem etkileri incelenmiştir. Her bir metal iyonunun gözlenebilme ve tayin sınırları belirlenmiştir. Önerilen yöntemin uygulanabilirliği, analit ilavesi/geri kazanım tekniği ile test edilmiştir. Bu testler sonucunda % 95 ila % 100 arasında değişen kantitatif geri kazanım değerleri elde edilmiştir. Optimize edilen yöntem, atık su ve çevresel su numunelerindeki  $Pb^{2+}$ ,  $Cu^{2+}$  ve  $Cd^{2+}$  derişimlerinin belirlenmesinde başarıyla uygulanmıştır.

**Anahtar Kelimeler:** Kitin, Biyo-adsorban, Ağır metal, Adsorpsiyon, FAAS

## **Grafen Oksit, Manyetik Grafen Oksit ve Nikel Oksit/Grafen Oksit Kompozitlerinin Sentezlenmesi Ve Sulu Ortamda Bulunan Kadmiyum ve Kurşun İyonlarının Giderilmesine Uygulanması**

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**Özet:** Bu araştırmada, grafit, grafitten sentezlenen olan grafen oksit ve grafen oksitten elde edilen manyetik grafen oksit ve nikel oksit/grafen oksit kompozitleri kullanılarak sulu ortamda bulunan Cd (II) ve Pb (II) iyonlarının giderilme şartları araştırılmıştır. Grafen oksit, manyetik grafen oksit ve nikel oksit/grafen oksit maddelerinin karakterizasyonu taramalı elektron mikroskobu (SEM) ve Fourier transform infrared spektrometresi (FTIR) yöntemleriyle belirlenmiştir. Grafen oksit, manyetik grafen oksit ve nikel oksit/grafen oksit kompozit maddeleri ile sulu ortamda bulunan Cd (II) ve Pb (II) iyonlarının giderilmesine, pH etkisi araştırılmıştır. Metallerin derişimleri alevli atomik absorpsiyon spektrometresi (FAAS) ile tayin edilerek belirlenmiştir.

**Anahtar Kelimeler:** Grafen Oksit, Manyetik Grafen Oksit, Ağır metal, FAAS.

## Prediction of the Formation of Chlorine-Containing Substances during the Destruction of Sovol in a Gas-Liquid Medium with the Participation of Metal Oxides

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**Abstract:** In order to neutralize waste organic oils in electrical equipment, the conversion of toxic sovol in a gas-liquid medium with the participation of metal oxides (barium, aluminum, calcium and magnesium) in a wide range of temperature was carried out. It was noted that during the decomposition of sovol in a water-oxygen medium, condensed phases and various low-molecular-weight chlorine-containing components and particles, such as Cl, Cl<sub>2</sub>, ClO, ClO<sub>2</sub>, Cl<sub>2</sub>O, HCl, HOCl, CCl, ClCO, Cl<sub>2</sub>CO, CHCl, CH<sub>2</sub>Cl, CH<sub>3</sub>Cl, HCICO are formed. The temperature regimes of transformation of the components, condensed phases, active particles were determined, and the thermodynamic parameters of the conversion process were calculated. High-temperature destruction of sovol in a gas-liquid medium with the participation of metal oxides showed the possibility of detoxification of high-molecular toxic organic chlorine-containing compounds by converting them to more stable salt form in the form of metal chlorides. It was noted that under subcritical conditions, due to a significant increase in the solubility of organic substances in water and, consequently, the availability of water for carrying out a chemical reaction, as well as an increase in the reaction rate with increasing temperature (up to 3000K), it became possible to carry out effective hydrolytic decomposition of sovol. In the process of dechlorination, non-volatile metal (Ba, Al, Mg, Ca) oxides were used, capable of forming thermally stable low molecular weight chlorides. In this case, calcium oxides and hydroxides, which are available reagents, were the most acceptable.

**Keywords:** Chlorine, Oxide, Oxygen, Sovol, Water.

## Study of Antimicrobial Properties of Dichloro-Diazabutadiene Synthesized Based On the 4-Chlorobenzaldehyde

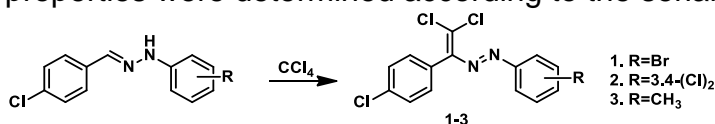
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**Abstract:** Phenylhydrazones are easily synthesized substances which have high pharmacological properties. They are the main part of antimicrobial, anticold, anticancer, antifungal, antituberculosis, antiviral and antimalarial medicines. Schiff bases of phenylhydrazone are also used as useful synthons for synthesizing N-heterocyclic substances (pyrazoles, pyridazine, dehydropyridazine etc.) which have high biological activity. In a presence of CuCl-catalyzed olefination of 1,1-dichlorodiazene derivatives synthesized from phenylhydrazones which are physiologically active.

Dichlorodiazenes of corresponding phenylhydrazones which are synthesized from Cl derivatives of benzaldehyde were synthesized, respectively, their antimicrobial properties were determined according to the serial dilution method.



1. (E)-1-(4-bromophenyl)-2-(2,2-dichloro-1-(4-chlorophenyl)ethyl) diazene

2. (E)-1-(2,2-dichloro-1-(4-chlorophenyl)ethyl)-2-(3,4-dichlorophenyl) diazene

3. (E)-1-(2,2-dichloro-1-(4-chlorophenyl)ethyl)-2-(p-tolyl) diazene

Antimicrobial property of these substances was researched in compare with ethanol, nitrofungin and rivanol. As test-cultura, gram-positive golden staph (*St.aureus*), gram-negative bacilli (*E.coli*), pigment producing blue-green pus (*Ps.aeruginosa*) and *Candida* fungus (*C.albicans*) were taken. To grow bacteria meat peptone agar, to grow fungus Saburo food environment was used. According to the bactericide and fungicide activity, (E)-1-(2,2-dichloro-1-(4-chlorophenyl)ethyl)-2-(3,4-dichlorophenyl) diazene can be shown as the most effective substance among the substances which were researched in microbiological laboratory and this substance can be recommended as an antimicrobial substance.

This work has been done by the "Fine Organic Synthesis" laboratory in Organic Chemistry Department of Baku State University, Azerbaijan. Antimicrobial activity of substances was examined by Department of Medical Microbiology and Immunology of Azerbaijan Medical University. This work was carried out with the financial support of the Foundation Intra University Grant Program 50 + 50, Baku State University.

**Keywords:** Phenylhydrazone, Antimicrobial, *Candida*, Gram-positive

## Karbon nanotüp destekli Ru, Pd ve Pt modifiye camısı karbon elektroduna dayalı L-sisteinin hassas elektrokimyasal tespiti

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**Özet:** Bu çalışmada, karbon nanotüp (CNT) destekli Ru, Pd ve Pt monometalik katalizör modifiye camısı karbon elektrotlarına (GCE) dayalı bir voltametrik L-Sistein (Cys) sensörü geliştirilmiştir. Ru/CNT, Pd/CNT ve Pt/CNT katalizörleri, sodyum borohidrit indirgeme yöntemi ile hazırlanıp ve endüktif olarak bağlanmış plazma kütle spektrometrisi (ICP-MS), N<sub>2</sub> adsorpsiyon-desorpsiyon, X-ışını kırınımı (XRD) ve transmisyon elektron mikroskopu (TEM) gibi gelişmiş yüzey analitik teknikleriyle karakterize edildi. Karakterizasyon sonuçları, katalizörlerin istenen metal yüklemelerinde başarıyla sentezlendiğini ortaya koymaktadır. Elektrokimyasal ölçümler için GCE, Cys için tek kullanımlık, ucuz ve hassas bir sensör elde etmek için Ru/CNT, Pd/CNT ve Pt/CNT katalizörleriyle modifiye edilmiştir. Modifiye edilmiş GCE'nin elektrokimyasal davranışı, döngüsel voltametri, diferansiyel puls voltametri, elektrokimyasal empedans spektroskopisi ile araştırılır. Ru/CNT ile modifiye edilmiş GCE elektrodu, en iyi CY'nin elektrooksidasyon aktivitesini sergiler ve bu nedenle hassasiyeti, tespit limitini, girişim çalışmasını ve gerçek numuneyi belirlemek için Ru/CNT ile modifiye edilmiş GCE elektrotunda ek elektrokimyasal ölçümler gerçekleştirildi. Yapılan çalışmalara göre sensör, 0–200  $\mu$ M aralığında, akım hassasiyeti 0.3054  $\mu$ A/ $\mu$ M (4301.42  $\mu$ A/mMcm<sup>2</sup>) ve en düşük algılama limiti 0.353 (S/N = 3) sinyal/gürültü oranı ile doğrusal bir tepkiye sahiptir. Girişim çalışmaları, Ru/CNT ile modifiye edilmiş GCE elektrodunun D-glukoz, ürik asit, L-Tirozin, L-Tryptofan, H<sub>2</sub>O<sub>2</sub>, yaygın müdahale eden suşlardan etkilenmediğini ortaya koymaktadır. Ru/CNT ile modifiye edilmiş GCE elektroduna dayalı olarak geliştirilen sensör, asetilsistein ilaç örneğindeki Cys'i ölçmek için de kullanılır. Bu yeni çalışma, bir Ru/CNT modifiye GCE elektrotunda Cys için algılama stratejisini bildirmektedir.

**Anahtar Kelimeler:** Sistein; Ru; Pd; Pt; Elektrokimyasal, Sensor

# **ENVIRONMENTAL ENGINEERING**

## **The Avifauna of Salt Lakes with Populations of the Crustacean Artemia Leach, 1819 in Northern Kazakhstan**

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**Abstract:** During the fauna-ecological research in period of 1998–2019, 47 species of birds had been registered with various degrees of arrival in the salty reservoirs of the Pavlodar region of Northern Kazakhstan. The most numerous types of orders were Charadriiformes and Anseriformes. The species composition of birds and the nature of their stay on salt lakes depends on a certain extent of the mineralization of a particular reservoir.

**Keywords:** Birds, Artemia, salty reservoirs, North Kazakhstan

## Dose Assessment of Radiation Exposure by Scenarios in the Settlements of Stepnogorsk Area

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**Abstract:** Radiation impact assessment was done for settlements of Stepnogorsk area. The aims of this study were to characterizing the general radiological situation of the area and evaluate radiation exposure by scenarios in settlements.

Two scenarios and one disaster scenario were evaluated: the first scenario assumed that the population consumes only food products produced in the territories contaminated with radionuclides; the second scenario also assumes that the inhalation of radon concentration by a critical group (schoolchildren and teachers) includes one exposure way; the third disaster scenario ("hypothetical") population consumes food with the maximum content of radionuclides.

For population living in the territories contaminated with radionuclides and consumed food from this territory the annual dose burden is 2.5 mSv y<sup>-1</sup> in Zavodskoy, 1.9 mSv y<sup>-1</sup> in Kvartsitka and 3.6 mSv y<sup>-1</sup> in Aqsu.

For a critical group working and studying at Aqsu school the annual dose burden is ranges from 7.7 mSv y<sup>-1</sup> to 10.81 mSv y<sup>-1</sup> at the ground floor, and for teachers - up to 12 mSv y<sup>-1</sup>. For schoolchildren on the second floor, this indicator ranges from 1.42 mSv y<sup>-1</sup> to 2.21 mSv y<sup>-1</sup>.

For population living in the territories with high background level and consumed contaminated food the annual dose burden is 9.1 mSv y<sup>-1</sup> in Zavodskoy, 8.3 mSv y<sup>-1</sup> in Kvartsitka and 11.5 mSv y<sup>-1</sup> in Aqsu.

There are eminent radiological risk to critical group and potential environmental contamination of school territory and radiological consequences calls for an urgent evaluation and potential application of effective remediation options.

**Keywords:** Radiation exposure, Mining activity, Critical group, Radiological assessment, Disaster scenario

## **Airborne Particulate Matter: How Techniques For Physicochemical Analysis Can Help Us Predict Adverse Human Health Impacts Of Air Pollution**

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**Özet:** Particulate matter (PM) is one of the major constituents of air pollution, which is a pressing global environmental issue. PM is composed of microscopic liquid and solid particles that, once humans are exposed to, could lead to toxic effects and increase the likelihood of adverse health outcomes. The health risks from PM are yet to be fully understood but are closely associated with their physical characteristics (e.g., size, shape) as well as their chemical composition. The present work aims to review existing methods of chemical speciation of PM and to list effective ways to study physicochemical toxicity and composition of airborne particulates. Over the decades of air pollution research, numerous laboratory methods have been developed to study the chemical composition and morphological properties of atmospheric particulates. The advances in technology have gradually allowed scientists, regulators, and health professionals to better and better detect the toxic constituents of air pollution and characterize their properties that assists in understanding their potential adverse health outcomes. This presentation will introduce the audience a review of (1) the primary electron microscopy-based techniques (including scanning electron microscopy (SEM), transmission electron microscopy (TEM), and atomic force microscopy (AFM)), (2) wet chemical analysis techniques (such as inductively coupled plasma analysis (ICP) and ion chromatography (IC)), as well as (3) X-ray-based techniques (including energy-dispersive X-ray spectroscopy (EDS), X-ray dispersive spectroscopy (XRD), and X-ray fluorescence (XRF)). The principles as well as the uses of these techniques will be discussed. Our investigations suggest that techniques including SEM coupled with EDS for acquiring statistically significant single-particle data as well as ICP and IC for bulk aerosol characterization are among the most effective analytical tools for PM monitoring procedures, whereas other reviewed analytical methods can provide valuable complementary data in PM analysis.

**Anahtar Kelimeler:** Aerosol analysis, Air pollution analysis, Air pollution health impacts, Air sampling, PM<sub>10</sub>, PM<sub>2.5</sub>, Risk characterization, Single particle analysis

## Potentially Toxic Elements in Airborne Particulate Matter: How Assessing Their Solubility May Improve the Characterization of Adverse Human Health Impacts

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**Özet:** Atmospheric pollution is currently one of the most pressing global environmental issues, particularly in developing countries such as Turkey and Kazakhstan. Specifically, the levels of multiple ambient pollutants have been shown repeatedly exceeding the maximum permissible level, exposing the general population of the major cities around the world to severe potential health risks. Particulate matter (PM) is one of the main parameters of air pollution and contains, among other pollutants, potentially toxic elements (PTEs) (e.g., As, Hg, Cd, Cr, Fe, Ni, Pb, and Zn). Exposure to PTEs have been clearly linked in the past to adverse health effects and PM exposure, in general, is associated with an increased risk of multiple diseases including respiratory conditions, cardiovascular diseases, and cancers. For this reason, properly assessing health risks from the exposure to the constituents of air pollution is an important public health challenge. This work aims to introduce a review of a laboratory technique that is recently getting more and more popular that allows for a more accurate prediction of human health risk. Evaluation of toxicity and health risk from PM exposure is commonly based on the total elemental concentration of PTEs measured in the airborne particulates. However, this approach can overestimate the toxicity of pollutants because due to the clearance mechanisms for airborne particulates in the human organism (e.g., coughing, sneezing, ciliary action), some deposited particles can be cleared out from the respiratory system after some time. Therefore, they only stay in contact with the respiratory system for some period of time, during which some mobilization of PTEs could occur. Recent studies suggest the use of a new approach in health risk assessment by studying the effect of the soluble fraction of PM in physiologically based simulated lung fluids (SLFs). They are commonly referred to as lung bioaccessibility methods. SLFs include Gamble's solution (GS), artificial lysosomal fluid (ALF), simulated epithelial lung fluid (SELF), and Hatch's solution, each representing separate regions of the respiratory system with different chemical properties. Incorporating bioaccessibility (solubility of PTEs in SLFs) into human health risk assessment will lead to a more accurate evaluation of air pollution impact.

**Anahtar Kelimeler:** Air pollution analysis, Air pollution health impacts, Air sampling, bioaccessibility, PM<sub>10</sub>, PM<sub>2.5</sub>, risk Characterization, Single particle analysis

## Overview of Radiation Situation on Stepnogorsk Mining and Chemical Combine

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**Abstract:** Stepnogorsk mining and chemical combine (further - SMCC) one of the eldest enterprises in Kazakhstan which has working since 1956. The main technological processes in SMCC included as follows: crushing and grinding of raw materials, selective leaching of uranium, uranium extraction, regeneration of uranium from the resin phosphate, U<sub>3</sub>O<sub>8</sub> re-extraction from the organic phase. Objects of study is comparative analyze of radiation situation on Stepnogorsk mining and chemical combine workplaces.

Annual effective dose, dose of radon decay products (RDP), dose of long lived radionuclides (LLR) for uranium workers of Stepnogorsk mining and chemical combine (SMCC) for last 35 years (from 1985 to 2020) were analyzed. Also for comparison annual effective doses of according to UNSCER reports of world uranium workers and workplace situation were analyzed. Average annual effective dose for last 35 years for uranium workers of SMCC constituted 8.19 mSv/year. According to UNSCEAR average annual effective dose of uranium worldwide workers decreased from 6.27 to 2.30 mSv/year. For SMCC uranium workers this trend not observed. One of reason of this value can be malfunction equipment in work sites. According to analyzed of LLR and RDP values of SMCC work sites showed that average dose of LLR is 5.61 mSv, average dose of RDP is 1.85 mSv. These doses do not exceed the permissible level of 20 mS per year, however, they are an order of magnitude higher than average UNSCEAR values for uranium mining workers 1.8 and 4.4 times higher respectively. Thus, the exposure of workers working with uranium is significantly different from that of underground uranium miners or working nuclear reactors, and that workers working with uranium must be carefully assessed in separate studies

**Keywords:** Uranium workers, Stepnogorsk, Effective dose, Miners, Radiation situation

## Research of technical characteristics of AMP brand sorbent

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**Abstract:** The development of effective sorption materials for the extraction of radionuclides from aqueous solutions is relevant due to the importance of radioecological problems caused by the accumulation and spread of radioactive contamination in the environment. Various sorption materials are widely used to extract radionuclides from aqueous solutions: natural and synthetic ion exchangers, complexing, modified, composite and other sorbents. The efficiency of the extraction of radionuclides depends on the selectivity of sorbents in the presence of inorganic and organic components contained in aqueous media [1-3]. For the extraction of radionuclides, it is preferable to use sorption materials capable of selectively sorbing radionuclides from aqueous media of complex composition. In this article, the technological characteristics of the AMP sorbent are studied. As a result of the study, the values of the decrease in the mechanical strength of the sorbent were revealed due to the change in the rotation speed of the ball mill, the physicochemical properties of the sorbent, as well as additional saturation with commercial desorbate and desorption of sulfate nitrate and denitration of sulfuric acid.

**Keywords:** Sorbent, Sorption, Mechanical strength, Desorption, Characteristic, Extraction efficiency, Radionuclide

## Recovering of Indigo Dye from Denim Wastewater

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**Abstract:** The aim of this study is to recover indigo dye, which is referred to as the pollutant released into the wastewater environment of the denim fabric industry. For this purpose, denim wastewater containing solid particles and small size cotton fibers was filtered by the physical holding-separation process. Indigo dye which is dissolved in wastewater was then oxidized with H<sub>2</sub>O<sub>2</sub> in the presence of KI catalyst at room temperature, and precipitated with ethanol, and filtered. This residue was purified by mixing and washing with distilled water and filtered. Subsequently, it was dried at room temperature and the recovered indigo dye was weighed. While the maximum recovered indigo dye was obtained as 0.0234 g in 0.5 g KI and 100 ml ethanol medium, the minimum amount was 0.0132 g in 0.4 g KI and 50 ml ethanol. Consequently, it has been understood that this method can be applied effectively in the denim industry to recover indigo dye from wastewater because of simple, cost-effective and selective.

**Keywords:** Denim wastewater, Indigo dye, Recovery

## **Enhance and Increase the Local Population Access for Renewable Energy of Biogas in Syria**

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**Abstract:** Syria remains one of the world's most complex humanitarian emergencies characterized by ongoing hostilities. 82% of assessed households in Syria report a significant deterioration in their ability to meet basic needs since August 2019. Due the recurrent disruptions in fuel availability and sharp price increases, rural people started using woods, plants residuals and dung cakes as an alternative energy source for cooking and heating. Therefore, a pilot project is implementing by targeting the rural people especially cow husbandry by provide people with biogas unite to produce biogas out of cow dungs and house wastes. That will increase the resilience of the crisis-affected people in Syria by increasing access to renewable energy via improving their livelihood situation. The objectives of this project are reducing fuel cost, replacing fossil fuels in cooking, production of clean fuel in form of methane from organic waste, and dispose of organic solid waste and reduce the cost of disposal in Syria. The biogas system is an anaerobic digester that treats farm and house wastes made from two cut-down standard high-density polyethylene water tanks and standard plumber piping. It is expected to produce about 800 liters of methane gas that will be enough for 2.5-3 hours of use and its waste as secondary product is used as a natural fertilizer that can either be sold to make income or used on farmland to improve crop yields. In conclusion, biogas systems improve the overall households' livelihoods and situation and also reduce carbon emissions that supports climate change mitigation.

**Keywords:** Biogas, Renewable energy, Recondary natural fertilizer, Syria

## **Possible Effect of Increased CO<sub>2</sub>, High Temperature and Drought As Climate Change Related Factors on Adaptation of Turkish Native Alfalfa Varieties**

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**Abstract:** Greenhouse gases have recently triggered climate change by causing temperature increases on a global scale. CO<sub>2</sub> is the most important greenhouse gas and one of the most abundant greenhouse gases in the atmosphere. It's concentration in the atmosphere has increased from 400 ppm to 700 ppm, it still continues to increase. With this CO<sub>2</sub> concentration increase, increases in atmospheric temperature are also observed. The yield and quality of plants grown in such changing climatic conditions has influenced. There is an urgent need of climate changes effects research and adaptation capability on local alfalfa varieties and determination of varieties that has the optimal yield capacity under the climate change conditions for the varieties adapted to Turkey Climatic Conditions in order to recommend for future changing conditions. Also this has a significant importance in terms for guiding the plant breeding studies and alfalfa producers nowadays and under the future conditions that intensive changing climate conditions.

**Keywords:** Adaptation, Drought, Climate change, Elevated carbon dioxide (CO<sub>2</sub>), High temperature, Medicago sativa (alfalfa)

## Herbs' effects in fatty liver treatment in the world-A review

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**Abstract:** Fatty liver disorder (FLD), also known usually as fatty liver or hepatic steatosis which is a condition of the excessive accumulation of lipids in hepatocytes that make the ability of liver lower and more weakness. Fatty liver disorder is a developing level to chronic liver diseases including steatohepatitis (nonalcoholic steatohepatitis, NASH, and alcoholic steatohepatitis, ASH), liver fibrosis, and cirrhosis worldwide. Increasingly, FLD is also affected by other related disorders like diabetes. In this study, we've gathered recent papers and knowledge in this case and finally, we included 66 randomised clinical trials in this review, which assessed 50 herbal medicines. All experimental actions had high risk of systematic disabilities (benefits and harms) and cause of the small number of cases in the trials, we've decided to tell general information. Medicinal plants analyzed in the randomised clinical studies contain specialized products like *Gynostemma pentaphyllum*, *Panax notoginseng*, and *Prunus armeniaca*. Herbs most commonly included as an ingredient in different products were *Crataegus pinnatifida*, *Salvia miltiorrhiza*, *Alisma orientalis*, *Bupleurum chinense*, *Cassia obtusifolia*, *Astragalus membranaceus*, and *Rheum palmatum*.

**Keywords:** Fatty liver, Hepatic, Fibrosis, Herbal, Trials

## Flora of the at-Bashi River Basin in the Inner Tien-Shan of Kyrgyzstan

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**Abstract:** Kyrgyzstan is a high-mountainous country in Central Asia, which is located in the center of the Tien Shan and Pamir-Alai mountain systems. Up to 90% of its territory is elevated to absolute heights of more than 1500 m.

The intercontinental position of the Tien-Shan, the significant elevation of the mountainous country over the territory of the vast deserts of the temperate zone of the Earth, the complex structure and, mainly, the latitudinal position of the ridges, determine a wide variety of natural-climatic features of Kyrgyzstan. The high mountain systems of Kyrgyzstan are recognized by the world community as one of the 200 most important ecological regions of the world, on which the ecological fate of the entire planet depends. Tien-Shan and Alai within our country represent a unique natural zone with a high concentration of plant species, with the preservation of natural landscapes and ecosystems.

The flora of Kyrgyzstan is one of the richest floras in the Central Asian region, represented by up to 4100 species of vascular plants belonging to about 850 genera and 140 families. Its spectrum includes up to 70% of the composition of genera and up to 90% of families of the studied genera and families characteristic of Central Asia.

The basin of the At-Bashi River is one of the largest in the Inner Tien-Shan. Occupies the eastern part of At-Bashi - Kara-Koyun depression. The depression is framed by mountains: from the north Naryn-Too, Ala-Myshik, from the south - the At-Bashi ridge. The length of the basin from north-east to south-west is 150 km, with a maximum width of up to 30 km., the bottom of the depression gradually decreases from east to west from 2800 m to 2000 m.

The mountains surrounding the valley are raised to significant heights. Their tops are covered with glaciers and snowfields, rocky outcrops. The largest river of the At-Bashi valley, the At-Bashi, is one of the high-water tributaries of the Naryn river.

At-Bashi (484 species), which is 8.8% of the flora of Central Asia, 11.8% of the flora of Kyrgyzstan. Thus, the flora of the valley is quite rich. An important characteristic of the flora structure is the ratio of taxa or floristic spectrum. The basis of the flora of the river basin. At-Bashi are angiosperms - 481 species or 99.4%, of which 412 species or 85.1% are dicotyledonous plants. Of the 49 families, the leading in terms of the number of species are Asteraceae 84 species, followed by Poaceae 60, and Fabaceae with 40 species in third place. Monotypic flora families are: Asparagaceae, Betulaceae, Crassulaceae, Hypericaceae, Limoniaceae, Pinaceae, Polygalaceae, Typhaceae, Thymelaeaceae, Valerianaceae (10 families in total). Woody plants in the studied flora are rather poor, both in life forms and according to the species composition, however, they have important phytocenotic significance, since they form special communities. There are also few semi-woody plants (17 species or 3.5%) confined to dry habitats. Herbaceous plants constitute the absolute majority in the considered flora - (417) 86.2%, most of them are weeds found on the roadside roads, on trails, old cattle camps and on the slopes of the southern expositions.

**Keywords:** Flora, Taxonomy, Family, Genus, Species, Life form

## Features of The Vegetation Basin At-Bashi Rivers of The Inner Tyan-Shan of Kyrgyzstan

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**Abstract.** Kyrgyzstan is a high-mountainous country. The character of the relief determines the altitudinal zonation of natural ecosystems.

Inner Tien-Shan - an extensive closed, raised at 2000-3500 m above sea level. m. is a mountainous country, the natural conditions of which in largely resemble Central Asia.

In terms of climatic features, the Inner Tien-Shan of Kyrgyzstan, including the At-Bashi valley, is very diverse due to differences in relief. The high intensity of solar radiation contributes to strong heating of the soil, while the air temperature remains comparably low. This leads to an unstable equilibrium of the atmosphere, to constant daytime convection, accompanied by the development of cloudiness and thunderstorms.

Alpine communities are differ from by their originality and, based on the dominant ecobiomorph, distinguish a wide variety of vegetation types. The complexity and originality of the vegetation of the highlands is determined by the geographic location. It should be noted that Central Asia is located at the junction of several botanical and geographical regions and is distinguished by an extraordinary richness of vegetation.

We adhere to the possibility of growing and codominating several life forms in plant communities. When identifying them, the following criteria are used: the dominance of several ecobiomorphs, the composition of the characteristic synusia, the structure of communities, the composition of the geographical elements of the flora. It follows from this that sparse forest, shrub and semi-shrub communities with ephemeral-ephemeroid cover are combined into a type of savanna vegetation. Based on the differences in the composition and structure of the codominant synusia, it is divided into 3 subtypes: cryophytic, shrub-light forest, and grass savannoids.

Depending on the composition of the ecobiomorphs the main synusium of upland xerophytes, the phryganoid type of vegetation is divided into 3 subtypes: cryophyte, shrub-light forest and semi-shrub phryganoids.

Cryophytic phryganoids include alpine communities: sclerophilous, cushion-shaped dwarf shrubs, semishrubs, and grasses with synusia of microthermal turf grasses In the middle mountains communities of the friganoid type mainly belong to the shrub-light forest subtype. These are shrub-juniper sparse growth of trees woodlands with upland-xerophytic-turf grass cover. As the absolute heights increase, the turf-grass sinusium thickens with steppe and meadow forbs, as a result of which the upland-xerophytic-ephemeroid-turf-grass cover is replaced by the upland-xerophyte-forb-turf-grass cover. Further, the forb-turf-grass sparse growth of trees are mixed with spruce forests and juniper light forests with a meadow-steppe cover.

Nowadays, due to the increased anthropogenic impact, communities of shrub-light-forest friganoids have been preserved in limited areas. A significant area is occupied by alpine xerophytic-ephemeroid- *Poa-Artemisia* species.

**Keywords:** Vegetation, Relief, Formation, Alpine communities, Climate

## **Air Pollution Status in Antalya (Turkey) before and during COVID-19 pandemic in terms of PM<sub>10</sub> and SO<sub>2</sub>**

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**Abstract:** Coronavirus is one of the most important pathogens causing upper respiratory tract infections. COVID-19 virus from coronavirus family was released in Wuhan, Hubei Province of China and affected the whole world in a short time, and consequently declared as a pandemic by the World Health Organization (WHO) in March 2020. To deal with this pandemic, several measures have been taken by local governments and policymakers. Many decisions have been implemented such as curfew, distance education, and working model, lockdown, transition to shift system in industrial institutions and organizations. The decisions taken have not only affected the epidemic but also environment. Air pollution and quality status have become one of the most crucial issues evaluated with the epidemic.

In this study, air pollution status in Antalya (Turkey) before and during COVID-19 pandemic period (December 2019-February 2021) was issued. Trends in PM<sub>10</sub> (particulate matter) and SO<sub>2</sub> in this period were examined on a seasonal basis. In the study, data of Antalya city centre air monitoring station were used. The lowest PM<sub>10</sub> emission was found in the range of 17.14-63.15 µg/m<sup>3</sup> in summer when tourism activities and population are the highest. The lowest SO<sub>2</sub> emission was observed in the spring of 2020 in the range of 0.77-4.94 µg/m<sup>3</sup>. In this study, it was found that COVID-19 restrictions led to a decrease in PM<sub>10</sub> and SO<sub>2</sub> emissions in Antalya. The study addresses an environmentally positive aspect of the COVID-19 problem in terms of air pollution.

**Keywords:** Air pollution, Coronavirus, COVID-19, Environment, PM<sub>10</sub>, SO<sub>2</sub>.

## Mikroplastiklerin Biyodegradasyonu ve Çevresel Yönleri

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**Özet:** Antropolojik faaliyetler sonrası oluşan makro ve mikro plastikler kontrollü bir şekilde uzaklaştırılmadığında kara ortamından sonra denizlere kadar makro plastikler kademeli olarak parçalanarak mikro ve nano plastiklere dönüşmektedirler. Mikroplastiklerin (MP) dağılımı, izlenmesi, taşınımı gibi konularda birçok çalışmalar son 10 yıldır yoğun bir şekilde yapılmaktadır. Bu çalışmaların genel sonucunda MP'lerin her yerde olduğunu kanıtlanmıştır. Fakat MP'lerin mikroorganizmalarla etkileşimi konusunda sınırlı çalışmalar mevcuttur. Bu çalışmada MP'lerin bakteri, fungus tarafından biyolojik olarak parçalanabilirliği, biyofilm oluşumunun degradasyon üzerine etkileri ve çevresel süreçleri ele alınarak yapılan çalışmalar üzerinden tartışılmıştır. Ayrıca MP'lerin biyolojik olarak parçalanabilmesi ile yüzeyde gelişen hidrofobiklik, mekanik stabilitesinin bozulması ve mikrobiyal nütrient kaynağı gibi özellikler kazanması sayesinde MP'lerin iyileştirilmesinde ve gideriminde biyoteknolojik bir çözüm sunabilir.

**Anahtar Kelimeler:** Mikroorganizma, Mikroplastik (MP), Biyodegradasyon, Biyofilm

## **İki farklı karbon bazlı iletken malzemenin hayvan gübresinden üretilen biyogaz üzerindeki etkileri**

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**Özet:** Anaerobik arıtım, atık giderimi sağlamanın yanı sıra aynı zamanda yenilenebilir bir enerji kaynağıdır. Özellikle organik katı atıkların, anaerobik işlemlere tabi tutulmasıyla hem atık bertarafı sağlamak hem de biyoenerji (biyogaz) üretimi mümkün olabilmektedir. Nüfus artışına bağlı olarak gıda ihtiyacının artmasıyla birlikte atık yönetimi hayvancılık sektörü için önemli bir problem haline gelmiştir. Bu bağlamda, hayvansal atıklardan biyoenerji üretimi sürdürülebilir bir yaklaşım olarak karşımıza çıkmaktadır. Son yıllarda, iletken malzeme kullanılarak, atıklardan üretilen biyogaz miktarının artırılması konusundaki çalışmalar oldukça yaygındır. Bu çalışmada iki farklı iletken malzeme (grafit, indirgenmiş grafen (rGO)) kullanılmıştır. İletken malzemelerinin farklı konsantrasyonlarında biyogaz üretimine etkisi kıyaslanmıştır. Elde edilen deneysel çalışmalar neticesinde kesikli reaktörlerde grafit ve rGO ilavesinin biyogaz üretimini arttırdığını göstermiştir. 1,5 g/L eklenen grafit ve 20 mg/L eklenen rGO sırasıyla biyogaz üretimini %15,69 ve %31,69 oranında artırmıştır.

**Anahtar Kelimeler:** Anaerobik Arıtım, İletken Malzeme, Biyogaz, Grafit, rGO

## Recycling Alternative for Waste Plastics: Wood Plastic Composite

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**Abstract:** The amount of industrial and urban solid waste products that are actually landfilled must be drastically reduced. Major components of municipal solid waste include plastics. Because of its unique properties, such as the ease of manufacturing and forming, low cost, and low density, plastic is the most widely used man-made material on the planet. It is useful in different variety of fields, including medicine, architecture, manufacturing, and transportation. Regrettably, after use, they are released into nature. Since some of them are non-degradable and some others have difficulties for degradation, their accumulation poses an environmental problem. The utilization of waste plastic in manufactory of another material is a partial environmental solution. This paper discusses briefly traditional and current waste plastic recyclings. And then, it offers main details about wood plastic composite as a profitable recycling alternative for waste plastics. The study concludes with a discussion of the research and development requirements for optimizing the benefits of using recycled waste plastic materials for composite goods.

**Keywords:** Environment, Recycling, Waste, Wood plastic composite

## Measuring some toxic metals in powdered Herb in local markets of Lahijan city-Iran

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**Abstract:** Heavy metals plays a big role when human are affected by certain types of them. It can create a lot of disorders and influences on the way of biochemical reactions in body. Herbs are known to be an impressive source of chemical or raw materials with ability of treatment, especially in Iranian folk medicines. As we know, Many heavy metals, are toxic. The studies are reporting the huge range of heavy metals levels in some developing countries like Pakistan, Iran, Egypt and Nigeria. This study was conducted to assess some heavy metal in powdered wild thyme (*Ziziphora persica*) obtained from local markets in Lahijan city-Iran northern which are being used daily in the foods. Twenty random samples were collected from various markets and were analyzed for assessment of lead; cadmium; mercury; tin; copper and zinc by ICP-OES. Results concluded that mean values of lead; cadmium and mercury were exceeded the standard scopes. While, copper and zinc were under the standard scopes.

**Keywords:** Toxic, Herbs, Treatment, Iran, Mercury

## Solar panel waste end-of-life material recycling

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**Abstract:** The energy demand is increasing with the increasing population of the world. Since a future where this demand cannot be met with fossil fuels (coal, oil and natural gas) is not far away, interest and demand for renewable energy sources are increasing. Solar energy, a relatively new source of clean energy, started to be used widely around the world. According to the 2019 BP Statistical Review, while 3.87% of electricity (154.66 TWh) of electricity was generated from solar energy in Europe; in 2020, 3.67% of the total electricity consumption in Turkey was provided by solar energy. To convert solar energy into electrical energy is dependent on certain valuable rare resources, recycling is an issue that should be prioritized to achieve sustainable production of photovoltaics, solar-thermal systems, and concentrated solar energy systems, etc. The aim of this study is to show the possibility and efficiency of the recycling waste PV panels that have lost efficiency, have reached the end of their economic life, or have been damaged during the manufacturing, logistics, and installation stages. Also, recycling of rare earth minerals such as germanium, tellurium, cadmium, indium, selenium, and gallium as well as high purity silica will be discussed. Finally, the recycling of PV panels and recovery of the resulting raw materials reveal new waste management strategies and offer new potentials that need to be addressed globally and in our own country.

**Keywords:** Recycling, Solar panels, Recovery of rare earth minerals, High purity silica

## **Metals with Propargyl Compounds in an Aggressive Environment Reserch of Corrosion as Inhibitors**

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**Abstract:** Corrosion of metals and their corrosion protection is an important scientific and economic problem. Technical development is slowing down in many industries due to unresolved corrosion problems. This is especially important in developed countries with large metal reserves. The problem is exacerbated by the fact that high-strength materials widely used in industry take a dangerous form of corrosion during operation in particularly aggressive environments and high temperatures. Exploitation in aggressive technological conditions, which contain hydrogen sulfide, carbon dioxide, sulfate-reducing bacteria in the composition of construction materials and equipment of the petrochemical industry, is accompanied by economic losses as well as environmental damage. The service life of equipment used in aggressive conditions is reduced. Although the normative ten-year service life of the equipment is set, the operation of the plant and equipment in such aggressive conditions does not exceed three years. Many oil fields are currently being pumped to increase oil production. Mineralized stratified water containing hydrogen sulfide in oil and water emulsions formed in wells during long-term injection causes hydrogen sulfide corrosion, the presence of sulfate-reducing bacteria in the environment creates biogenic hydrogen sulfide and deepens corrosion. In order to increase the production of old oil fields, carbon dioxide is also injected into the reservoirs, which leads to the most dangerous corrosion - carbon dioxide corrosion.

**Keywords:** Corrosion protection, Oil and gas chemical industry, Aggressive conditions, Hydrogen sulfide corrosion, Oil and water emulsion.

# **FOOD ENGINEERING**

## **Antioxidant Activity, Phytic Acid And Mineral Content of Pasta Made From Lupin Flour and Resistant Starch Supplemented With Vital Gluten and/or Transglutaminase**

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**Abstract:** In this study, vital gluten, transglutaminase and vital gluten + transglutaminase combination were used to improve the quality of pasta prepared with two different lupin flour (debittered by traditional method and ultrasound application) at 15% level and resistant starch type 4 (RS4) at 10% level. The effects of additives and 15% lupin flour + 10% RS4 addition on the total phenolic content, antioxidant activity, phytic acid and mineral content of pasta were determined. Compared to lupin flour debittered by traditional method, the use of ultrasound-treated lupin flour in pasta had no adverse effect on the total phenolic content, antioxidant activity, phytic acid and mineral content. Addition of 15% lupin flour + 10% RS4 decreased phytic acid and increased Ca, P, Mn and Zn content of pasta compared to 100% semolina pasta. The additives revealed similar total phenolic content, antioxidant activity, phytic acid and mineral content to pasta containing 15% lupin flour + 10% RS4.

**Keywords:** Vital gluten, Transglutaminase, Lupin (*Lupinus albus* L.), Resistant starch, Pasta

## Utilization of Edible Insects as Protein Source in Cereal-Based Foods

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**Abstract:** Edible insects are the main source of nutrients for many populations. They are rich in protein, fat, dietary fibers, vitamins and minerals. The insects can help alleviate hunger and malnutrition. Nowadays, edible insects as a protein source are widely used to develop functional food formulations. The use in an invisible form of insects can increase their acceptability by the consumers. There are many studies on cereal-based products including bread, pasta, noodle, cookie, cracker and cereal bar made from various edible insect products in the literature. The review report is on the current knowledge about nutritional composition of edible insects and use of edible insect products as a protein source to prepare different cereal-based foods. The high potential of edible insects in developing protein-rich products is demonstrated.

**Keywords:** Edible insects, Cereal-based foods, Protein

## **Evaluation of the Antidiabetic Effect of Sidr Honey on the Diabetic Rats Induced By Streptozotocine**

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**Abstract:** Diabetes is characterised by disorder metabolic caused by the complete or relative insufficiency of insulin secretion and/or insulin action.

Honey is a sweet viscous substance made by honey bees using the nectar part of the flowers. The virtues of honey has been used in traditional medicine for a long time, when the scientific world was concerned about testing their virtues.

This work was conducted to evaluate the hyperglycemic activity of Sidr honey in diabetic rats induced by STZ (65mg/kg IP) for two months. The rats were arranged for 6 groups, the control lot and diabetic lot received distilled water, the third, fourth and fifth groups received honey at different doses (250, 500 and 1000 mg/kg), the sixth group received metformin (33.33 mg/kg).

The results showed that honey slightly lowered blood sugar levels. It improved body weight, lipid, liver and renal testes in diabetic rats. In addition, the histological study shows that honey effectively improves pancreatic tissue in diabetic rats.

**Keywords:** Antidiabetic, Sidr honey, Histology, Rats.

## **In vivo Evaluation of Antidiabetic activity of Algerian Date Extract (Phoenix dactylifera L.)**

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**Abstract:** The aim of this study was investigate in vivo antidiabetic activity of Algerian date pulp in streptozotocine induced experimental diabetes. Aqueous date pulp extract as natural treatment was intragastrically administrated to STZ (60 mg/kg b.w) induced diabetic rats at doses of 150 and 300 mg/kg b.w for 4 weeks. The administration of APD1 reduced significantly fasting blood glucose levels in diabetic rats compared to diabetic control group. Significant decrease in plasma fasting blood glucose was observed after administration of APD1 and APD2 in diabetic groups compared with diabetic control group. D-APD1 and D-APD2 groups have shown a beneficial treatment response against diabetic complications in pancreas, liver and kidney tissues. This study suggests that pulp date has a potential antidiabetic effect could be due to its rich composition of active compounds.

**Keywords:** Phoenix dactylifera L., Antidiabetic activity, Blood glucose, Histology, Rats.

## **Descriptive Sensory Evaluation of Chewing Gums: A Comparative Survey on Chewing Gums with Natural and Biodegradable Gum Bases**

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**Abstract:** Sensory qualitative attributes of ten formulated chewing gum based on natural and biodegradable gums including; Saqqez (*Pistacia atlantica* subsp. *mutica*) in the, Kundur (*Boswellia serrata* Roxb.), and Mastic (*Pistacia lentiscus* var. *Chia*), each gum 0-50% by weight of chewing gum, were compared with the chewing gum available in the market using a trained sensory panel who were trained using the Sensory Spectrum method. The panel evaluated the chewing gums using three tactile (springness, elasticity and adhesion to touch) and seven oral attributes (texture cohesion in the mouth, adhesion to the teeth, bitterness, chewiness, springness, hardness overall acceptance). ANOVA showed that five of the 7 sensory attributes (texture cohesion in the mouth, adhesion to the teeth, bitterness and overall acceptance) were significantly different across the samples. The present investigation demonstrated that the composite samples, were prepared by a melt blending method, were more effective. In fact, the main differences and a higher degree of acceptance, appeared in the participation of two natural gums next to each other as the blend. Contradictory, the lowest score of overall acceptance and the high score of bitterness and adhesion to the teeth, belongs to the sample containing kundur gum lonely as the gum base. Moreover, findings on some sensory characteristics suggested that the practical and efficient applicability of blending gums as gum base in chewing gum, where the sensory scores were competitive and even much better than commercial ones.

**Keywords:** Chewing gum, Saqqez, Mastic, Kundur

## Effect of Mineral Salt Replacers on the Physicochemical, Microbial and Sensory Properties of Yogurt Drink, Ayran

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**Abstract:** Reducing the salt content of foods often impairs the taste and consumer acceptability as well as the shelf life in many cases. In this study we investigated the impact of mineral salt replacers on chemical, microbiological and sensory properties of Ayran samples. Ayran or so-called yogurt drink is a type of acidified milk drink widely consumed in Turkey that is basically produced by diluting the yogurt with water and adding salt. We produced six different Ayran samples having 6% NFDM, 1.8% fat and 0.5% salt/salt replacers as follows; A (control): 100% NaCl, B: 100% KCl, C: 70%KCl + 30% NaCl, D: 50% NaCl + 50% KCl, E: 30%KCl + 70% NaCl, F: Pansalt (%56 NaCl+ %28 KCl + %12MgSO<sub>4</sub> + %2 L-lisin+ %1 Silicon Dioxide. Mineral salt replacers didn't affect pH, acidity and whey separation throughout the storage. Saltiness scores of the sample B and C were lower than the others, while D, E and F had similar saltiness scores with control (A). Results showed that use of Pansalt and the mixtures of NaCl:KCl at the ratios of 7:3 and 1:1 produced acceptable yogurt drinks. Streptococcus thermophilus and Lactobacillus bulgaricus counts were similar for all samples at day 1. There was a decrease in L. bulgaricus count of sample A, D and F at day 10 and an increase in S. thermophilus count of sample A, C, E and F at day 20.

**Keywords:** Reduced salt, Ayran, Salt replacers

## Study on Probiotic Survival in Cheddar Cheese

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**Abstract:** The study was designed to check the effect of ripening temperatures (4 and 8°C) on survival of probiotics microorganisms after ripening for 24 weeks. *Bifidobacterium animalis* subsp. *Lactis*, *Lactobacillus casei*, *Lactobacillus acidophilus* species were used as an adjunct in the production of Cheddar cheeses from buffalo milk. Then cheeses were ripened for 24 weeks at 4 and 8°C. Effects of ripening temperatures on survival of starter lactococci and probiotic microorganisms, pH and composition of cheeses and production of organic acids were examined. The counts of starter lactococci in cheeses produced with *B. animalis*, *Lb. casei* or *Lb. acidophilus* ripened at 8 °C were significantly lower than those ripened at 4 °C ( $P < 0.05$ ) at 24 weeks. Probiotic microorganisms remained viable ( $>7.50 \log_{10}$  CFU/g) at the end of 24 weeks and their viability was not affected by the ripening temperatures. There were significant effects of the type of probiotic microorganisms used, ripening time, ripening temperatures and their interactions on the concentration of lactic and acetic acids in the cheeses ( $P < 0.05$ ). Increasing the ripening temperature from 4 °C to 8 °C did not affect the viability of the probiotic microorganisms, the salt, fat and protein contents of the cheeses during ripening of 24 weeks. This study shows that careful selection of probiotic microorganisms is required to have Cheddar cheese with high nutritional value for health benefits.

**Keywords:** Probiotics, Cheddar cheese, Ripening, Temperature, Nutritional value

## A survey on Quality Aspects of Market Available Ice Creams

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**Abstract:** Ice cream has high nutrition and it is wholesome frozen dairy product. Contamination of Ice cream with microorganisms is a common problem in the Pakistan and it basically arises if some ingredients are contaminated after pasteurization or if there is no means of proper sanitation of processing equipment. Ice cream is considered hygiene if its production and microbiological quality is good. There was variation in quality of locally produced ice creams in different area of Lahore. 60 locally produced ice creams were carried from six different areas of Lahore that includes Shalamar Town, Mughalpura, DHA, Sadar, Gulberg, and Darogawala. Each sample analyzed for physico-chemical (such as pH, fat, protein, total solids, meltdown and overrun) and microbiological analysis (Total Viable, Coliform and Staphylococcal Counts) by comparing means p-value 0.000 while level of significance was  $\alpha$  0.05 and detection of salmonella spp. Each analysis was performed 3 times. Fat and protein contents were medium to higher percentage in Ice creams of DHA, Gulberg and Sadar while there were low to medium fat and protein contents in the Ice creams available in area of Shalamar, Darogwala and Mughalpura. There was significant difference in overrun of Ice creams available in all six market areas. There was significant variation in microbiological quality of samples due to environmental factors and processing practices. The samples collected from Mughalpura, Darogwala and Shalamr town were highly contaminated having more microbial count which showed contamination is due to poor handling and unhygienic conditions as compare to Gulberg, Sadar and DHA.

**Keywords:** Ice cream, Quality, Contamination, Microorganisms, Bacterial load count

## **Efficacy of Taurine added LSM based Diet on Apparent Nutrient Digestibility and Mineral retention in Common Carp Fish Fingerlings**

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**Abstract:** Taurine is an essential component that is limited in plant based diets and its absence cause major health issues inclusion growth in fish fingerlings. Incorporation of natural acids in fish feed decreases pH in the gut and improves the phytate hydrolysis, upsurges the pace of gastric activities, improves mineralization and supplement ingestion. Current study was conducted to evaluate the effects of dietary taurine added linseed meal (LSM) based diet on nutrient digestibility and mineral retention in Common carp (*Cyprinus carpio*) fingerlings. *C. carpio* fingerlings were fed with graded levels (0, 2, 4, 6, 8 and 10gkg<sup>-1</sup>) of dietary taurine for 60 days. The diets were fed to triplicate groups of fish fingerlings (6.22 g average initial body weight) to apparent satiation twice a day and feces were collected. Highest digestibility values of crude proteins (73%), crude fat (66%) and gross energy (72%) were observed at 4 gkg<sup>-1</sup> inclusion of dietary taurine in LSM based diet. Likewise, better absorption ( $P<0.05$ ) of majority of minerals (Ca, Cu, Na, P and K) and highest survival (98%) rate were also found in fish fed the above said level of taurine. Thus, it seems that taurine could be used as feed additive in LSM based diet to confer better growth and health of common carp at the level of 4 gkg<sup>-1</sup> in diet as compared to control and other test diets.

**Keywords:** Taurine, *C. carpio*, Nutrient digestibility, Mineral absorption

## Collection and Documentation of Data for Establishing a Kyrgyz National Food Composition Database

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**Abstract:** Information about food composition is essential in many fields such as food manufacturing and research, clinical practice, nutrition policy, public health, education. Food compositional data is also used for nutrition labeling of foods, also in national programs for the assessment of the nutritional status of the population, and the development of therapeutic and institutional diets. Development of the composition of foods often has benefits for the trade-in foods because importing countries with nutrition-labeling regulations prefer (and may require) imported foods to conform to the standards expected of locally produced foods. Since the Kyrgyz Republic hasn't owned a food composition database, is important to establish a national Kyrgyz food composition database. The paper presents the results, suggestions, and limitations of this work. The literature review shows the lack of peer-reviewed articles regarding national Kyrgyz food composition data. For the documentation of food composition data, the Daris 1.1.8 Software was used. This software was provided by the National Agricultural and Food Centre of the Slovak Republic. A total of 40 local Kyrgyz foods with at least 5 components per food were documented. Most data about the moisture content, sugars, dietary fiber, ash, organic acids, vitamin C, and few data about amino acids, fatty acids, minerals were documented and after that expressed in the same format per 100g of edible portion. Finally, the paper discusses the future needs in the area of food composition.

**Keywords:** Food composition, Computerized database, Nutrients, Public health, Users

## **The Importance of Cold Chain Logistics in Dairy Products**

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**Abstract:** Logistics mode of cold-chain concerning fresh milk and dairy products is an important content of cold-chain logistics about dairy products, which is the key to determine the security of quality about fresh milk and dairy products, stabilize the price of dairy products, improve cold-chain circulation rate of dairy product and ensure the economic benefit and service quality of the cold-chain logistics about dairy product. One of the essential classifications of cold chain logistics is related to dairy products. The dairy products spoilage in the circulation, transport and marketing process can be reduced by cold chain logistics. Cold chain logistics of dairy products refers to system engineering in which products are stored at specific low temperature before production, storage, transportation, marketing and consumption. It is aimed to ensure high quality and prevent damage to foods.

**Keywords:** Dairy products, Logistic, Marketing, Cold chain, Cold chain logistic.

## Applications of Gum Arabic as Edible Coatings in Food Industry

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**Abstract:** Gum arabic is one of nature's most common polysaccharides, with high water solubility and biocompatibility at a low cost. Gum arabic is an emulsifier from the trunks and branches of the Acacia tree, Gum Arabic is mostly used in the different sectors of the food. It is a non-digestible food ingredient that has many applications in the food and pharmaceutical industries. Gum arabic has vital role in industrial manufacturing, spanning from food. The gum arabic prevents the crystallization of sugar and acts as an emulsifier for fats, it distributes the fats homogeneous distribution and thus it is not an outer surface coating that is subject to oxidation, and acts as a flavor stabilizer as it forms a coating around the flavor materials and thus prevents its evaporation, oxidation and absorption of water. Gum arabic and its derivatives are commonly used in the food industry, but their use as edible coatings in a variety of items has only recently been investigated. The purpose of this review is to give deep insight on the relevant work conducted in the area of edible films and coatings obtained from Gum arabic and to explore further its potential in food industries. Gum arabic is a better alternative to plastic packaging products because it is easily available, inexpensive, and bio-degradable, and it has successfully met market demands for fresh fruit and vegetable use. Gum arabic-based active edible packaging and films, which include a variety of bioactive agents that can improve the nutritious, sensory, and organoleptic properties of fresh food items, can be used as a significant vehicle for the food packaging industry and value-added goods in terms of food safety, consistency, conservation, and preservation.

**Keywords:** Gum arabic, food technology, Food packaging, Edible films, Edible coatings, Food additive

## ДЖАЛАЛ ЭД-ДИН РУМИ - ВЕЛИКИЙ ЧЕЛОВЕК ВСЕХ ВРЕМЕН

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**Abstract:** Аннотация: в статье предпринята попытка создать некоторые штрихи к портрету, общепризнанного мировым сообществом, человека всех времен Джалал эд-дина Руми. Это человек особый, которого одновременно и афганцы, и таджики, и иранцы, и турки считает своим великим соотечественником, представителем своего народа. Руми это человек, который сумел объединить в одном лице поэта, философа и суфиста. Он, феномен эпохи средних веков, идейный основатель суфизма и одного из важнейшего течения «Мавлявия» ордена суфистов. Руми поэт, суфист, философ, автор замечательных творений. Его двестише охватывает очень многое: от многочисленных притч восточных народов в стихотворной форме, их миропонимании и мировосприятии, жизненных потрясений и озарений духа, до искусства флирта и большой любви; от повседневных житейских забав - до вершин элегантности и величия. Его творения полны любовью, юмором, нежностью, теплотой и доступны, понятны и хорошо воспринимаются, всеми кто читает его творения на своем языке. Неслучайно, 2007 год - объявлен ЮНЕСКО Годом Джалал Эдд-ина Руми.

**Keywords:** Руми, штрихи, портрет, поэт, философ и суфист, двестише Мевлявия, ЮНЕСКО.

## Кыргызстандын түштүк аймагындагы бадамдардын (*Amygdalus communis* L.) физикалык-химиялык өзгөчөлүктөрү

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**Аннотация:** Азыркы учурда, бадам (*Prunus dulcis*) пайдалуу тамак катары суроо-талапка ээ, калктын жана өндүрүүчүлөрдүн арасында популярдуу. Бадам химиялык курамы боюнча өтө ар түрдүү. Бадамдын курамындагы макро- жана микроэлементтердин курамын жана мүнөздөмөлөрүн изилдөө жаңгактын курамында май кислоталары, липиддер, аминокислоталар, белоктор, углеводдор, витаминдер жана минералдар, ошондой эле экинчи метаболиттер сыяктуу көптөгөн азык компоненттерин камтый тургандыгын көрсөттү. Бирок, бадамдын азыктык баалуулугуна бир нече факторлор таасир этет, анын ичинде генетикалык факторлор, бадам сортторунун ар түрдүүлүгү, түшүм жыйноо шарттары жана айлана-чөйрө факторлору. Бул эмгекте Кыргызстандын түштүк аймагындагы бадамдардын физикалык-химиялык мүнөздөмөсү жүргүзүлгөн. Бадамдын узундугу, туурасы, калыңдыгы жана салмагы өлчөнгөн. Ядро менен кабыктын түшүмдүүлүгү эсептелген. Нымдуулук, күл кармашы, белок, ошондой эле бадамдын ядросундагы калий, фосфор, кальций жана магнийдин кармалышы аныкталды.

**Ачкыч сөздөр:** бадам (*Prunus dulcis*); белок; минералдар; химиялык курамы.

## **Sürdürülebilir Protein Kaynakları: Bitki, Böcek, Yapay Et ve Tek Hücre Proteinleri**

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**Özet:** Biyolojik çeşitliliğe ve ekosistemlere karşı koruyucu, duyarlı, kültürel olarak kabul edilebilir, erişilebilir, uygun fiyatlı, besleyici olarak yeterli, güvenli ve sağlıklı sürdürülebilir gıdalar gelecek yıllarda, artan nüfusa bağlı olarak gıda talebini özellikle protein gereksinimini karşılamada önem kazanacaktır. Dünya'daki su, enerji, yetiştirme alanı gibi kaynakların kullanımının ve sera gazı emisyonları üretiminin kontrolü ve ekosisteme etkisi göz önüne alınarak, hayvansal kaynakların dışındaki sürdürülebilir potansiyel protein kaynaklarının özellikleri bu derleme çalışması ile incelenmiştir.

**Anahtar kelimeler:** Sürdürülebilir gıda, Yenilebilir böcekler, Yapay et, in vitro et, Bitki bazlı proteinler, Tek hücre proteini

## **Mühliye (*Corchorus olitorius*) Bitkisine Farklı Kurutma Metotlarının Etkisi**

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**Özet:** Mühliye, Tiliaceae familyasının *Corchorus* cinsine ait bir bitkidir. İyi bir protein, demir ve potasyum kaynağı olup, fenolik madde içeriği ve antioksidan aktivitesi yüksektir. Geleneksel tıpta birçok hastalığa karşı terapötik olarak kullanılmaktadır. Bu çalışmada mühliye bitkisinin kurutulmasında; tepsili, etüv, mikrodalga ve vakum kurutma olmak üzere dört farklı kurutma metodunun, mühliyenin fiziksel ( $L^*$ ,  $a^*$ ,  $b^*$ ,  $C^*$  ve  $h^\circ$  açısı) ve kimyasal (nem,  $a_w$ , serbest, bağlı, toplam fenolik madde, DPPH antioksidan aktivite) özelliklerine etkisi araştırılmıştır. Renk ölçümleri sonucunda renk değerlerini en iyi koruyan kurutma metodunun vakumlu kurutma olduğu görülmüştür. Toplam fenolik madde içerikleri en yüksek olan örneklerin sırasıyla tepsili (495,61 g GAE/kg) ve vakumlu (466,60 g GAE/kg) kurutucuda kurutulan mühliye tozları olduğu tespit edilmiştir. Serbest ekstraktlarda etüvde (% 68,24) kurutulan örneklerin, bağlı ekstraktlarda ise tepsili (% 74,62) ve vakumlu (% 72,26) kurutulan örneklerin antioksidan aktivitesinin daha yüksek olduğu görülmüştür. Bu çalışmanın sonucunda, tepsili ve vakumlu kurutmaya elde edilen mühliye tozunun bir katkı ya da ikame maddesi olarak ucuz ve fonksiyonel nitelikte yeni gıda formülasyonlarında kullanımı önerilmektedir.

**Anahtar Kelimeler:** Mühliye, Tepsili kurutma, Etüvde kurutma, Mikrodalga kurutma, Vakumlu kurutma

## **Farklı Kurutma Yöntemlerinin ve Ön İşlemin Kuşkonmaz (Asparagus Officinalis) Dilimlerinin Renk Değerleri Üzerindeki Etkisinin Yanıt Yüzey Yöntemi ile Optimizasyonu**

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**Özet:** Kuşkonmazın (*Asparagus officinalis*) sağlık üzerine olumlu etkileri olduğu bilinen bir sebze olmakla beraber taze tüketimi sınırlı zaman diliminde gerçekleşmektedir. Kuşkonmazın üretildiği zaman dışında da fiziksel özelliklerini koruyarak tüketimi için veya ara ürün olarak diğer gıda maddelerinin üretiminde kullanımı için kurutma yöntemi farklı ekipmanlar ile denenmiş ve buna ilaveten ozmotik dehidrasyon ön işlemi yapılmıştır. Kurutulan kuşkonmaz dilimlerine ait en yüksek  $L^*$  değeri sıcak hava kurutmada 80,95, mikrodalga kurutmada ise 34,38 olarak belirlenmiştir. Kararma indeksi değeri ise sırasıyla sıcak hava ve mikrodalgada 1,91 ve 337,64 olarak belirlenmiştir. Daha kısa zamanda kurutmak amacıyla kullanılan mikrodalga yönteminde sıcak hava kurutmaya göre daha koyu renkli ürünler elde edilmiştir. İstenilen renk değerine sahip kurutulmuş kuşkonmaz elde edebilmek için uygun modeller geliştirilmiştir. Ön işlem uygulamasının ve kurutmada seçilen işlem parametrelerinin renk değerleri üzerine istatistiksel olarak etkili olduğu tespit edilmiştir.

**Anahtar Kelimeler:** Renk, Kuşkonmaz, Mikrodalga, Sıcak hava kurutma, Optimizasyon.

## **Fermente Artık Havuç Tozu İlavesinin Tarhana Fermantasyonunda Mikrobiyal Flora Üzerine Etkisi**

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**Özet:** Türkiye’de geleneksel gıdalar arasında bulunan bitkisel ve hayvansal proteinlerin kombinasyonu olan tarhana, yüksek besleyici özellikte, buğday ürünleri, yoğurt ve diğer bileşenlerin harmanlanarak başlıca laktik asit fermantasyonuyla elde edilen ve kurutularak dayanıklılığı artırılan bir fermente ürünüdür. Ülkemizde, tarhana gelenek, görenek ve beslenme alışkanlıklarına göre üretimi bölgeden bölgeye farklılık gösteren önemli bir gıdadır. Kesin olarak yararlanılan standart bir üretimi olmamakla birlikte üretimde kullanılan hammaddelerin çeşitliliğine bağlı olarak günümüzde dünya genelinde de birbirinden farklı tarhanalar üretilmektedir.

Tarhana üretiminde kullanılan un, protein bakımından zengin değildir ancak tarhana üretiminde temel hammaddelerden yoğurt, önemli bir protein kaynağı olup, tarhana fermantasyonu sırasında buğday unu ile birbirlerini önemli bir şekilde tamamlayabilmektedir. Öte yandan üretimde yararlanılan laktik asit fermantasyonu besin değeri yüksek ve beğenilen lezzette ürün elde edilmesinde önemli rol oynamaktadır. Bununla beraber, tarhana üretiminde farklı ikame edici hammaddelerle tarhananın besleyicinin zenginleştirilmesi bakımından önem kazanmıştır.

Bu çalışmada, geleneksel ürünü olan tarhana üretiminde yine geleneksel ürünü olan şalgam suyundan arta kalan fermente siyah havuçların değerlendirilerek artık fermente havuç tozunun tarhananın mikrobiyal florası üzerine etkisinin belirlenmesi amaçlanmıştır. Bu amaçla şalgam suyu fermantasyonundan arta kalan fermente siyah havuçlar donuk kurutucuda kurutularak toz haline getirilmiş ve elde edilen siyah havuç tozu, farklı oranlarda (%1, %2, %3 ve %5) tarhana bileşimine ilave edilerek oda sıcaklığında (25°C’de) fermantasyona bırakılmıştır. Fermantasyon boyunca denemelerde laktik asit bakterileri (LAB), koliform bakteri, toplam mezofilik aerobik bakteri (TMAB) ve maya sayımları yapılmıştır. Fermantasyonun başlamasıyla LAB, TMAB ve toplam maya (TM) sayısında günden güne artış gözlenmiş ve maksimum değere ulaşıldıktan sonra azalma görülmüştür. Fermantasyon boyunca denemelerde koliform bakteriye rastlanmamıştır.

**Anahtar Kelimeler:** Tarhana, Şalgam suyu, Geleneksel üretim yöntemi, Fermente siyah havuç, Mikrobiyal gelişim

## **Şeker Şurupları Üretimi, Gıdalarda Kullanımı ve Sağlık Üzerine Etkisi**

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**Özet:** Mısır nişastasından elde edilen birçok tatlandırıcı bulunmaktadır. Glukoz şurubu üretiminde nişastanın yapı taşları olan glukoz molekülleri enzimler yolu ile birbirinden ayrılmakta ve yüksek oranda glukoz içeren şurup elde edilmektedir. Sıvı formda olan bu ürüne yaygın olarak kullanıldığı ABD’de ise mısır şurubu denilmektedir. Glukoz şurubunun enzimler yolu ile işlenmesi sonucu glukozun bir kısmı fruktoza dönüştürülmekte, böylelikle daha tatlı ve yapısal olarak sakkaroz çözeltisine daha benzer bir ürün ortaya çıkmaktadır. Mısır şurubuna oranla yüksek miktarda fruktoz içeren bu ürüne ABD’de yüksek fruktozlu mısır şurubu (YFMŞ) denmektedir. Türk Gıda Kodeksi’nde bu ürün içerdiği şekerlerin oranına göre glukoz-fruktoz şurubu ya da fruktoz- glukoz şurubu olarak adlandırılmaktadır. Bu şurupların kullanımının artışı sonucunda obezite, tip 2 diyabet, hipertansiyon, dislipidemi, karaciğer yağlanması, gut ve kanser gibi birçok sağlık probleminin arttığı düşünülmekte olup, konu ile ilgili birçok çalışma yapılmıştır. Yapılan çalışmaların sonuçlarına göre YFMŞ’nun insan sağlığı üzerine zararlı etkisinin sadece fruktoz şurupları tüketimi ile ilgili olmadığı, bununla birlikte tüketilen miktarın kontrollü olması gerektiği gerçeğini ortaya koymaktadır.

**Anahtar Kelimeler:** Nişasta, Glukoz şurubu, Fruktoz şurubu, Mısır şurubu

## **Kültürlü ve Kültürsüz Kremadan Üretilen Tereyağı Ve Sadeyağ Örneklerinin Depolama Süresince Lipolitik Bakteri Ve Maya-Küf Gelişiminin Belirlenmesi Ve Karşılaştırılması**

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**Özet:** Bu çalışmada, süt kremasından kültürlü ve kültürsüz tereyağı üretilmiştir. Kültürlü tereyağı için *L. lactis* subsp. *lactis* biovar. *diacetylactis* ve *Leu. mesenteroides* subsp. *cremoris* starter kültürü kullanılmıştır. Kültürsüz tereyağı direk kremadan üretilmiştir. Kültürlü ve kültürsüz tereyağlarının üretimi tamamlandıktan sonra bu tereyağlarından 60-90 ve 120 °C 'de sadeyağ üretilmiştir. Üretilen tereyağları ve sadeyağlar +4 °C' de 60 gün depolanmıştır. Depolamanın 1 - 30 ve 60. günlerinde tereyağı ve sadeyağların bazı maya-küf ve lipolitik mikroorganizma gelişimi ile ilgili mikrobiyolojik analizler yapılmıştır. Yapılan analiz sonuçlarına göre maya-küf sayıları depolama süresi boyunca kültürsüz tereyağlarında kültürlü tereyağlarına oranla daha yüksek oranda üreme göstermiş olup bütün sadeyağ örneklerinde maya-küf bulunmamıştır. Lipolitik mikroorganizma sayısı kültürsüz tereyağı ve sadeyağlarda kültürlü tereyağı ve sadeyağ örneklerine göre depolama süresince daha yüksek oranda tespit edilmiştir. Yapılan bu çalışma sonucunda; kültürlü ve kültürsüz tereyağı ve sadeyağ üretiminde uygulanan sıcaklığa ve depolama süresine bağlı olarak tereyağı ve sadeyağların buzdolabı sıcaklığında (+4 °C) depolama süresi de belirlenmeye çalışılmıştır.

**Anahtar Kelimeler:** Tereyağı, Sadeyağ, Starter kültür, Lipolitik bakteri

## **The Effect of Shalgam Beverage Fermentation Residual Products of Setic and Turnip Radish Powder on Microbial Change during Tarhana Fermentation**

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**Abstract:** The limited food resources and the rapid increase in the world population in recent times necessitate the efficient and effective use of these resources. Residues in the food industry can contain highly valuable components, depending on the raw material and processing conditions. Especially in terms of nutritional value, the fermentation of grain-based foods provides significant benefits to the product.

Tarhana, which is widely consumed in our country, is a traditional food type with a strong yeast flavor, acidic and sour taste. It is produced from various raw materials in lower quantities, depending on the region and region, mainly wheat flour and also yoghurt with its derivatives. The use of shalgam beverage residues in the enrichment of the nutrients of tarhana is a new way of evaluation. Shalgam beverage is also rich in various amino acids, phosphorus, potassium, calcium, iron and some minerals. In this study, the effects of powders obtained from setic and turnip radish, which are the residues of shalgam beverage, which have positive effects on human health, on the microbial flora in fermentation were investigated by adding certain amounts of tarhana, which is one of our traditional foods. Total coliform bacteria, total aerobic mesophilic bacteria, total yeast-mold counts and total lactic acid bacteria counts were performed periodically every day during fermentation. With the start of fermentation, an increase was observed in the total mesophyll aerobic bacteria count, yeast-mold count, and total LAB counts. However, a continuous increase in the number of microorganisms was observed in all trials. However, coliform bacteria have not been encountered in any trial.

**Keywords:** Tarhana, Shalgam beverage residues, Setik powder, Turnip radish powder, Microbial growth

## Evaluation of the Fouling Behaviour for Ultrafiltration of Blackberry Juice Using Resistance-in-Series Model

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**Abstract:** Ultrafiltration is increasingly used for clarification in juice industry, since it has many advantages over the traditional methods. However, fouling of membranes is the main drawback of this process. Depectinized blackberry juice was clarified in a laboratory scale ultrafiltration system using 10, 30 and 50 kDa molecular weight cut-off polyethersulfone membranes. Response surface methodology was used to evaluate the effects of operation parameters including temperature (20-40 °C) and transmembrane pressure (100-300 kPa) as well as molecular weight cut-off values of membranes and also pretreatment with gelatin and bentonite on total fouling resistance. The resistance-in-series model was used to determine the each resistance (membrane resistance, cake layer resistance, fouling resistance) and their contribution to total resistance. While the cake layer resistance contributed about 10% to the total resistance in almost all of the experimental runs, the contribution of fouling resistance was mainly depends on the pretreatment of juice with gelatin and bentonite and pore size of the membrane. The average values of fouling resistance were about 27%, 45% and 65% of the total resistance when using 10, 30 and 50 kDa molecular weight cut-off membranes, respectively.

**Keywords:** Blackberry juice, Ultrafiltration, Membrane fouling

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# **GEOLOGICAL, GEOMATICS AND MINING ENGINEERING**

## **Алматының сейсмикалық жағдайындағы ісінгіш топырақтардың орнықтылығын зерттеу әдістері**

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**Реферат:** Бұл мақалада Алматының сейсмикалық жағдайларына байланысты ғимараттар мен басқа да құрылыстарды жобалауда, салуда топырақтың сапасына мән беру және ісінгіш топырақтарда орындалуы тиіс жұмыстар көрсетілген.

**Кілт сөздер:** жер сілкінісі, сейсмикалық коэффициенттер, ісінгіш топырақ, қауіпсіздік коэффициенті, сейсмикалық аумақ

**Волластониттин кристаллдарынын морфологиясы,  
гранулометриялык курамынын анын негизиндеги керамиканы  
алуудагы синтеринг кинетикасына таасири**

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**Abstract:** Волластонит - бул баалуу, кээде уникалдуу, физикалык-химиялык, физико-механикалык жана жылуулук касиеттеринин комплекси бар материал. Бул спецификалык өзгөчөлүктөр минералдын ички түзүлүшүнө жана анын кристаллдарынын ийне сымал формасына байланыштуу. Волластониттин маанилүү технологиялык касиеттери анын уулуу эместиги, жарылуучу эместиги, күйбөгөндүгү, бөлүнүп чыккан зыяндуу аралашмалардын жоктугу. Бул изилдөөлөрдүн максаты волластониттин кристаллдарынын морфологиясы, гранулометриялык курамынын анын негизиндеги керамиканы алуудагы синтеринг кинетикасына таасирин аныктоо болгон. Жүргүзүлгөн изилдөөлөр көрсөткөндөй, волластониттин майда жана орто фракцияларынын массаларынын синтеринг кинетикасы сфералык бөлүкчөлөр үчүн дал келет. Бирок, узун ийнелери бар волластонит фракциялары үчүн синтеринг кинетикасы бир кыйла айырмаланат. Үлгүнүн структурасында туш келди багытталган ири кристаллдарды тыгыздоо процесси бир калыпта эмес, ал кичирейүүнүн күйүү температурасына түз сызыктуу көз карандылыгында чагылдырылат. Ошентип, керамикалык массалардын курамында эквиваленттүү эмес кристаллдарды колдонууда, күйгүзүүдө продуктулардын кичирейишин алдын-ала айтуу үчүн, кристаллдык фазанын фракциялык курамын эске алуу керек.

**Keywords:** волластонит, кинетика, кристалл, морфология, гранулометриялык анализ

## **Calcite (CaCO<sub>3</sub>) Mining in Turkey and Industrial Importance of Niğde Region Calcites**

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**Abstract:** The mining sector has a special importance in terms of creating jobs, meeting energy needs, encouraging service, manufacturing and subsidiary industries, highlighting regional development and providing foreign currency to the country. This issue also applies to calcite mining. Technological advantages (hardness, strength, toughness, whiteness, etc.) where is used together with its cheapness and being a natural mineral as mineral filler in various industries such as paint, paper, plastic makes it more and more important every day. On the other hand, in the world, it is produced approximately 90 types of ores while about 60 kinds of ores are produced in our country. According to the data of the General Directorate of Mineral Research and Exploration (MTA), as of 2015, our country, which ranks 28th among 132 countries in the world with total mineral production, ranks 10th in terms of mineral diversity. In this study; both chemical analysis (XRF) and color (whiteness) measurement results on calcite samples obtained from various regions of our country show that the chemical purity and whiteness of the calcite sample in the Niğde region is the highest.

**Keywords:** Mining, Calcite, Mineral filler, Purity, Whiteness

## **Vibrating Mills Used in Mineral Industry and Applications**

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**Abstract:** Vibratory mills can be used for fine and ultrafine grinding, colloidal grinding and obtaining different products such as nanopowders and metallic nanostructures. These mills are easy to operate, low energy consumption, high energy efficiency for fine grinding and low initial investment cost. However, increased maintenance costs arise due to the negative effects of vibration on the environment, expensive anti-vibration isolation measures, high noise during operation (up to 90-120 dB), capacity problems (grinding over 5 tons/hour causes a problem, fine grinding efficiency decreases) and malfunctions in mechanical parts.

**Keywords:** Mineral industry, Fine grinding, Grinding media, Vibratory mill, Wear

## **Atık Yumurta Kabuğunun Değerli Ve Kullanılabilir Ürünlere Dönüştürülebilirliği**

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**Özet:** Son yıllarda, yeryüzünde yaygın bir şekilde tüketilen yumurta kabuğu atığının oluşturduğu çevre kirliliğini azaltmak ve doğal kaynakların korunması sağlamak amacıyla geri dönüşümün önemi gün geçtikçe daha da artmaktadır. Sanayileşmenin çok hızlı gelişmesi, doğal kaynakların tüketilmesine ve doğal kaynakların yerine ikame olarak kullanılabilecek yeni malzemelere ihtiyaç duyulmasına neden olmuştur. Farklı kaynak araştırma çalışmaları neticesinde endüstriyel ve evsel atıkların geri dönüşümü önem kazanmış ve bu konuda araştırmalar sürdürülmüştür. Endüstride boyalar, kâğıt kaplamada kullanılan malzemeler, yapıştırıcılar, dolgu maddeleri, baskıda kullanılan mürekkepler, plastikler gibi birden çok alanda mikronize ürünlere duyulan ihtiyacın her geçen gün daha da arttığı düşünüldüğünde doğal kaynakların korunması için geleneksel malzemelere nazaran daha ekonomik ve daha iyi mekanik özelliklerde alternatif bir biyo-dolgu malzemesi üretme konusu oldukça önemli bir durum haline gelmiştir.

**Anahtar Kelimeler:** Yumurta kabuğu, Atık, Geri dönüşüm, Biyo-dolgu, Kompozit malzeme

## **Flood Monitoring and Detection using NdwI and Ndvi Derived from PlanetScope Data**

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**Abstract:** Flood is one of the most common natural disasters in the world. With the help of remote sensing data, flood areas can be determined quickly and easily. In this study, Normalized Difference Water Index (NDWI) and Normalized Plant Index (NDVI) were used to determine flood areas in a branch of the Missouri River in the United States. Flood affected areas were determined by object-based classification method using five recent Planet satellite imagery. In the study, a comparison was made before and after the flood using 5 Planet satellite images taken on September 10-14-18-23-30 in 2019. It was determined how much the study area was affected by the flood.

**Keywords:** Flood, NDWI, NDVI, PlanetScope

## Features Influencing Land Value Forecasting and Differences Between Value Maps According to MRA Method

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**Abstract:** Real estate valuation has an important place for the economies of both Turkey and the countries of the world. Creating a system of value estimation and value maps with the features that affect the value of the lands created as a result of the increasing population will provide a more orderly and fair implementation. In the study, model verification of 6 different combinations of 105 land values and 25 different features from Saraçoğlu District within the borders of Karatay / Konya region, was carried out by multiple regression analysis. The results and market values of the models with the most successful feature group were mapped with the Geographical Information System (GIS). Difference maps were created with the map result of the values in the market conditions of the maps created from the models. It was concluded that the high number of real estate features was a factor in the value estimation, but 12 land features between model-1 and model-6 did not affect the success very much.

**Keywords:** Real estate valuation, Feature reduction, Mass real estate valuation, Value map

## **Covid-19 Salgın Döneminde İşletmeler İçin Ulaşım Ağında Uygun Tesis Yer Seçimi Analizi: Kargo Örneği**

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**Özet:** COVID-19 salgın döneminde, insan hareketliliğinin azaltılmasına yönelik çeşitli önlemlerin alınmasıyla birlikte internet üzerinden sipariş talebi artmış; yemek servisinden market alışverişine, kargo hizmetlerinden su siparişine kadar birçok hizmet çeşitli işletmeler tarafından kurye taşımacılığı ile yürütülmeye başlamıştır. Hizmetin müşteriye en kısa sürede ulaştırılması için ilgili işletmelerin tesis yeri seçimi ve en uygun konumun belirlenmesi ihtiyacı ortaya çıkmıştır. Bu anlamda, Coğrafi Bilgi Sistemleri (CBS) tekniklerini kullanarak ulaşım ağında işyeri-müşteri arasında erişim süresine, tesis sayısına, hizmet alanına ve talep karşılamasına göre analiz yapılabilmektedir. Bu çalışmada, İstanbul ili Pendik ilçesindeki örnek uygulama ile mevcut kargo şirketlerinin konumları üzerinden CBS ortamında ağ tabanlı yer seçimi (Location-Allocation) analizi gerçekleştirilmiştir. Kargo şirketlerinin çalışma bölgesi içerisindeki 5 ve 10 dakika süre içerisinde mevcut talebi karşılama durumları tespit edilerek, hızlı ve etkili hizmet sağlamak için 4 yeni kargo şirketi yeri önerilmiştir.

**Anahtar Kelimeler:** Coğrafi Bilgi Sistemleri (CBS), Ağ (Network) Analizleri, Konum tahsis (Location-Allocation) Analizi, Sürdürülebilir kent hizmetleri

## Doğu Karadeniz Havzasının Ortalama Yağış Yüksekliği

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**Özet:** Drenaj havzalarında yağış yüksekliğinin belirlenmesi, havzaların su potansiyellerinin hesaplanmasında oldukça önem arz etmektedir. Bilindiği üzere yağış, mekânsal ve zamansal olarak farklılık gösteren meteorolojik bir olaydır. Yağışın, bölgeden bölgeye değişiklik gösteren eğim, bakı ve özellikle yükseklik artışına bağlı olarak değişkenlik özelliği gösteren bir yapısı bulunmaktadır. Yağış yüksekliğinin hesaplanmasında farklı yöntemler/yaklaşımlar kullanılmaktadır. Meteoroloji gözlem ağının yatayda ve dikeyde yetersiz ve heterojen dağılımı yıllık ortalama toplam yağış yüksekliğinin tam olarak belirlenmesini zorlaştırmaktadır. Türkiye'nin kuzeydoğu bölümünde yer alan Doğu Karadeniz Drenaj Havzasının (DKDH) ortalama yağış yüksekliğini Coğrafi Bilgi Sistemleri'nden (CBS) yararlanılarak hesaplanmıştır. Ölçüm istasyon değerleri CBS ortamında oluşturulan 0.005 derecelik noktalar oluşturulmuş ve bu noktaların yağış değerleri Schreiber (1904) eşitliğinden yararlanılarak en yakın istasyon değerinden hesaplanmıştır. Elde edilen yağışlardan da yararlanılarak Thiessen Poligonu yöntemi ile havzanın ortalama yağış yüksekliği 1961 mm olarak hesaplanmıştır. Ayrıca, oluşturulan noktaların yağış değerleri kullanılarak jeoistatistik kullanarak yağış dağılım haritaları hazırlanmıştır. Jeoistatistik yöntemlerinden en iyi sonuç sırasıyla Radial Basis Functions (RMS=38,904), Kriging (RMS=39.084) ve Kernel Smoothing (RMS=39.596) yöntemleri vermiş olup sırasıyla ortalama yağış yükseklik değerleri ise 1961, 1962 ve 1961 mm olarak hesaplanmıştır. Sonuçlar dikkate alındığında DKDH gibi topoğrafyanın dik olduğu havzalarda 0.005 derecelik nokta atımı ve bu noktaların yağış yüksekliklerinin Schreiber (1904) eşitliği ile hesaplanması durumunda, Radial Basis Functions, Kriging ve Kernel Smoothing yöntemlerin kullanılarak yağış dağılım haritaları güvenle hazırlanabilir.

**Anahtar Kelimeler:** Yağış yüksekliği, Jeoistatistik, Schreiber eşitliği

# **MECHANICAL, METALLURGICAL, AND MATERIALS ENGINEERING**

## Spinor Dynamics in Pristine and Mn<sup>2+</sup> Doped CsPbBr<sub>3</sub> NC: Role of Spin-Orbit Coupling in Ground and Excited State Dynamics

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**Abstract:** Fully inorganic lead halide perovskite nanocrystals (NCs) are of interest for optoelectronic and light emitting devices due to their photoluminescence (PL) emission properties which can be tuned/optimized by (I) surface passivation and (II) doping. (I) Surface passivation of the NC affects PL capabilities, as an under-passivated surface can introduce trap states which reduces PL quantum yields (QY). (II) Doping NCs and quantum dots (QDs) with transition metal ions provides stable optical transitions. Doping perovskite NCs with Mn<sup>2+</sup> ions provides high intensity 4T<sub>1</sub> → 6A<sub>1</sub> optical transitions in addition to the bright, intrinsic NC emission. Here we use Density Functional Theory (DFT) to investigate the roles of surface passivation and doping on PL emission stability of perovskite NCs. Two models are investigated: (i) a pristine NC (Cs<sub>8</sub>Pb<sub>27</sub>Br<sub>54</sub>) terminated with 48 amines and 54 carboxylic acids with overall charge 2+ (ii) a NC doped with Mn<sup>2+</sup> ion (Cs<sub>8</sub>Pb<sub>26</sub>Mn<sub>1</sub>Br<sub>54</sub>) terminated with the same ligands and charge. The Mn<sup>2+</sup> ion substitutionally replaced a Pb<sup>2+</sup> placing it in an octahedral Br<sup>-</sup> ligand field. Ground state electronic structure was determined using non-collinear spin DFT with PBE functional in a plane-wave basis set along with PAW pseudopotentials in VASP software. We include spin-orbit coupling into ground-state and excited-state dynamics to allow ‘spin-forbidden’ transitions. Spinor Kohn-Sham orbitals (SKSOs) are used to generate non-adiabatic couplings needed to describe non-radiative relaxation of photo-excited states. Spin-flip transitions are inferred from changes in magnetization during excited-state trajectory. SKSOs are also used to generate oscillator strengths, which determine radiative relaxations rates, to generate time-resolved and time-integrated PL emission. It was found that non-collinear spin basis with spin-orbit coupling slows down hole relaxation in the doped NC by two orders of magnitude compared to spin-polarized basis. This is attributed to ‘spin-flip’ transition from the perovskite NC to the Mn<sup>2+</sup> dopant and low-probability non-radiative d-d transition.

**Keywords:** Non-equilibrium charge dynamics, Doping, Computer modeling

## **An Evaluation of Fuel Cell Electric Vechile Application for Electric Grid Support**

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**Abstract:** The importance of the electric energy usage has been coming into prominence day by day with the reduction of the fossil fuels. Especially, the consumption rate of electricity increases in recent years by the growing number of battery electric vechiles. The battery electric vechiles draw high current from the electric network during the grid connection. Thus, the electric grid suffers from the high current value drawn by the electric vechiles. Moreover, the electric grid has additional issues affecting its operation. Reactive power and overloading are some problems of the electric grid. On the other hand, fuel cell electric vechile, a type of the electric vechile, has gain popularity recently because of having benefits over battery electric vechile such as fast refueling, long distance and low maintance. In this study, an evaluation of the fuel cell electric vechile during the electric grid connection has been performed and conducted. Accordingly, fuel cell electric vechile has several advantages during the electric grid connection. The fuel cell electric vechile is also considered as a distributed electric source during overloading of the electric network. This shows that it can be used as an electric producer when it is connected to the electric grid. Furthermore, it can be utilised for reactive power compensation to support the electric grid and minimizing electric power losses.

**Keywords:** Fuel cell electric vechile, Electric grid connnection, Distributed source, Electric grid support

## **Determining Heat Transfer Coefficients of 0.08 mm, 0.1 mm Diameter Wires in Wind Tunnel**

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**Abstract:** In this study, it is aimed to determine the number of heat transfer for wires of different diameters for detailed research in parallel and cross flow using wind tunnel. These correlations were found experimentally by passing air over certain diameters of wires at laboratory. The wire diameters used in the experiment are 0.08 mm, 0.1 mm and air velocities are 1 m/s, 1.5 m/s, 2 m/s, 2.5 m/s, 3 m/s, 3.5 m/s, 4m/s, 4.5 m/s, 5 m/s. Wires of various diameters are placed in the wind tunnel. These wires are heated and the heat transfer coefficients with the specified air flows are found. A power supply was used for the heating operation. A multimeter was used to determine the voltage and current values and the resulting wire resistances were calculated. The power that given is equal to the total heat transfer that taken. Electrical power is equal to exertion on convection heat transfer and radiation heat transfer. The heat transfer coefficient is obtained from the formulas of convection heat transfer coefficient and radiative heat transfer coefficient. Fand-Keswani, Churchill, Hilpert correlations in the literature are used in cross-flow. Andrews, PEEK, Kesse Matsuo correlations were applied in calculations in parallel flow situations. In these experiments, they were also observed that the heat transfer coefficient change in the wires of different diameters takes place depending on the diameter. The results of the tests are detailed with formulas, tables and graphics. In summary, the heat transfer coefficients were found and their correlations were determined. Cooling has been modeled by these experiments.

**Keywords:** Convective heat Transfer coefficients, Parallel flow, Cross flow, Wind tunnel, Wire

## Self-Scheduling Controller Via Multi-Objective Optimization for Longitudinal Motion of Aircraft

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**Abstract:** In this paper, a novel gain-scheduling approach is investigated to overcome the performance and robustness limitations of the conventional gain scheduling method. This is accomplished by formulating the gain scheduling problem for different flight conditions of the aircraft in a multi-objective optimization problem framework that is then solved by the nondominated sorting genetic algorithm II (NSGA-II). The solutions for the multi-objective problem, known as Pareto-front approximation (PFA), are obtained based on minimizing the integral of time absolute error (IAE) at each flight condition as the objective function. Meanwhile, a new auto decision-maker method is proposed to find the optimal parameters of the self-scheduling controller, which is designed based on the classical PID and fractional order PID (FOPID) approaches from the calculated PFA according to the current flight condition. Dominance-based and the proposed new hybrid search approaches are considered as an attempt to provide a Pareto-front approximation with higher quality. The gain-scheduling controller is evaluated according to the quality of the nondominated optimal solutions and step response specifications at the selected flight conditions.

**Keywords:** Aircraft control, Self-Scheduling, Multi-Objective optimization, Genetic Algorithm, Fractional order PID

## Bir Minibüs Modelinde Aerodinamik Direncin Numerik Olarak İyileştirilmesi

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**Özet:** Otomotiv endüstrisinin ana çalışma konularından birisi sürüklenme katsayısını azaltmak için araç tasarımı ve aerodinamiğinin iyileştirilmesi olmuştur. Taşıtlara etki eden kuvvet ve momentlerin Hesaplamalı Akışkanlar Dinamiği (HAD) yöntemiyle tespit edilmesi taşıtın prototipini gerçek boyutlarında üretmeden zamandan ve maliyetten önemli avantaj sağlamaktadır. Bu çalışmada, SolidWorks programında tasarlanan bir karlık modeli bir minibüs modeli üzerine montajı yapılmış ve Ansys CFD yazılımında k-ε türbülans modeli kullanılarak üç boyutlu akış yapısı ve simülasyonu incelenmiştir. Numerik akış analizleri 20 m/s, 25 m/s, 30 m/s ve 35 m/s serbest akış hızlarında dinamik benzerlik şartının sağlanabildiği  $2.83 \times 10^5$ - $6.61 \times 10^5$  Reynolds sayısı aralığında gerçekleştirilmiştir. Kinematik benzerlik için blokaj oranı %5.34'dir. Karlık modeli montajı yapılan model aracın aerodinamik direnç katsayısı ortalama 0.352 olarak hesaplanmıştır. Taşıt ön yüzey bölgesinde basınç kaynaklı aerodinamik direnç iyileştirilmiş böylece CD katsayısında %15.19 iyileşme sağlanmıştır. Toplam sürüklenme kuvvetinin %88.71'i basınç kaynaklı, %11.29'nin ise sürtünme kaynaklı olduğu belirlenmiştir.

**Anahtar Kelimeler:** C<sub>D</sub> katsayısı, Hesaplamalı akışkanlar dinamiği, Aerodinamik, Sürüklenme kuvveti, k-ε türbülans modeli

## Cam küre ile dövülen AA7075 alaşımının mekanik ve yüzey özelliklerinin incelenmesi

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**Özet:** Bu çalışmada, endüstriyel uygulamalarda sıklıkla kullanılan AA7075-T6 alüminyum alaşımının cam küre ile dövülmesi sonucu mekanik ve yüzey özelliklerinin bilya boyutu ve püskürtme basıncına bağlı olarak değişimi incelenmiştir. AA7075-T6 malzeme 70-110 µm (G10) ve 300-400 µm (G35) çaplarında iki farklı boyutta cam küre ve iki farklı dövme basıncı (2 ve 7 bar) kullanılarak dövülmüştür. Bilyalı dövme işlemleri sonrası kütle kaybı, kesit sertliği ve yüzey morfolojisi incelenmiştir. İncelemeler sonucunda düşük basınçta (2 bar) her iki cam küre boyutu için oldukça sınırlı kütle artışı 2 mg, yüksek basınçta (7 bar) ise kütle kaybı 9 mg (G10) ve 32 mg (G35) gerçekleşmiştir. Yüzey pürüzlülüğünün düşük basınçta 6 kata, yüksek basınçta ise 26 kata kadar arttığı tespit edilmiştir. Derinliğe bağlı kesit sertliğinin düşük basınçta her iki cam küre boyutunda belirgin olarak değişmediği; yüksek basınçta ise G10 için %8-10, G35 için ise %10-15 arası sertlik artışı gerçekleştiği belirlenmiştir. Etkin sertlik derinliğinin G10 için 500 µm, G35 içinse 300 µm derinliğe kadar olduğu belirlenmiştir. Bu çalışma sonucunda, bilyalı dövme işlem parametrelerinin AA7075 alaşımının yüzey pürüzlülüğü, kesit sertliği ve kütle kaybına etkileri anlaşılmış ve AA7075 alaşımının mekanik özelliklerinin geliştirilmesi için işlem parametrelerinin optimizasyonu ortaya koymuştur.

**Anahtar Kelimeler:** Bilyalı dövme, cam küre, kesit sertliği, yüzey morfolojisi, yüzey pürüzlülüğü

## **Assessment of Natural Gas Based Trigeneration System for Automotive Industry: Energy and Economic Analysis**

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**Abstract:** In this paper, a trigeneration system that can meet the electricity, heating, and cooling needs of a factory in Bursa is introduced. The trigeneration system consists of a gas engine to produce electrical power, a single effect absorption chiller that uses LiBr/H<sub>2</sub>O as a working fluid for process cooling, and heat exchangers for heating. In this facility application, the investment and operating costs of the trigeneration system were determined, system feasibility was made, and payback periods in 3 different shifts were determined for alternative scenarios. For scenario 1; the payback period is 3,58 years, 5,47 years, 11,57 years, and for scenario 2; it is 10,47 years, 16,57 years, 39,72 years, respectively, when the factory operates in 3, 2, and 1 shift.

**Keywords:** Energy, Trigeneration, CCHP, Absorption cooling systems, Waste heat recovery

## Seramik Yapıştırıcılarda Dolgu Malzemesi Olarak Perlitin Kullanılabilirliğinin Araştırılması

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**Özet:** Bu çalışmada; çimento esaslı seramik-fayans yapıştırıcılarda alternatif dolgu malzemesi olarak ham perlitin kullanılması araştırılmıştır. Yapı kimyasalları sektöründe özellikle kolay temin edilebilirliği ve ucuzluğu dolayısıyla dolgu malzemesi olarak genellikle mikronize kalsit ( $\text{CaCO}_3$ ) kullanılmaktadır. Öte yandan, ham perlit dünya rezervinin yaklaşık %70'i Türkiye'de bulunmakta olup, bu hammaddeyi yapı kimyasalları üretiminde ikame dolgu malzemesi olarak kullanılması önem taşımaktadır. Laboratuvar ölçeğinde gerçekleştirilen deneysel çalışmalarda, aynı fiziksel özelliklere sahip kalsit dolgulu seramik yapıştırıcı ile perlit dolgulu seramik yapıştırıcılarının performans değerleri (basınç ve eğilme-çekme dayanımı) karşılaştırılmıştır. Kalsit dolgulu seramik yapıştırıcıya kıyasla perlit dolgulu numuneler sırasıyla, 7 ve 28 günlük basınç dayanımında %31.6 ve %4.7'lik bir artış göstermiş, eğilmede çekme dayanımlarında ise %8.1 ve %21.7'lik bir azalma olduğu görülmüştür. Perlitli numunelerin ortalama birim hacim ağırlığının %4.8, su emme oranının %14.4, porozitesinin ise %18.9 azaldığı tespit edilmiştir.

**Anahtar Kelimeler:** Perlit, Kalsit, Seramik yapıştırıcı, Dolgu malzemesi, Dayanım

## **Effect of Pressure Increase Rate and Threshold Speed Parameters to Static Friction Forces in Pneumatic Cylinders**

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**Abstract:** In this study, the effect of pressure increase rate and threshold speed parameters on the maximum static friction forces in pneumatic cylinders' onset of motion was investigated. In order to investigate the effect of these two parameters, a series of experiments at different pressure increase rate and threshold speed values were carried out on a pneumatic cylinder in real time with MATLAB/Simulink. In these experiments, an incremental pressure starting from zero was applied to the relevant pressure chamber of the pneumatic cylinder by means of a pressure regulating valve, and the instant of the first movement was accepted as the point where the determined threshold speed was first exceeded. These two determinative parameters with different values were selected and tested. The results of the experiments shown that the pneumatic cylinder has different friction force values. When the data obtained were examined, it was seen that the pressure increase rate applied to the pressure chambers had a considerable effect on the static friction force value and the threshold speed parameter slightly affected the static friction force results. As a result of this study, it is clearly understood that in calculating the static friction force of pneumatic cylinders, the pressure increase rate and the threshold speed values should also be taken into account.

**Keywords:** Static friction force, pneumatic cylinder, MATLAB/Simulink

## **Evaluation of Cracking Pressure Ratio at Proportional Directional Control Valves for Different Valve Control Signals and Supply Pressures**

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**Abstract:** In this study, the determination of cracking pressure ratio which is important in pneumatic proportional directional control valves was discussed. MPYE-5 series proportional directional control valve, widely used in precision pneumatic control applications, was examined at different valve control signals and supply pressures, and the cracking pressure ratio parameter was mapped depending on these two different operating conditions. In order to quickly determine cracking pressure ratio, the valve parameter determination methods mentioned in previous studies were automated and the cracking pressure ratio value was determined quickly. As a result of the study, it has been suggested that the valve has quite different cracking pressure ratio values in small valve openings (close to the middle position) and this variability should be taken into account in precision control applications. In addition, it has been concluded that the supply pressure also affects the cracking pressure ratio value. The results obtained have been presented graphically and these results have been intended to be a reference for future pneumatic precision control applications.

**Keywords:** Pneumatics, Proportional directional control valve, Cracking pressure ratio

## Kürlenme İşleminin Kompozit Yapıların Doğal Frekansı Üzerine Etkisi

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**Özet:** Kompozit malzemeler uzay ve savunma sektörlerinde sıklıkla tercih edilirler. Bu tür yapılar için çok sayıda üretim metodu geliştirilmiştir. Filaman sargı metodu ile çalışmaya konu olan silindirik yapılar üretilir. Sarım düzeni parçadan beklenen mekanik özellikleri sağlamada büyük önem taşır. Matrisi oluşturan reçine ve fiber belirlenen sarım düzeninde sarıldıktan sonra ısıtılma işlemine tabi tutulur. Bu işlem reçineyi oluşturan polimerlerin arasındaki kimyasalların oluşumu için gereklidir. Bu çalışmada fiber takviyeli kompozitlerin kürlenme sıcaklıklarının oluşan yapının doğal frekansı üzerine etkisinin belirlenmesi amaçlanmıştır. Cam fiber ve epoksi reçine kullanılarak filaman sargı tekniği ile numuneler üretilmiştir. Kürlenme sıcaklığı parametresi için üreticinin önerdiği sıcaklık zaman döngüsü referans alınmıştır. Referans sıcaklığın alt ve üst seviyeleri kullanılarak kürlenme işlemleri yapılmıştır. Üretilen numuneler iki ucu serbest olacak şekilde test düzeneğine asılmıştır. Birim impuls verilerek doğal frekansları tespit edilmiştir. En yüksek doğal frekansa üreticinin belirlediği referans sıcaklıkta kürlenen ürünlerin sahip olduğu gözlemlenmiştir.

**Anahtar Kelimeler:** Doğal frekans, Reçine, Kompozit, Filaman sarım, Kürlenme

## Electrochemical Deposition and Characterization of Polyaniline/Graphene Oxide-Polyaniline Composite Films on Pt-Ir Electrode

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**Abstract:** In this study, the electrochemical deposition and characterization of polyaniline/graphene oxide-polyaniline (PANI/GO-PANI) composite films on Pt-Ir electrode was investigated. Graphene oxide (GO) was synthesized by modified Hummers method from pure graphite powder and dried in oven at 60°C for 24 hours to obtain GO powder. 4 mg/mL GO powder was ultrasonicated in 0.5 M H<sub>2</sub>SO<sub>4</sub> prior to electrochemical deposition. Pt-Ir electrodes (Dr. Wieland, Germany) were used as anode and cathode material. 0.4 M aniline and 4 mg/mL GO in 0.5 M H<sub>2</sub>SO<sub>4</sub> were electrolyzed for 6 hours under direct current at a potential value of +0.75V. The coating on Pt-Ir was dried at room temperature for 24 hours. Then PANI was electrochemically deposited on GO-PANI/Pt-Ir composite material at +0.75V with 1 M aniline in 0.5 M H<sub>2</sub>SO<sub>4</sub> solution. Finally PANI/GO-PANI composite film on Pt-Ir electrode was obtained after drying at room temperature for 24 hours. PANI/GO-PANI composite films were characterized using FTIR, SEM and XRD.

**Keywords:** Electrochemical deposition, Graphene oxide, Polyaniline, Pt-Ir electrode, PANI/GO-PANI.

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## **PHYSICS-MATHEMATICS**

## **Асимптотическое разложение возмущенного решения общей трехточечной краевой задачи для линейных дифференциальных уравнений второго порядка**

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**Аннотация.** В данной работе рассматривается сингулярно возмущенная трехточечная общая полувыврождающаяся краевая задача для обыкновенного дифференциального уравнения второго порядка. Используя метод К.А. Касымова, Д.Н. Нургабыл строится аналитическое представление решения рассматриваемой краевой задачи. На основе этого представления формулируется невозмущенная задача, доказывается предельный переход решения исходной задачи к решению невозмущенной задачи, устанавливается рост производной решения рассматриваемой задачи, условие возникновения явления начального скачка, асимптотическое поведение искомого решения исследуемой задачи при  $\varepsilon \rightarrow 0$ . Найдена величина начального скачка.

**Ключевые слова:** краевая задача, возмущение, малый параметр, вырожденная задача, начальный скачок

## The Role Of Audits In Improvement Of Quality In Radiotherapy

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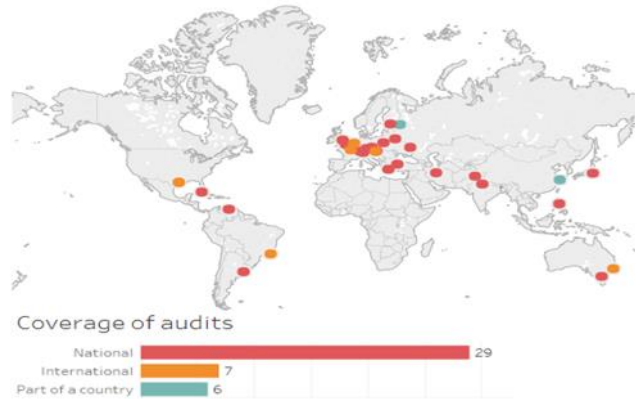
**Abstract:** Many governments around the world invest in radiotherapy equipment, as since many years there is a steady growth in number of cancer cases. Over 80% of radiotherapy equipment registered in IAEA hosted Directory of Radiotherapy Centres (DIRAC) database are linear accelerators. More and more machines in low and middle-income countries are able to deliver high precision radiotherapy, such as stereotactic radiotherapy (SRT) and intensity modulated radiotherapy (IMRT). However, the development of dedicated audit methodologies suitable for these complex radiation treatment techniques have not been addressed accordingly in these countries. Currently, there is still deficient access of radiotherapy centres to the audits although it has proven to be very effective in identifying problems in clinical dosimetry. A medical physicist with support from an audit group can find the cause of the problems and resolve them. Dosimetry audits have been recommended by several international organisations as a necessary component of ensuring the safety of medical radiation uses.

An audit verifies that activities relating to the dose determination, planning and delivery do ensure that patients receive the intended doses. Participation in audits leads to improved practices resulting in increased accuracy of dosimetry in a radiotherapy centre. Another benefits include: independent review of methods, procedures, processes and data, by assessing effectiveness and functioning of the overall approach. Participation in audits can result in reduced uncertainties and in increased accuracy and consistency of radiotherapy dosimetry among centres. When new and complex technologies are introduced at the radiotherapy centre, an audit can support and give confidence during that process. With increasing complexity of treatments which can produce more focussed radiotherapy treatment, the QA methods should also reflect the same complexity. Therefore, the gradual development and extension of the scope of dosimetry audits, from single beam in reference conditions initially, to checking more parameters of dosimetry, complex irradiations, combined beams, treatment planning, equipment performance, new technology, etc. continues to increase the potential benefits.

There is a wide range of different practices of quality audits in radiotherapy, either reviewing the whole radiotherapy procedure or specific critical parts of it. Audits can be focused on basic dosimetry in reference conditions or extended to non-reference conditions where output for the asymmetric, wedged, oblique, MLC shaped, and large open fields can be checked. Profiles for open and wedged fields as well as percent depth doses are also often a part of the audit. There are also tests including the MLC transmission, leaf gap dosimetry and MLC positioning accuracy. Some audits are focused on Treatment Planning System (TPS) calculations for complex beam geometries such as 3-D conformal techniques or IMRT. Such audits are performed using semi-anthropomorphic and anthropomorphic phantoms.

More detailed information is available in recently published summary of worldwide auditing activities. The most up to date data can also be found on the DAN website. In accordance with the data collected in 2017, 45 institutions in 39 countries provide audits in radiotherapy. As it can be seen in Figure 1 most of them operate nationally and seven organisations offer audits on international scale. The IAEA

jointly with the World Health Organization (WHO) delivers audits to radiotherapy centres in 60–70 countries per year, the Imaging and Radiation Oncology Core (IROC) Houston QA Centre together with the Radiation Dosimetry Service (RDS) also based in Houston, USA, in 60 countries and the EQUAL-ESTRO, Villejuif, France, in 40 countries. DAN services are reported annually.



**Figure 1.** Status of Dosimetry Audit Networks in 2017.

There are countries where the national regulations require participation in an audit, but in many countries radiotherapy centres participate voluntarily. Hospitals usually participate in auditing activities on regular basis, every 1-2 years, however some DANs offer audits less frequently and some only by request. Most often audits concentrate on the dose delivered by high energy photon and electron beams with some extending the scope to brachytherapy, kV X-rays, and more specific types of equipment such as CyberKnife, TomoTherapy, GammaKnife or Intraoperative Radiation Therapy (IORT) machines. There are also three organizations which provide audit service for proton facilities.

Audits can be either remote or on-site based depending on the local arrangements and resources as well as the audit complexity. Different dosimeter types are used for the various types of audits. The typical dosimeters used for audits in reference conditions by 45 different DANs are listed in Table 1. Several additional dosimeters are in use by different DANs, for example detector arrays are in use for advanced TPS audits where dose distributions are measured. Also, alanine, diode or diamond are listed as dosimeters of choice by some DANs.

**Table 1. Dosimeter types used for audits in reference conditions.**

Dosimeter type	On-site audits	Remote audits
<b>Ionisation Chamber</b>	25	4
<b>Well type chamber</b>	5	-
<b>Film</b>	2	-
<b>TLD</b>	4	17
<b>OSLD</b>	1	3
<b>RPLD</b>	-	3

**Keywords:** Audits, Dosimetry, Stereotactic radiotherapy, Intensity modulated radiotherapy.

## Investigation of Neutron Deficient Nuclei Alpha Decay Half-Lives

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**Abstract:** In the present study, the alpha decay half-lives of the neutron deficient nuclei have been investigated within a range of atomic number between  $80 \leq Z \leq 120$ . In the calculations Wentzel-Kramers-Brillouin approximation and some semi empirical expressions have been used. Obtained results have been compared with the experimental data and to reduce the rms value, very recently proposed preformation factor formula [1] has been applied to WKB mechanism. Besides, not only experimentally confirmed half-lives but also unmeasured alpha decay half-lives for the nuclei  $80 \leq Z \leq 120$  have been studied. For the unmeasured  $Q_\alpha$  values, mass excess values have been extracted from the WS4+RBF mass excess table [2].

**Keywords:** Alpha-decay, Neutron deficient nuclei

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## Роль физического вакуума в инфляционной модели Вселенной

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**Abstract:** Рассматривается инфляционная модель Вселенной. На основе этой модели показана роль физического вакуума в исследовании свойств и строения Вселенной. Изучение вакуума, его структуры, построение моделей вакуума – перспективное направление в изучении космологических проблем.

Цель данной статьи продемонстрировать, как рассмотрение вакуума и происходящих в нем процессов, может пролить свет на ранний этап формирования Вселенной в рамках инфляционной модели (ИМ). Показано, что космическая инфляция согласно инфляционной теории осуществляется в три этапа, в которой происходит переход ложного вакуума в истинный.

Делается вывод из теории, что свойства элементарных частиц могут значительно отличаться в разных вакуумных состояниях. Из анализа ИМ сделан вывод о том, что изучение вакуума и его свойств является перспективным направлением.

**Keywords:** физический вакуум, Вселенная, инфляционная модель, истинный вакуум, ложный вакуум.

## Study of cosmic rays using the Hadron 55 facility

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**Abstract:** Quite often forgotten that particle physics has originated from cosmic ray physics. After splendid results of particle physics thanks to accelerator technique advances we are again witnessing some interest to super high energy cosmic ray studies due to some new effects observed at energy range above 10<sup>15</sup> eV which are hard to explain within the conventional processes governed by Standard Model. These new phenomena observed in cosmic ray experiments can be accounted for by production of new particles or by new interaction mechanisms. Besides, high energy cosmic ray flux at energies above 10<sup>15</sup> eV may probably contain unusual particles, e.g., strangelets, which could give rise to the abnormal phenomena observed in cosmic ray experiments but are absent or could not be detected in accelerator experiments due to their properties. Any years ago started a new cosmic ray experiment at the Tien Shan High Mountain Research Station (TSRS) located at an altitude of 3340 m above sea level 45 km far from Almaty city where we have assembled a new HADRON-55 hybrid setup consisting of a two-storey coordinate scintillation-ionization calorimeter (CSIC) of 55 m<sup>2</sup> in area and a dense array of scintillation detectors which cover the calorimeter itself as well as the adjacent territory.

**Keywords:** Cosmic rays, HADRON, Interaction, Energy, Particle

## **Geoacoustic emission during the passage through the earth's crust of high-energy cosmic ray muons**

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**Abstract:** The unresolved problem of traditional seismology to date is the separation from the stream of information recorded by numerous seismic sensors of a strictly defined signal about the approach of a catastrophic earthquake specific in time and space. Such a signal is usually lost against a constant background from a large number. At the turn of the 1980s and 1990s, scientists from the Physics Institute and the Institute of Physics of the Earth developed a preliminary concept for a new promising direction in seismology. Using the signal from elastic vibrations in the acoustic frequency range for earthquake prediction. These signals can be generated by ionization. Ionization is formed at the moment of the passage of high-energy muons through a seismically stressed medium in the deep layers of the earth's crust.

**Keywords:** Acoustic emission, Muons, Seismology, Earth, Cosmic rays, Microphon

## Approximate Solution of The Nonlinear Second-Order Differential Equations with Derivatives With Respect to an Increasing Function

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**Abstract:** In this paper, we consider the Cauchy problem for a second-order nonlinear differential equations with derivatives with respect to an increasing function:

$$u''_{\varphi(t)}(t) = p(t)u'_{\varphi(t)}(t) + F(t, u(t)) + g(t), \quad (t, u) \in [t_0, T] \times \mathbb{R} \quad (1)$$

$$u(t_0) = \alpha, \quad u'_{\varphi}(t_0) = \beta, \quad \varphi(t_0) = 0, \quad (2)$$

where  $\varphi(t)$  is a given strictly increasing continuous function on  $[t_0, T]$ ,  $g(t), p(t) \in C[t_0, T]$  and  $F(t, u(t))$  is a given continuous function, and  $u(t)$  is the sought function on  $[t_0, T]$ .

To solve the (1)-(2) Cauchy problem, first, we reduce this equation to the nonlinear Volterra-Stieltjes integral equation of the second kind

$$u(t) = \int_{t_0}^t p(s)u(s)d\varphi(s) + \int_{t_0}^t [\varphi(t) - \varphi(s)][F(s, u(s)) - p'_{\varphi}(s)u(s)]d\varphi(s) + f(t), \quad t \in [t_0, T] \quad (3)$$

The integral equation (3) is solved with an approximation by the generalized trapezoid rule. The solution of the integral equation (3) will be the approximate solution of the (1)-(2) Cauchy problem.

**Keywords:** Generalized trapezoid rule, nonlinear second-order differential equation, Volterra-Stieltjes integral equation of the second kind, the derivative with respect to an increasing function.

## System of parabolic equations with a power boundary layer

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**Abstract:** The work is devoted to the construction of the asymptotics of the solution of a singularly perturbed system of equations of parabolic type in the case when the limiting equation has a regular singularity as a small parameter tends to zero. The asymptotics of the solution of such problems contains power and parabolic boundary layer functions.

In this paper, we study a system of  $n$  parabolic equations, when the matrix-function stands at the second derivative and the small parameter is contained by the coefficient at the time derivative. The presence of a matrix factor complicates the structure of the asymptotic solution, namely,  $2n$  parabolic,  $n$  power and angle boundary layer functions appear in the form of products of these boundary layer functions.

Consider the first boundary value problem

$$L_\varepsilon u \equiv (\varepsilon + t)\partial_t u - \varepsilon^2 A(x)\partial_x^2 u - D(t)u = f(x, t), \quad (x, t) \in \Omega$$

$$u(x, 0, \varepsilon) = 0, \quad u(0, t, \varepsilon) = u(1, t, \varepsilon) = 0,$$

where  $\Omega = (0, 1) \times (0, T]$ ,  $\varepsilon > 0$  is small parametre,  $u = u(x, t, \varepsilon) = \text{col}(u_1(x, t, \varepsilon), u_2(x, t, \varepsilon), \dots, u_n(x, t, \varepsilon))$ .

We introduce regularizing variables

$$\xi_{i,l} = \frac{\varphi_{i,l}(x)}{\sqrt{\varepsilon^3}}, \quad \varphi_{i,l}(x) = (-1)^{l-1} \int_{l-1}^x \frac{ds}{\sqrt{\lambda_i(s)}}, \quad l = 1, 2, i = \overline{1, n}, \quad \tau = \frac{1}{\varepsilon} \ln \left( \frac{t + \varepsilon}{\varepsilon} \right),$$

$$\mu_j = \beta_j(0) \ln \left( \frac{t + \varepsilon}{\varepsilon} \right) \equiv K_j(t, \varepsilon), \quad j = \overline{1, n},$$

and an extended function such that

$$\tilde{u}(M, \varepsilon)|_{\xi = \frac{\varphi(x)}{\varepsilon}} \equiv u(x, t, \varepsilon), \quad M = (x, t, \xi, \tau, \mu).$$

The problem obtained in this case, regular in a small parameter, is solved by the usual method of perturbation theory.

**Keywords:** System of parabolic equations, boundary layer, small parameter, regularizing variables, boundary layer function.

## Determination of RC circuit of calcite-doped hydrogels from dielectric plane plots

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**Abstract:** In this study, the suitability to an equivalent RC circuit of the samples obtained by doping the calcite molecules to pure hydrogels synthesized by the radical polymerization method at equal concentrations with two different processes was tested by impedance spectroscopy method. In this context, complex dielectric plane plots of calcite doped hydrogels produced by different processes were determined, and the suitability of these experimental data with dielectric relaxation models was tested. The dielectric plane plots of calcite-doped hydrogels were detected to be compatible with the Cole-Davidson relaxation model. To draw the equivalent circuit application of these Cole–Davidson plots, the resistance and series capacitance data of the samples were analyzed as a function of frequency in the frequency range of 100 Hz to 40 MHz. And besides, the evolution of surface resistivity with frequency, which significantly affecting the resistance values of calcite doped hydrogels was analysed as well. The polarization mechanisms that determine the charge transmission as a function of the frequency of the samples were analysed in detail. It was concluded from the experimental results obtained that calcite-doped hydrogels are an inspiring material for RC electrical circuit applications. In addition, it was determined that the calcite doping process had an effect on the resistance and capacitance values of the samples.

**Keywords:** Calcite, Hydrogels, Dielectric plane plots, RC Circuit, Cole-Davidson relaxation model

## Regularized asymptotics of the solution of systems of parabolic differential equations

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**Abstract:** The regularization method for singularly perturbed problems of S. A. Lomov is generalized to constructing the asymptotics of the solution of the first boundary value problem for systems of differential equations of parabolic type with a small parameter at all derivatives. It is shown that the asymptotics of the solution of the problem contains  $n$  exponential,  $2n$  parabolic, and  $2n$  angle boundary layer functions. The exponential boundary layer function describes the boundary layer along  $t = 0$ , the boundary layer along  $x = 0$  and  $x = 1$  is described by parabolic boundary layer functions.

Consider the problem:

$$L_\varepsilon u \equiv \varepsilon \partial_t u - \varepsilon^3 A(x) \partial_x^2 u - D(t)u = f(x, t), \quad (x, t) \in \Omega$$

$$u|_{t=0} = 0, \quad u|_{x=0} = u|_{x=1} = 0,$$

where  $\Omega = (0, 1) \times (0, T]$ ,  $\varepsilon > 0$  is small parametre,  $u = u(x, t, \varepsilon) = \text{col}(u_1(x, t, \varepsilon), u_2(x, t, \varepsilon), \dots, u_n(x, t, \varepsilon))$ .

By introducing regularizing variables:

$$\xi_{i,l} = \frac{\varphi_{i,l}(x)}{\varepsilon^2}, \quad \varphi_{i,l}(x) = (-1)^{l-1} \int_{l-1}^x \frac{ds}{\sqrt{\lambda_i(s)}}, \quad \tau_i = \frac{1}{\varepsilon} \int_0^t \mu_i(s) ds \equiv \frac{\alpha_i(t)}{\varepsilon}, \quad \eta = \frac{t}{\varepsilon^2},$$

$$l = 1, 2, \quad i = \overline{1, n},$$

and an extended function such that:

$$\tilde{u}(M, \varepsilon)|_{\chi=G(x,t,\varepsilon)} \equiv u(x, t, \varepsilon), \quad M = (x, t, \xi, \tau, \eta).$$

The extended problem is regular in a small parameter and is solved by the usual method of perturbation theory.

**Keywords:** Exponential boundary layer function, Parabolic boundary layer function, Angular boundary layer function, Small parameter, System of parabolic differential equations

## Method of Diophantus – al Khwarizmi: At the joint of ancient and modern time

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**Abstract:** It is known that in scientific works on the methodology of teaching mathematics, a special place is occupied by works devoted to the issue of teaching students to solve various mathematical problems, as well as problems of other sciences and practice using mathematical models. In the psycho-pedagogical and methodological literature there are many different aspects of the study of this urgent and difficult issue. The process of solving mathematical problems is divided into several interrelated stages, each of which is often an independent object of scientific research in the methods of teaching mathematics. For example, in his scientific works L. M. Fridman identifies eight stages, Y. M. Kolyagin - six, D. Poya - four stages. It can be noted that in all the sets of stages of solving a mathematical problem, a necessary and significant place is occupied by a stage that has an important heuristic, research component: a careful study of the formulation of the problem and finding an idea for its solution, identifying among several ways of solving this problem a shorter and simpler method of solving, search and implementation of new solutions.

In this paper, we construct a generalized algorithm for using a substitution, which is named after the outstanding mathematicians of antiquity Diophantus and Muhammad ibn Musa al- Khwarizmi. We consider examples of problems from geometry, algebra, economics, differential equations and cryptography. Their solutions are simplified by applying the Diophantus - al Khwarizmi method.

**Keywords:** Substitution of Diophantus - al Khwarizmi, quadratic equation, Transfer method, Problems of geometry, Algebra, economics, Differential equations, Cryptography

## Some family of integrable Riccati equations

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**Abstract:** The study of methods for solving linear ordinary differential equations of the first order, is occupied one of the central places in the initial course of ordinary differential equations. Usually, several methods for solving separable, linear, Bernoulli, Riccati ordinary differential equations are studied. In this paper, it is shown that all the above equations are special cases of a certain family of ordinary differential equations and, as consequence, can be solve by a uniform algorithm. On the base of this algorithm, a problem of integrability of some family Riccati equations are investigated.

**Keywords:** Ordinary differential equations of the first order, Linear equations, Bernoulli equations, Riccati equations, Separable ordinary differential equations, New method of solving

## On the Orthonormal Polynomials over a Contour of the Complex Plane

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**Abstract:** Let  $\mathbb{C}$  be a complex plane;  $L \subset \mathbb{C}$  be a closed rectifiable Jordan curve,  $G = \text{int}L$ , with  $0 \in G$ ,  $\Omega = \text{ext}L$ . Let  $h(z)$  nonnegative, summable on a  $L$  and nonzero except possible on a set of measure zero function. The systems of polynomials  $\{K_n(z)\}$ ,  $K_n(z) = a_n z^n + \dots$ ,  $\deg K_n = n$ ,  $n = 0, 1, 2, \dots$ , satisfying the condition

$$\int_L h(z) K_n(z) \overline{K_m(z)} |dz| = \begin{cases} 1, & n = m, \\ 0 & n \neq m, \end{cases}$$

Are called orthonormal polynomials for the pair  $(L, h)$ . These polynomials are determined uniquely if the coefficient  $a_n > 0$ . These polynomials were first studied by G.Szego [1]. V.I.Smirnov, P.P.Korovkin and Ya.L.Geronimus was investigated these polynomials under the various conditions on the weight function  $h(z)$  and contour  $L$ . P.K.Suetin [2] was investigated many properties of the polynomials  $K_n(z)$  for smooth contour and weight function  $h(z)$  which is zero or infinite at finite number points on contour  $L$  and obtain several estimates for the rate of growth of the polynomials  $K_n(z)$  on the contour  $L$  depending of the singularities of the weight function  $h(z)$  on  $L$  and of the contour  $L$ .

In this work, we continue work [3.4] to investigate the order of the height of the modulus of orthogonal polynomials over a contour with respect to the weighted Lebesgue space, where the contour and the weight function have some singularities at the finite number points on the contour.

**Keywords:** Orthonormal polynomials, Smooth curve, Quasiconformal curve

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## On the Behavior of the Derivative of Polynomials in Unbounded Regions of the Complex Plane

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**Abstract:** Let  $\mathbb{C}$  denote the complex plane and  $G \subset \mathbb{C}$  be a bounded Jordan region with boundary  $L := \partial G$ ,  $0 \in G$ ;  $\Omega := \text{ext} L$ ,  $\Delta := \{w : |w| > 1\}$ . Let  $w = \Phi(z)$  be the univalent conformal mapping of  $\Omega$  onto  $\Delta$  such that  $\Phi(\infty) = \infty$  and  $\lim_{z \rightarrow \infty} \frac{\Phi(z)}{z} > 0$ . For  $R > 1$ , we take  $L_R := \{z : |\Phi(z)| = R\}$  and  $G_R := \text{int } L_R$  and  $\Omega_R := \overline{\mathbb{C}} - \overline{G_R}$ .

Let  $\mathcal{P}_n$  denotes the class of all algebraic polynomials  $P_n(z)$  of degree at most  $n \in \mathbb{N}$ . Let  $\{z_j\}_{j=1}^l$  be the fixed system of distinct points on the curve  $L$ . We consider the following weight function  $h(z)$ :

$$h(z) := \prod_{j=1}^l |z - z_j|^{\gamma_j}, \quad z \in G_{R_0}, \quad 1 < R_0 < \infty,$$

where  $\gamma_j > -2$ , for all  $j = 1, 2, \dots, l$ .

For the Jordan region  $G$  and  $0 < p \leq \infty$  we introduce:

$$\|P_n\|_p := \|P_n\|_{A_p(h,G)} := \left( \iint_G h(z) |P_n(z)| d\sigma_z \right)^{1/p}, \quad 0 < p < \infty,$$

$$\|P_n\|_\infty := \|P_n\|_{A_\infty(1,G)} := \max_{z \in G} |P_n(z)|, \quad p = \infty,$$

where  $\sigma$  is the two-dimensional Lebesgue measure.

In this work, we study the pointwise estimation in unbounded region  $\Omega_{1+\frac{\varepsilon_0}{n}} := \overline{\mathbb{C}} - G_{1+\frac{\varepsilon_0}{n}}$

for sufficiently small  $\varepsilon_0 > 0$ , for the derivative  $|P_n'(z)|$  as the following type:

$$|P_n'(z)| \leq c \eta_n(G, h, p, d(z, L)) |\Phi(z)|^{n+1} \|P_n\|_p, \quad z \in \Omega_{1+\frac{\varepsilon_0}{n}},$$

where  $G$  is a bounded region with piecewise smooth boundary,  $c = c(G, p) > 0$  is a constant independent of  $n, h(z), P_n(z)$  and  $\eta_n(G, h, p, d(z, L)) \rightarrow \infty$ , as  $n \rightarrow \infty$ , depending on the properties of the region  $G$  and the weight function  $h(z)$ .

**Keywords:** Algebraic polynomials, Smooth curve, Bernstein-Walsh inequalities.

## **Испытание эффективности твердотельного альфа-трекового детектора LR-115 type 2 для применения в радоновых исследованиях**

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**Аннотация:** В данной работе описаны проведенные нами предварительные лабораторные испытания твердотельного альфа-трекового детектора LR-115 type 2 производства Dosirad (Франция) перед началом исследования по определению концентрации радона в воздухе населенных пунктов Акмолинской области и г. Нур-Султан. Основной и конечной целью данных исследовательских работ является создание карты радоноопасности территории Акмолинской области. Для этого несколько образцов испытываемого трекового детектора были облучены с разной длительностью времени, химически обработаны и исследованы на растровом электронном микроскопе. Определена плотность треков на каждом из образцов. Анализ полученных результатов показал наличие положительной корреляционной связи ( $R=0,999634$ ) между длительностью экспозиции образцов и плотностью их альфа-частиц, что показывает эффективность применения данного материала в качестве детектора радиоактивного газа радона.

**Ключевые слова:** концентрация радона, твердотельный альфа-трековый детектор (ТТАТД), альфа-излучение, радионуклидный источник.

## Willmore Function of Manheim Partner Curves in Euclidean 3-Space $E^3$

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**Abstract:** In this paper Willmore function of a Manheim curve is computed and giving some theorems in Euclidean 3-space. It can be seen that the Wilmore function is taken by the Willmore energy and contain naturally in some physical context.  
Mathematics Subject Classification (2000): 53A04, 53B30.

**Keywords:** Willmore energy, Curvatures, Mean curvature, Manheim curve

## Focusing Capability of Cantor Fractal Based Optical Metamaterial

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**Abstract:** Optical designs with fractal geometry can be a new field for focusing performance analyses. In particular, fractal zone plates, which are known as diffracted lenses, are recent studies that have focusing capability. Even though these structures exhibit a focus array, their dimensions are on millimeter scales. Adapting fractal zone plates to nanoscale and focusing performance studies to track technology shrinking in size can also be a new class of study. In this context, Cantor set based nanoring arrangements are investigated for optical focusing.

**Keywords:** Cantor set, Metamaterial, Optical focusing.