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# ICOEST 2024

## Sarajevo

**10TH INTERNATIONAL CONFERENCE ON  
ENVIRONMENTAL SCIENCE AND  
TECHNOLOGY**

June 05-09, 2024

# BOOK OF ABSTRACTS

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10th INTERNATIONAL CONFERENCE ON ENVIRONMENTAL SCIENCE AND TECHNOLOGY (ICOEST)

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**SARAJEVO, BOSNIA AND HERZEGOVINA ON JUNE 05–09, 2024**

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## WELCOME TO ICOEST 2024

*On behalf of the organizing committee, we are pleased to announce that the 7th International Conference on Environmental Science and Technology (ICOEST-2024) is held in Sarajevo, Bosnia and Herzegovina on June 05-09, 2024. ICOEST provides an ideal academic platform for researchers to present the latest research findings and describe emerging technologies, and directions in Environmental Science and Technology. The conference seeks to contribute to presenting novel research results in all aspects of Environmental Science and Technology. The conference aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results about all aspects of Environmental Science and Technology. It also provides the premier interdisciplinary forum for scientists, engineers, and practitioners to present their latest research results, ideas, developments, and applications in all areas of Environmental Science and Technology. The conference will bring together leading academic scientists, researchers and scholars in the domain of interest from around the world. ICOEST is the oncoming event of the successful conference series focusing on Environmental Science and Technology. The scientific program focuses on current advances in research, production and use of Environmental Engineering and Sciences with particular focus on their role in maintaining academic level in Science and Technology and elevating the science level such as: Water and waste water treatment, sludge handling and management, Solid waste and management, Surface water quality monitoring, Noise pollution and control, Air pollution and control, Ecology and ecosystem management, Environmental data analysis and modeling, Environmental education, Environmental planning, management and policies for cities and regions, Green energy and sustainability, Water resources and river basin management. The conference's goals are to provide a scientific forum for all international prestige scholars around the world and enable the interactive exchange of state-of-the-art knowledge. The conference will focus on evidence-based benefits proven in environmental science and engineering experiments.*

*Best regards,*

*Prof. Dr. Özer ÇINAR*

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## FEASIBILITY OF USING BLACK LIQUOR WASTE AS CEMENTIOUS MATERIALS ADMIXTURE: AN EXAMPLE OF ALGERIAN RESEARCH

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### Abstract:

Civil engineering materials to reduce the deterioration of the environmental issues caused by the continuous discharge of black liquor to the land.

The main aim of this experimental research is to study the feasibility of using black liquor obtained from paper plants in Algeria, as admixture in cementious materials.

The black liquor has been added at percentages of 0.20, 0.25, 0.30, and 0.35 % by weight of cement in the case of the cement paste study. In the case of concrete, the percentage of black liquor varied from 02 % to 06 % by weight of cement at intervals of 0.05%. The results obtained show that black liquor retards considerably the consistency of cement paste by more than 10 % as well as the initial set time of cement. The fluidity and compressive strength of concrete were significantly increased by adding black liquor. Moreover, it was observed from the analysis of the results of the experiment that adding black liquor acts as an admixture in both concrete and mortar respectively.

**Keywords:** Paper Plant Waste, Black Liquor, Lignin, Admixture, Consistency, Workability, Shrinkage

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## EXPLORING THE IMPACT OF SOLAR RADIATION ON ENVIRONMENTAL DYNAMICS IN OMAN USING NORMALIZED DIFFERENCE VEGETATION INDEX (NDVI)

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### Abstract:

This study delves into the intricate relationship between solar radiation and environmental dynamics in Oman, focusing on the normalized difference vegetation index (NDVI) as a pivotal indicator of vegetation health and ecosystem resilience. Leveraging advanced remote sensing techniques and sophisticated climate models, we conduct a comprehensive analysis of the spatiotemporal variations in solar radiation and NDVI across diverse ecological landscapes in Oman. Our rigorous investigation uncovers nuanced correlations between solar radiation patterns and fluctuations in NDVI, shedding light on the intricate mechanisms driving vegetation dynamics in response to changing solar energy inputs. Furthermore, our study extends beyond mere observational analysis to explore the underlying drivers and mechanisms shaping the observed patterns, including land cover changes, precipitation variability, and anthropogenic factors. By elucidating these complex interactions, we aim to provide actionable insights for informed decision-making and evidence-based policy formulation to mitigate the adverse impacts of climate change on Oman's fragile ecosystems. This research contributes valuable knowledge to the broader discourse on climate change adaptation and environmental management, underscoring the critical importance of integrating solar radiation dynamics into holistic environmental assessments and sustainability strategies.

**Keywords:** Solar Radiation, Environmental Dynamics, Oman, Normalized Difference Vegetation Index (Ndv)

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## ANALYSIS OF SOLAR RADIATION AND REMOTE SENSING INDICES FOR COASTAL MANAGEMENT IN OMAN

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### Abstract:

Coastal management is a critical aspect of environmental stewardship, particularly in regions like Oman where marine ecosystems face threats from human activities and climate change. We present a comprehensive seasonal comparative analysis of solar radiation and remote sensing indices to enhance coastal management strategies along Oman's coastlines. Focusing on key indices including the normalized difference chlorophyll index (NDCI), chlorophyll-a index (CAI), and land surface temperature (LST), we investigate their seasonal variations and relationships with solar radiation dynamics. Leveraging satellite imagery and meteorological data spanning multiple seasons, we conduct an in-depth assessment of these parameters to elucidate the temporal dynamics of coastal ecosystems. Our analysis reveals distinct seasonal patterns in NDCI, CAI, and LST, reflecting the complex interplay of environmental factors influencing coastal processes and marine productivity. Furthermore, we explore the intricate relationship between solar radiation and these remote sensing indices, highlighting the role of solar energy in driving ecological processes along Oman's coastlines.

By integrating these findings into coastal management practices, policymakers, researchers, and stakeholders can develop targeted interventions to mitigate environmental degradation and promote sustainable development in coastal areas. This research underscores the importance of incorporating solar radiation dynamics and remote sensing techniques into comprehensive coastal monitoring and management frameworks. By adopting an interdisciplinary approach that integrates remote sensing technology, meteorological data, and ecological insights, we can enhance our understanding of coastal dynamics and inform evidence-based management strategies for preserving marine ecosystems and supporting coastal communities in Oman and beyond.

**Keywords:** Coastal Management Oman Solar Radiation Remote Sensing (NDCI) (CAI)

\*

## PASSIVE MONITORING OF NO<sub>2</sub>, SO<sub>2</sub>, O<sub>3</sub>, VOLATILE ORGANIC COMPOUNDS AND CARBONYLS IN LUANDA, ANGOLA

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### Abstract:

An air quality monitoring campaign of gaseous pollutants by passive sampling techniques was carried out, for the first time, in 25 locations of the metropolitan area of Luanda, Angola, in June 2023. Concentrations of benzene, toluene, ethylbenzene, xylenes, trimethylbenzenes, SO<sub>2</sub> and NO<sub>2</sub> were generally higher in locations more impacted by traffic. Benzene, SO<sub>2</sub> and NO<sub>2</sub> levels did not exceed the World Health Organisation guidelines. Ozone concentrations surpassed those documented for other African regions. Unexpectedly, higher O<sub>3</sub> formation potential values were recorded at heavy-trafficked roads. The top 5 ozone formation species were found to be m,p-xylene, toluene, formaldehyde, propionaldehyde and butyraldehyde. The Mulenvos landfill presented a distinctive behaviour with a very low toluene/benzene ratio (0.47), while values close to 5 were obtained at traffic sites. The maximum levels of  $\alpha$ -pinene, D-limonene, formaldehyde, acetaldehyde, acetone, acrolein, propionaldehyde, butyraldehyde, benzaldehyde, valeraldehyde, hexaldehyde and crotonaldehyde were recorded at the landfill. The formaldehyde/acetaldehyde ratio ranged from 0.40 at the Mulenvos landfill to 3.0, averaging 1.8, which is a typical value for urban atmospheres. Acetaldehyde/propionaldehyde ratios around 0.4-0.6 were found in locations heavily impacted by traffic, whereas values between 0.7 and 1.2 were observed in green residential areas and in places with more rural characteristics. All hazard quotient (HQ) values were in the range from 1 to 10, indicating moderate risk of developing non-cancer diseases. The exception was the Mulenvos landfill for which a HQ of 11 was obtained (high risk). The cancer risks exceeded the tolerable level of  $1 \times 10^{-4}$ , with special concern for the landfill and sites most impacted by traffic. A mean lifetime cancer risk of  $9 \times 10^{-4}$  was obtained. The cancer risk was mainly due to naphthalene, which accounted, on average, for 94.6% of the total.

**Keywords:** Luanda, Air Quality, Passive Sampling, Gaseous Pollutants

*\*This work was supported by FCT (SRFH/BD/08461/2020; UIDP/50017/2020+UIDB/50017/2020+LA/P/0094/2020; 10.54499/2022.04240.PTDC).*

## GASEOUS POLLUTANTS IN ELEMENTARY SCHOOLS OF LUANDA, ANGOLA

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### Abstract:

In several classrooms and outdoor courtyards of four primary schools in Luanda, a preliminary study was carried out involving monitoring by passive methods of various gaseous pollutants: benzene, toluene, ethylbenzene and xylenes (BTEX), ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>) and 15 carbonyl compounds. The concentrations recorded did not exceed exposure limits and air quality standards established by international organizations. The NO<sub>2</sub> values observed in the rooms were very close to those obtained outside, while the indoor BTEX values slightly exceeded those recorded outdoors. These compounds originated mainly from road traffic emissions. O<sub>3</sub> levels in classrooms were, on average, 2.3 times lower than outdoors. For most carbonyl compounds, concentrations in classrooms were 1.8 to 3.8 higher than those measured in playgrounds, suggesting the presence of active emission sources indoors. Butyraldehyde, formaldehyde and hexaldehyde were the most abundant carbonyl compounds. While BTEX, O<sub>3</sub> and NO<sub>2</sub> levels in Luanda were within the ranges reported for schools in European countries, formaldehyde concentrations in educational establishments in the Angolan capital were lower, reflecting the better natural ventilation conditions provided by a milder climate.

**Keywords:** Schools, Luanda, BTEX, Ozone, Nitrogen Dioxide, Carbonyls

*\*This work was supported by FCT (SFRH/BD/04992/2021;*

*UIDP/50017/2020+UIDB/50017/2020+LA/P/0094/2020; 10.54499/2022.04240.PTDC).*

## PESTICIDE POLLUTION IN RICE PADDIES

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### Abstract:

With the rapid increase in the world population, there is an increase in food production and consumption. In order to supply demand for rice, the use of pesticides against various invasive species which may decrease the product yield has become widespread not only in Turkiye, but also over the world. As a result of pesticide application through the rice production, both surrounding environments and the living beings are exposed to pesticide pollution. Paddy is cultivated intensively in the Marmara region of Turkiye. The aim of this study was examination of pollution due to pesticide use in paddy fields in Ipsala and Biga over one-rice growth season. The study covered the whole rice paddy production process starting from preparation of the land to post-harvesting period. In this study, samples were collected from soil, water, plant, stubble, husk and rice. The samples collected from the field were first extracted by QuEChERS AOAC 2007.01 method and then analyzed by Gas Chromatography Mass Spectrometry (GC-MS/MS) and Liquid Chromatography Mass Spectrometry (LC-MS/MS). According to the results of the study; 15 different pesticide active ingredients were identified in the samples. Among them, oxadiazon and propiconazole were banned for using and importing/exporting in Turkiye. Oxadiazon was detected in soil, plant, and stubble samples collected in both fields, while propiconazole was detected only in soil sample collected in Ipsala. Due to the chemical properties of the pesticides; pesticide amounts in the water samples collected from both fields were below the limit of detection. Pesticide amounts in the soil and plant samples showed an increasing trend with the pesticide applications. The most important finding of this study was that the pesticide content in stubble was higher than husked rice. The pesticide content in rice was 10 to 40 times lower than husk.

**Keywords:** Paddy, Pesticide, Quechers, Rice, Environmental Pollution

*\*This work was supported by Canakkale Onsekiz Mart University the Scientific Research Coordination Unit, Project No: FDK-2023-4439*

## ANALYZING THE IMPACT OF GREENHOUSE GAS EMISSIONS RESULTING FROM AGRICULTURAL ACTIVITIES

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### Abstract:

Due to the rapid increase in the world population, the need for food is considered one of the most important problems of today. The hunger problem will cause malnutrition in many parts of the world and with it, the health system will collapse. New technologies and inputs have begun to be used in agricultural production to obtain quality and efficient products to avoid famine in the future. Agricultural pesticides, which are used as new inputs and called pesticides, have been widely used in recent years to protect agricultural products from invasive insects, disease agents, and weeds, due to their ease of use and short duration of action. Greenhouse gases resulting from agricultural production are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). These gases, which are effective in food production, have contributed to the acceleration of global climate change. In this review article, the harmful effects of greenhouse gases resulting from agricultural activities and their prediction models are mentioned. In addition, information is given about wrong practices used in agriculture. The article aims to provide a two-way perspective on the effects of greenhouse gas emissions on global warming and the effects of global warming on agriculture. As a result, air pollutants released from human activities such as animal husbandry, paddy fields, and applied techniques in agricultural production accumulate in the atmosphere and increase rapidly, creating greenhouse gases. Increasing greenhouse gases disrupt the radiation balance on the earth and increase surface temperatures by strengthening the effect of gases. In this case, it again reduces the quality and efficiency of agricultural production.

**Keywords:** Agriculture, Agricultural Pesticides, Climate Change, Global Warming, Greenhouse Gases, Famine, Food Security

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## MANGROVE RESTORATION AND CARBON CREDIT ECONOMIC BENEFIT IN RED SEA, SAUDI ARABIA

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### Abstract:

Mangrove environments are some of the highest biodiverse ecosystems worldwide and are recognized for their remarkable provision of vital ecosystem services. However, these ecosystems are under threat from climate change and human activities, necessitating restoration efforts. The United Nations (UN) period on Ecosystem Restoration (2021–2030) underscores the importance of this endeavor. Mangroves play a pivotal role in sequestering carbon, contributing to the concept of blue carbon. This has led to increasing interest in blue carbon stocks and their potential as an income source through carbon offset projects. Saudi Arabia, with mangrove stands along the Red Sea coastline, faces unique challenges and opportunities for restoration and conservation. This study aims to evaluate mangrove restoration and carbon credit economic benefits in the Red Sea, Saudi Arabia, through a multifaceted methodology. First, a mangrove nursery will be established to grow propagules of *Avicennia marina*, which will be transplanted into degraded mangrove ecosystems along the Red Sea coast. We will determine carbon sequestration rates to establish baseline data. In addition, we will develop a framework in line with a well-established standards for monitoring and management of mangrove forests for blue carbon sequestration. Finally, policy and financial mechanisms to support mangrove-based carbon offset projects will be assessed. By implementing this methodology, the study seeks to contribute to the conservation and restoration of mangrove ecosystems, mitigate climate change impacts, and explore sustainable income sources for coastal communities in Saudi Arabia.

**Keywords:** Mangrove Restoration, Blue Energy, Saudi Arabia, Red Sea

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## DRIVING THE CLEAN ENERGY TRANSITION: ASSESSING INNOVATIONS, SPILLOVER EFFECTS, AND POLICY IMPLICATIONS ACROSS DIVERSE TECHNOLOGY FIELDS

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### Abstract:

In order to meet the Paris Climate Agreement's aim of confining global warming to 1.5°C to 2°C by the end of this century, significant investments in environmental technologies are paramount, and a drastic shift from high-carbon technologies is essential. This study investigates the salient roles of innovations within 18 unique clean technology fields. First, the study identifies those technology fields which prove most efficient in driving innovation, and subsequently quantifies the spillover effects for each field. The impact of public environmental policies and regulations on both clean and "dirty" technological innovations is also examined in depth. Employing robust statistical methods, this study utilizes a comprehensive longitudinal dataset comprised of 100 million patent documents, sourced from the Worldwide Patent Statistical Database (PATSTAT). Furthermore, the study incorporates encompassing measures of environmental policy and regulation for a multidimensional analysis. The annual dataset spans a period of 21 years, from 2000 to 2021, covering 44 countries and 18 diverse energy technology fields. The study uncovers comprehensive evidence to ascertain the most pivotal technology fields contributing to the clean energy transition. Also, it assesses the impact of public climate change policies on energy technologies, thereby decoding the effectiveness of various public policies across different technology fields. The findings hold significance for policymakers, addressing sustainability goals and their implications, which are meticulously discussed within the paper.

**Keywords:** Environmental Technologies; Clean Technology Fields; Environmental Policies; Spillover Effects; Clean Energy Transition

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## HEAVY METAL POLLUTION IN RICE PADDIES

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### Abstract:

Heavy metals are one of the most important issues that cause environmental pollution from both natural and anthropogenic sources. Heavy metals such as Arsenic (As), Mercury (Hg), Lead (Pb), etc. contaminate the environment through a variety of natural ways as well as chemicals that are intensively used in agricultural areas. Once heavy metals are introduced into the field, they can be transferred through environmental media. In Türkiye, paddy is intensively produced and cultivated, especially in the Marmara region. The aim of this study was to examine pollution due to heavy metals in paddy fields in Ipsala, Edirne, and Biga, Canakkale, over the one-rice growth season, covering the pre-planting to post-harvesting periods. Additionally, major minerals (Aluminum: Al, Calcium: Ca, Magnesium: Mg, and Potassium: K) were also analyzed in samples. In this study, the samples were collected from soil, water, plant, stubble, husk, and rice from both paddy fields. The samples were first extracted by acid digestion procedure (EPA 3050B method) and then analyzed by Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The target heavy metals in the samples were As, Cadmium (Cd), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Pb, Manganese (Mn), Hg, Nickel (Ni), Tin (Sn), Vanadium (V), and Zinc (Zn). According to the results of the study, Cd had the lowest levels in all samples except for the rice sample collected from the field in Ipsala. The highest concentrations were in major elements such as K, Ca, Mg, and Al. The average concentration of heavy metals in soil samples was ordered as Fe > Mn > Ni > Cr > Zn > V > Pb > Cu, while it was ordered as Fe > Hg > Sn > Zn > Mn > Cu > Pb > Ni in water samples. None of the samples exceeded the national limit values.

**Keywords:** Environmental Pollution, Heavy Metal, Paddy, Rice

\*

## NEW DANGER FOR SHIPS – CYBER ATTACKS

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### Abstract:

Cyber attacks are one of the most important risks of today for all organizations and individuals using the internet. As a result of these attacks, businesses suffer serious losses and often pay large ransoms to recover their systems. Nowadays, cyber attacks are made against many businesses, as well as Maritime and Port companies. However, in recent years, the most interesting and risky cyber attacks are those directed towards ships. Because the value of the cargo carried by the ships, the size of the ship and the life safety of the seafarers further increase the importance of these attacks. Until the last few years, cyber attacks on ships could not be made due to the structure of existing conventional communication systems. However, cyber attacks on ships have increased gradually in the last two years. The most important reason for this is the change in the characteristics of marine communication systems on ships. Because today, broadband data communication is increasingly used in ship-to-land communications. The number of some new model Inmarsat and Starlink satellite terminals that enable this form of communication on ships is increasing day by day. For this reason, ships with these systems can easily access the internet via these systems. Therefore, today it has become possible to reach ships and access the navigation and machinery systems on the ship using the internet environment. Another important factor in increasing the risk of cyber attacks is that many systems of ships have become automatically controlled in recent years. Because in such an attack, it is possible to easily take control of the ship. Developments regarding autonomous ships in the last few years have further increased the importance of this issue. These developments in ship structures and maritime communication systems make it inevitable that cyber security will emerge as a very important and important area of interest for ships in the near future.

**Keywords:** Keywords: Marine Communication Systems, Siber Attacks, Marine Pollution, Coastal Management, Autonomous Ships

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## ECO TRENDS IN CIVIL ENGINEERING

Dino Obradović<sup>a\*</sup>, Marija Šperac<sup>a</sup>, Ena Grčić<sup>a</sup>

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### Abstract:

Civil engineering is a human activity, a scientific and technical discipline that includes the design, organization and execution of all civil engineering and construction works. Some of the common construction products are roads, bridges, railways, tunnels, ports, drainage and water supply systems, dams, residential and public buildings, sports halls, etc. The construction of new buildings reduces the amount of green or arable land needed by the population. Also, the demolition of existing buildings creates waste that needs to be properly disposed. The problem of waste disposal is very pronounced nowadays, so it is necessary to look for new ways of using existing as well as newly created waste. One of the available ways of using waste is its incorporation into materials used in the construction of buildings. The above can be observed through the concept of circular economy, which is the opposite of linear economy. Circular economy says that products should be kept as long as possible in their life cycle, i.e. that no waste is created. Such resources should be reused in other products. The paper will present some of the materials that can be reused in construction, as well as application of certain products that improve certain properties of construction products. Some examples are reuse of glass fiber reinforced plastic in concrete, utilizing biosilica to enhance the compressive strength of cement mortar, boosting concrete strength with sewage sludge fly ash, adding rubber into the concrete mix and polyethylene terephthalate (PET) waste in concrete mixture. Eco trends must be applied in all phases: from design to construction and to removal of various objects. Eco trends in civil engineering are aimed at protecting the environment by reducing the amount of unusable waste material and saving on construction material prices.

**Keywords:** Circular Economy, Civil Engineering, Eco Trends, Recycling, Waste Materials

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## COMPLEX STUDY OF THE NATURAL MINERAL WATERS OF THE EASTERN CARPATHIANS

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### Abstract:

There are numerous mineral water springs along the volcanic range of the Eastern Carpathians (Romania). Many of these springs are frequently visited and regularly consumed as drinking water by the local population. A total of 42 widely consumed springs were analyzed chemically, geochemically and microbiologically in four different seasons. Waters in contact with the sediments of the Transylvanian Basin were the richest in chloride ions. Their chloride ion content varied between 800 and 1015 mg/l. The waters with the highest calcium-bicarbonate content were the springs, which were in contact with Neogene volcanic rocks. In this region, the highest calcium content was of 336 mg/l, and the bicarbonate content was of 2528 mg/l. Some waters were rich in sodium-bicarbonate. These springs emerged mainly from Carpathian flysch units. Chemically, the waters met the drinking water quality standards. Microbiologically, some springs did not match the standards. The waters were contaminated mostly with *Escherichia coli*, *Clostridium* sp. or faecal *Enterococcus* bacteria indicating infiltrations from the surface or mixing of the mineral water with polluted groundwater, since many of these springs are situated in populated areas. As their chemical quality is excellent, maintaining and keeping these valuable resources clean would be of key importance.

**Keywords:** Mineral Water, Carpathian Mountains, Chemical Quality, Microbiological Quality

*\*This study was supported by the Institute of Research Programmes, Sapientia Foundation, Cluj-Napoca, Romania*

## CONSERVATION VALUE OF REED BEDS FOR HABITAT SPECIALIST SPIDER SPECIES

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### Abstract:

Wetlands play an important role in preserving biological diversity. A significant portion of them are composed of reed beds, which are highly vulnerable and sensitive to fluctuating water levels and human interventions. The largest continuous reed beds in Romania are found in the Danube Delta Biosphere Reserve (Dobrogea) and in the Reed Nature Reserve from Sic (Transylvanian Plain). This study aims to survey and compare the structure of the spider communities in different type of reed beds. The spiders were collected between 20th April and 15th July 2023, using reed traps, and the samples were preserved in 70% ethanol-solution. The species were identified in the laboratory, under a stereoscopic microscope, using various keys. A total number of 348 spiders (111 juveniles, 46 males and 191 females) were collected, and 32 species from 12 families were identified. The dominant species was *Clubiona phragmitis*, *Donacochara speciosa*, *Hypsosinga heri* and *Mendoza canestrinii*. All of these four species are habitat-specialist, typical of reedbeds, and therefore their occurrence is insular. In addition, a few interesting species were found, of which *Larinia elegans* is a new record for the Romanian arachnofauna. Additionally, the identification of some noteworthy species is still ongoing. One of them is a *Helicium* species, of which we collected a male specimen. Based on the investigations carried out so far, it is almost certain that we collected *Helicium chikunii* (Logunov & Marusik, 1999), a species previously known only from Asia. This is considered to be the first occurrence of this genus and species in Europe.

Our current results justify the need for a larger and more comprehensive study (in terms of duration, sample size, sampling method, and habitat types) aiming to investigate reed bed spider faunas and to come to a better understanding of the structure of these spider communities.

**Keywords:** Spiders, Reed Beds, Habitat Specialist, Biodiversity, Conservation, New Records

*\*This study was supported by Underwater Research Center and Domus Hungarica scholarship program (Contract nr: 93/34/2023/HTMT).*

## THE EFFECT OF DIFFERENT ENVIRONMENTAL CONDITIONS ON SOME MORPHOLOGICAL CHARACTERISTICS OF FORAGE KOCHIA POPULATIONS

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### Abstract:

Forage kochia (*Bassia prostrata* (L.) Beck) is a perennial, semi-shrub form C4 plant adaptable to drought and cold climates, soil salinity, and high calcareous conditions. In addition, this species can be used not only as a fodder crop but also for fire prevention and erosion, thus supporting biodiversity, protecting natural resources, and enabling sustainable land use. For this reason, five plants belonging to three different forage kochia populations were studied in our preliminary study to determine the morphological differences between the plants in three ecological environments. In the study, plants were grown in arid, salt-affected soil (SASs) conditions throughout 2018 and 2019. In the spring of 2020, the plants under SASs environmental conditions were transplanted, irrigated conditions (IC), and cultivated throughout 2020 and 2021. At the end of 2021, the same plants were uprooted and grown with organic barnyard manure (FWM) conditions for 2022 and 2023 in an area without soil salinity. The same observations and measurements were made during the six-year flowering period of the plants. The canopy diameter, related to the area covered by the plant above the soil, was 172.7 cm in the second year of the KKK population grown under IC. It has the lightest stigma color under IC. Considering these data, Broad-sense heritability ( $H^2$ ) was calculated to determine how much of the traits of the genotypes were caused by the environment and genetics. As a result of these calculations, it was determined that canopy diameter and stigma color were affected by environmental conditions, respectively. The trait most affected 85% and 81% by environmental conditions ( $1-H^2$ ) was leaf length, with 95%. As a result, it can be interpreted that some morphological characteristics of forage kochia are highly affected by environmental conditions, contributing to its adaptation to different ecological conditions.

**Keywords:** *Bassia Prostrata*, Ecosystem Management, Rangeland Improvement, Salt- Affected Soils

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## HOW COULD AFFECT THE AEGEAN SEA AFTER CHEMICAL TANKER COLLISIONS IN THE STRAIT OF CANAKKALE (DARDANELLES)?

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### Abstract:

Today's technology and requirements directly affect human needs. According to the International Maritime Organization - IMO, more than 90% of all needs in the world are transported by Maritime Transportation, and ships have a very important role in this regard. It is well known that most of the maritime and producing countries are interested in energy transportation and that these kinds of transportation modes are very important for the development of countries. In this context, the navigation in important passages, seaways and canals around the world affects both human life and the marine environment. The Straits of Istanbul and Canakkale, which are major parts of the Turkish Straits Sea Area-TSSA, are undoubtedly important natural waterways. If precautions are not taken, especially after an accident that may occur in the Canakkale Strait, pollution will reach the Aegean Sea due to currents. The study describes insights into pollution impacts and prevention activities.

**Keywords:** Turkish Straits Sea Area (TSSA), Strait Of Canakkale (Dardanelle), Marine Pollution Simulation, Strategy Of Maritime Management.

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## OPTIMIZATION OF TI/IRO<sub>2</sub>-RUO<sub>2</sub> ELECTRODES COMPOSITION FOR ELECTROOXIDATION PROCESS

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### Abstract:

This study focused on the treatment of paracetamol, which was chosen as a model pollutant and is the most used painkiller drug in the world, through the electrooxidation process. In this study, optimization of the composition of Ti/IrO<sub>2</sub>-RuO<sub>2</sub> electrodes, one of the most frequently used Ti-based active electrodes in the literature, was studied. Optimization studies were carried out so that the Ir/Ru mass ratio was 80/20-70/30-60/40-50/50-40/60-30/70-20/80-10/90, respectively. Studies have focused on the effect of PCT concentration and pH. The data obtained showed that increasing the IrO<sub>2</sub> ratio changed the surface structure especially the cracks. Considering the efficiency, higher RuO<sub>2</sub> ratio resulted in more successful results. Looking at chlorine measurements, the increase in RuO<sub>2</sub> supported higher free chlorine formation. However, excessive RuO<sub>2</sub> increase caused a negative effect on electrode life studies (10/90 composition). With the increase in PCT concentration, electrodes containing higher RuO<sub>2</sub> gave more successful results, while 30/70 electrode were able to work in a wider pH range. In the 40/60 composition, which is considered the most efficient, the highest removal efficiency was 53 TOC% for 60 mA.cm<sup>-1</sup> current density and 50 mg.L<sup>-1</sup> PCT concentration, while free chlorine formation was 1 mM and OH radical formation was min 28.6 % higher than the others. The electrode with IrO<sub>2</sub> composition of 70/30 gave low results (max 35 % TOC) that could work in a very narrow range throughout the entire study. The study provides comprehensive results for the optimization of Ti/IrO<sub>2</sub>-RuO<sub>2</sub> electrodes, which are active electrodes frequently used in the literature

**Keywords:** Electrooxidation, Ti/IrO<sub>2</sub>-RuO<sub>2</sub>, Electrode Coating, Paracetamol, Water Treatment

*\*This study is supported by TUBITAK 1001 program project no:121Y532*

## UNVEILING SYNERGISTIC ENHANCEMENT MECHANISM OF NITROGEN REMOVAL IN SURFACE FLOW CONSTRUCTED WETLANDS: UTILIZING IRON SCRAPS AND ELEMENTAL SULFUR AS INTEGRATED ELECTRON DONORS

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### Abstract:

Lacking electron donors generally causes poor denitrification performance in constructed wetlands (CWs). In this study, iron scraps (ISs) and elemental sulfur (S<sub>0</sub>) were employed as electron donors in different surface flow constructed wetlands (SFCWs): control (C-SF), ISs added (Fe-SF), S<sub>0</sub> added (S-SF), and ISs and S<sub>0</sub> combined (Fe+S-SF) to investigate the performance and mechanism of nitrogen (N) removal through continuous flow and batch experiments. The impact of hydraulic retention times (HRTs) and temperatures on N removal was explored. The combined use of ISs and S<sub>0</sub> significantly improved nitrate (NO<sub>3</sub><sup>-</sup>-N) removal in Fe+S-SF compared to the other CWs. During the 3-d HRT and highest temperature (30 °C), the NO<sub>3</sub><sup>-</sup>-N removal efficiency in Fe+S-SF reached the highest value of 71.66 - 12.54%. The results of the batch experiments revealed an N removal pattern that aligned with the findings of a continuous flow experiment. The 16S rRNA analysis of the microbial community revealed a selective enrichment of key functional genera (e.g., Ferritrophicum and Dechloromonas), resulting in enhanced N removal in Fe+S-SF. These findings suggest that the synergistic use of ISs and S<sub>0</sub> can achieve better denitrification efficiency and potentially be utilized for enhanced N removal from low C/N wastewater.

**Keywords:** Iron Scraps, Elemental Sulfur, Nitrogen Removal, Microbial Community, Constructed Wetlands.

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## PREPARATION, TRADITIONAL USE AND BENEFITS OF ST JOHN'S WORT OIL IN TURKIYE

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### Abstract:

Turkiye is one of the richest countries in the world in terms of plant biodiversity due to its geographical location and different ecological characteristics. There are approximately 12.476 plant taxa in the flora of Turkiye and approximately 500 of these plant species are used for medicinal purposes.

St. John's Wort (*Hypericum perforatum* L.) is a significant medicinal plants with a global reputation, which has been used as a raw material with traditional medicine for more than 2000 years. St. John's Wort extract is used in the treatment of depression, sleep disorders, anxiety, myalgia, de-worming, rectal inflammation, mild pain; the medicinal oil is an important that is frequently used in wound and burn treatments among the people and has also been the subject of many scientific researches. The pharmacologically important components of St John's Wort and its medicinal oil are hypericin and hyperforin. Thanks to these bioactive components, its usage area in food, pharmaceutical and cosmetic industry is increasing day by day. For this reason, it is one of the important medicinal plants whose sustainable production should be increased in our country.

In this study will examine the morphological characteristics of *Hypericum perforatum* L., commonly known as St. John's Wort, which is naturally distributed and cultivated in Turkiye. Additionally, the preparation, traditionally uses, chemical composition and benefits of the St. John's Wort oil will be presented.

**Keywords:** St John's Wort, *Hypericum Perforatum* L., Medicinal Oil, Traditional Use, Hypericin, Hyperforin

*\*this study was not supported by any organisation*

## COMPARISON OF ELECTRODE GEOMETRY FOR ELECTROOXIDATION PROCESS

Beyzanur Guzel\*, Dilara Ozturk, Abdurrahman Akyol

**Abstract:** PST was used as a model compound in the electrooxidation process.

In this study, where the effect of the geometric structures of the electrodes on the electrooxidation system was examined, electrodes with 60% RuO<sub>2</sub> - 40% IrO<sub>2</sub> content were produced using titanium plate and mesh titanium, and the efficiencies of the electrodes were compared. Thermal decomposition method was used during the production of electrodes. Following the spreading process, drying at 120 °C and calcination at 550 °C were applied for 5 minutes each, respectively.

In the system where total organic carbon (TOC) removal efficiencies and free chlorine formation amounts were monitored, the effects of current density and PST concentration on the potential of the electrodes were investigated. While increasing the current density has a positive effect on TOC removal and free chlorine formation in both electrodes, the mesh electrode is on average 5%-6% more efficient than the plate electrode. Considering the removal efficiencies obtained for the mesh electrode, it was seen that positive results were obtained, especially for high concentrations. It has been observed that the higher surface area of the mesh electrode provides a positive effect for the direct oxidation process in the electrooxidation principle. In the light of the results obtained, it has been seen that improving the geometric structures of the electrodes can make positive contributions to the electrooxidation system.

**Key Words:** Electrooxidation, Electrode geometry, Mesh electrode, Paracetamol.

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