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**6TH INTERNATIONAL CONFERENCE ON
ENVIRONMENTAL SCIENCE AND TECHNOLOGY**

BOOK OF ABSTRACTS

OCTOBER 23, 2020

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(ICOEST)**

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**BOOK OF ABSTRACTS OF THE
6th INTERNATIONAL CONFERENCE ON ENVIRONMENTAL SCIENCE AND TECHNOLOGY
(ICOEST)**

OCTOBER 21–25, 2020, BELGRADE, SERBIA

Edited by

Prof. Dr. Özer Çınar

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WELCOME TO ICOEST 2020

On behalf of the organizing committee, we are pleased to announce that the 6th International Conference on Environmental Science and Technology (ICOEST-2020) is held from October 21-25, 2020 in Belgrade, Serbia. ICOEST 2020 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 2020 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



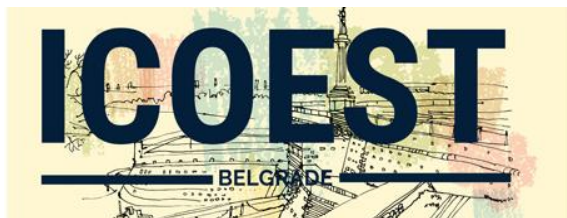
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October 21-25 2020 Belgrade

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WATER SUPPLY AND SEWERAGE SYSTEM IN THE REPUBLIC OF CROATIA AND THE REPUBLIC OF SLOVENIA

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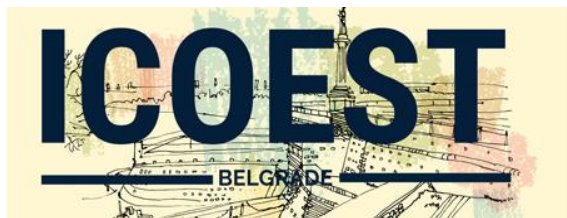
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Abstract:

According to forecasts of various international organizations, it is estimated that by 2040 the Earth will be left with no sufficient quantities of drinking water. Water used for supplying drinking water to the population and industry is obtained from natural resources (i.e., the environment) and is distributed through the water supply system to the consumer. The used, polluted water is returned to the environment through the sewerage system with prior water treatment. During the distribution of drinking water through the water supply system, water losses occur. Such lost water does not reach the end consumers and is not even charged by the water supply company. These interconnected processes of obtaining water used for water supply and of returning polluted water to water resources, directly affect the changes in the quantity or quality of water, as well as the local environment and the local population, and, of course, the Earth in general. This paper will analyze statistical data on water supply (the total amount of water intake, distributed water, water losses, length of the water supply network, the number of water supply connections) and sewerage (total amount of wastewaters, length of sewerage network, number of sewerage connections) in the Republic of Croatia and the Republic of Slovenia. The interdependence of these elements will be presented through correlation coefficients

Keywords: Correlation, Sewerage, Statistic, Water Supply

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A NEW GENERATION COMMUNICATION SYSTEM MODEL THAT PROVIDES IMMEDIATE DATA AND POLLUTION IN THE SEAS

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Abstract:

Measuring and collecting different types of data pertaining to the marine environment is necessary for preventing sea pollution, route and navigation planning, voyage safety, safety of life and property, tracking sea movements, energy acquisition and scientific studies. Many types of sensors have been produced for this purpose. With these; sea depth, temperature, flow direction/speed, salt content, flowmeter measurements, wind direction/speed, and seawater pollution can be measured. Countries and administrations aim to contribute to the safety of voyages and the environment using data collected from such sensors. New generation mobile phones and VHF/AIS systems can be used to transfer collected data, depending on distance of the sensor from the shore. These can be used individually or in combination. The use of 5G wherever phone coverage exists and VHF/AIS elsewhere is seen as an ideal combination. In recent years, important developments were made in radio communication technology. Device sizes, energy consumption and communication costs are decreasing, and bandwidth is increasing. 5G systems in particular improved transfer rates and latency. It is predicted that soon latency will drop below 1ms and transfer rates will surpass 1 Gbps. Therefore, it has become technically possible to deploy sensors to collect such data, which is then stored in a server to be analyzed by deep learning and used for multiple purposes. Additionally, it will be possible to develop a system that can effectively mitigate negative developments in our surrounding seas through the processing of such data by an Artificial Intelligence system and taking appropriate actions (e.g. upon detecting sea pollution, collecting images via drones, unit movement based on position information, etc.). The deployment of systems that support this functionality and being championed by an authority is sufficient for this purpose

Keywords: Marine Environment, Sea Pollution, Sensors, Data, 5G Systems

*



SIMULATION OF MARINE POLLUTION FROM A TANKER ACCIDENT AT THE CANAKKALE STRAIT (DARDANELLE)

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Abstract:

The Turkish Strait Sea Area is very important waterway for global maritime transportation. Also TSSA has importances geopolitic, geographic, strategic and economic. Turkish Strait Sea Area is consist of The Istanbul Strait (Bosphorus), The Canakkale Strait (Dardanelle) and The Marmara Sea. The Turkish Straits has great importance during history. With the Montreux convention, The Turkish Strait Sea Area has been governed at 1936. Legally, all marine safety and management process such local maritime traffic, innocent passage, safety navigation and marine environmetal management has been controlled by The Turkish Maritime Authorities during sailing along The Turkish Straits. Istanbul and Canakkale Straits are great natural waterway and seems like valley. Due this characteristics, straits needs survey and measure deply with Marine Sciences and environment sciences. Turkish Straits Sea Area's components have become more importance cause recently increasing of energy transportation from the Blacksea. This working, try to simulation on Tanker Collusion simulation using by PISCES II and try to Show marine pollution effects at Canakkale Strait.

BAP: The Corresponding Author gratefully acknowledge the support of Galatasaray University, Scientific Research Support Programme under grant number of 19.600.001.

Keywords: Turkish Straits Sea Area(Tssa), Canakkale Strait(Dardanelle),Pisces, Marine Pollutions, Simulation

**Galatasaray University, Scientific Research Support Programme under grant number of 19.600.001.*



ASSESSMENT OF ECOLOGICAL RISK OF HEAVY METAL CONTAMINATION IN AGRICULTURAL SOIL IN MUNICIPALITY PLJEVLJA (MONTENEGRO)

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Abstract:

Assessment of heavy metals contamination of agricultural soil is of great importance for human health due to the potential contamination of plants for human nutrition. Thus, soil plays a crucial role in food safety as it determines the possible composition of food and in the food chain. With the development of industry, the content of heavy metals in the soil caused by human activities has steadily increased, resulting in environmental degradation. Since there is a very little data about agricultural contamination in Montenegro, this study aimed the assessment of ecological risk of heavy metal contamination in agricultural soil of Pljevlja municipality.

Contamination of soil with a five metals (Pb, Cu, Cd, Cr and Zn) was investigated, due to their biological toxicity. Contamination factor (Cf) and ecological risk factor (Er) are used for the assessment of soil contamination. The results based on the mean Cf value and mean Er value indicated the high and considerable ecological risk for pollution with Pb and Zn, respectively.

Keywords: Heavy Metals, Contamination, Agricultural Soil

**This study is supported by Institute of Public Health of Montenegro*



INVESTIGATION OF THE REDUCTION OF HERBICIDE METRIBUZIN WITH SPHINGOMONAS MELONIS BACTERIA

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Abstract:

The bioremediation of metribuzin (C₈H₁₄N₄O₅) which is one of the selective herbicide in soy bean, potatoes, cotton, tomatoes and sugar cane farming in Turkey was investigated with *Sphingomonas melonis* bacteria under agitated culture conditions and artificial agricultural field. The bacterium was isolated in collected soil samples from one of the agricultural area in Alihocali Street in Adana province of Turkey. The area is unexposed to metribuzin before. Five apparatuses were set up at 240 ppb concentrations (advised concentrations for farmers) of metribuzin and filled with 10, 20, 50 and 100 ml of *S. melonis* bacteria to each Erlenmayer flasks. Each ml of the enriched solutions contains 1×10^7 Colony forming unit. One of the erlenmayer flask is used as blank (Includes no bacteria, only 240 ppb metribuzin). These flasks were shaken at 160 rpm at 25 °C in sterile conditions for 14 days. In 24 hours intervals, each sample was collected to flasks and chemical oxygen demand (COD) was determined with DR/890 colorimeter by the line of closed reflux method while Biochemical oxygen demand (BOD₅) experiments were performed via standard methods 5210D with oxitops. At the end of 14 days, in agitated culture medium, best removal performance observed in media with 100 ml of *S. melonis* as 91% and 88% in COD and BOD₅ respectively. In a artificial agricultural field study, 100 mL of *S. melonis* used for bioremediation studies. According to the results of this study, the bioremediation seen at COD and BOD₅ parameters were 95 % and 92% respectively at the end of 2. week. These experiments have focused that, *S. melonis* should be a selective type for bioremediation of metribuzin on receiving environments.

Keywords: *Sphingomonas Melonis*, Bioremedition, Herbicide, Metribuzin

*

RESPONSE OF HIGH-, MID- AND LOW-ABUNDANT TAXA AND POTENTIAL PATHOGENS TO EIGHT DISINFECTION METHODS AND THEIR INTERACTIONS IN DOMESTIC HOT WATER SYSTEM

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Abstract:

Eight disinfection methods were applied to control biofilm contamination in domestic hot water system. The inactivation efficiency, responses of high- ($\geq 1\%$), mid- ($0.1\%\sim 1\%$) and low-abundant taxa ($\leq 0.1\%$) to disinfection, and interactions within and across three sub-communities were investigated. Ultraviolet was the most effective disinfection method for total bacteria and *Escherichia coli*, and chlorine dioxide had the highest inactivation efficiency on heterotrophic bacteria, while silver ions exhibited poor performance on all of them. At the phylum level, the responses of microorganisms to eight disinfection methods were different, but Proteobacteria and Firmicutes dominated in most samples. Eight disinfection methods had a greater impact on the proportion of high- and mid-abundant taxa than that of low-abundant taxa, and led to dissimilar transformations of genera among high-, mid- and low-abundant taxa in each sample. High-, mid- and low-abundant taxa of different samples showed similar structures and were roughly clustered into three Groups. Moreover, high-abundant taxa had more complex internal interactions than mid- and low-abundant taxa, and mainly presented co-occurrence patterns. The associations between high- and low-abundant taxa were close, and some low-abundant genera were identified as hub bacteria, such as *Paracoccus*, *Thioalkalispira* and *Flavitalea*. Furthermore, a total of 23 potential pathogens were detected in this study, and they mainly showed positive interactions, with *Mycobacteria* and *Streptococcus* as keystone genera. These results highlight the dissimilar responses of high-, mid- and low-abundant taxa to disinfection, and the critical role of some low-abundant genera in the microbial network, as well as the co-occurrence patterns among potential pathogens.

Keywords: Domestic Hot Water System; Disinfection; Pipe Wall Biofilm; Mid- And Low-Abundant Taxa; Potential Pathogens; Network Analysis

*

SMART SCALE FOR IOT APPLICATIONS

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Abstract:

The use of electronic and communication devices in homes, factories, cars and many other sectors are increasing day by day, helping us to create a more environment friendly world. There is a growing demand to manage and analyze the collected data in a simple way. Many devices around us are turned into "smart devices". This concept implies that the devices can collect data in a controlled manner, save it and transmit it to other devices either automatically or with minimal human control and minimal effect on the environment. The "Internet of Things" (IoT) has emerged as a new technology which allows devices to connect to a network through various protocols and communicate with each other over wide area networks. Thus the need to collect and analyze the data in a more manageable way has become an important research issue. This paper describes the work for creating a smart scale that can be incorporated in various healthcare, home and industrial IoT systems. The developed prototype system allows transferring weight data, provided from smart sensors, to a data center using the MQTT protocol via ESP32. The user will be able to access the information in the data center from his mobile device or personal computer and follow up and/or analyze the data. A user interface was developed for Android based devices using the Android Studio. The project ensures full integration between the MQTT applications and the Android Studio using the Eclipse-Paho library. The prototype system can find usage in various areas, from personal health, to environmental and industrial sectors. Results from the smart scale can be transmitted electronically, integrated in public healthcare systems, environment monitoring systems and industrial applications.

Keywords: Smart Scale, Internet Of Things, Public Healthcare

*

IOT BASED FOREST FIRE MONITORING SYSTEM

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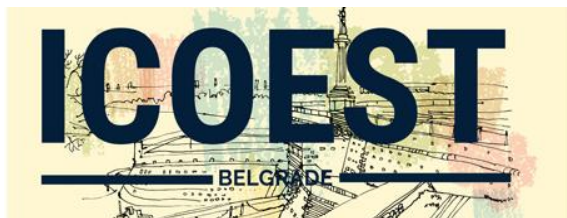
Abstract:

This paper describes a prototype system for monitoring forest fire using IoT and drones. Sensors placed in the forest area continuously measure parameters, which can provide early warning about arising fire situations such as temperature, humidity, carbon monoxide and simultaneously transfer the data for processing to a control unit. The control unit aggregates and maps the collected information separately for each parameter and then creates fire mapping based on the FFDI index including all parameters. The severity of the situation is reflected on the map using a special coloring scheme. When a certain color level is exceeded, a drone (possibly carrying water supplies) is sent to the transmitted coordinates to provide visual data and help extinguish the fire at as early stage as possible.

The project incorporates of two major stages. The first one is establishing the wireless sensor network the second one is controlling the movement of the autonomous drone. The wireless sensor network consists of small size sensors, cheap off-the-shelf nodes placed in the environment to interact with the physical world. These nodes autonomously cooperate in the physical area and provide information about the current surrounding environment over LAN and WAN. Since these devices can easily be damaged and need to be replaced, they are intentionally selected to be very cheap with little processing ability. The functions of integrating and evaluating the collected data are embedded in the control unit, which is located at a safe distance within communication range. The communication between the control unit and the drone is over WAN. The drone would normally be waiting ready in a monitoring station or fire fighter location. Upon receiving critical information the drone can be dispatched to collect visual data of the area and/or if possible to help with extinguishing the fire.

Keywords: Internet Of Things, Forest Fire Monitoring

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DEGRADATION OF PHENOL IN WATER BY USING TiO_2 NANOTUBES

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Abstract:

The aim of this study is to investigate degradation of phenol in water by using titanium oxide nanotubes (TNT). TNT's were successfully produced by using Titanium foil (TC4 Grade). Degradation and Adsorption experiments were carried out by using control sample and phenol solution with TNT catalyst. The samples were kept in dark atmosphere to provide adsorption-desorption equilibrium. Photocatalytic degradation performance tests were carried out with 300 W Osram Ultra-Vitalux E27 (%4.53 UVA, %1 UVB, %94.47 Vis) light source under 1, 3 and 5 hours of reaction time. Absorbance measurements were investigated by using Shimadzu UV-Vis Spectrometer. It is noted that the best phenol degradation was reached with 10 mg/L sample as 68,21%. However, it is obtained that the lowest phenol degradation was 1,72% with control sample in 5 mg/L phenol solution. Consequently, TNT's were provided positive contribution to the degradation of phenol in water in comparison with the control sample.

Keywords: Titanium, Nanotubes, Degradation, Phenol, Ultraviolet

*



REUSE OF URBAN WASTEWATER EFFLUENT FOR SUSTAINABLE WATER PRODUCTION

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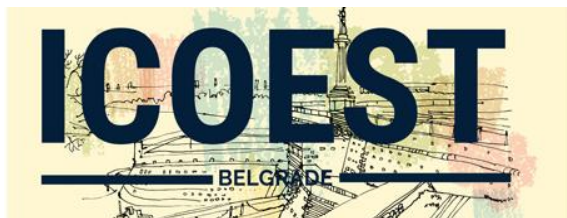
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Abstract:

The scarcity of water resources brings the reclamation and reuse of waste water in the world. In this study the aim is to investigate the potential reuse of the urban wastewater effluent for use of sustainable water production. The recovery techniques and reuse areas, the required treatment techniques, the current situation in the world and Turkey, and cost analysis of treatment facilities in Turkey were investigated. It is possible to meet the amount of water used in urban, industrial, agricultural and industry with wastewater recovery. Proposals are being developed for the recovery and use of waste water in the world and Turkey. As a result of this study, it should be considered that the various usage areas of treated wastewater, reuse alternatives should be evaluated for large, medium and small scale facilities. Determination of targeted quality parameters in the field of use, and determining the investment, operation and maintenance costs of the applied processes should be considered.

Keywords: Wastewater, Recovery, Reuse, Sustainable, Water Production

*



EVALUATION OF VARIOUS MEDICAL AROMATIC PLANT (ANTIBACTERIAL / ANTIOXIDANT) EXTRACT STRUCTURE IN THE WOOD INDUSTRY

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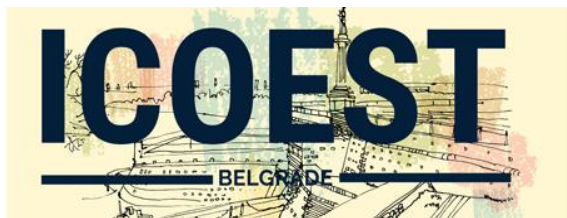
Abstract:

Throughout the history of mankind, various plants (medicinal aromatics etc.) have been used naturally to prevent all diseases, or they have been used in a wide range of fields, especially in the pharmaceutical industry, by cultivating in agriculture / greenhouse areas. A wide variety of protective impregnation / top surface materials and new methods are developed in order to increase the durability of wood and increase the resistance level against many effects (biotic, abiotic, nature, environment, etc.), and it is important that these materials are friendly to human / environmental health. As well as the advantages of the wood material, it has to be treated with some preservatives and colorants in order to be protected against internal and external influences and to be aesthetic. However, as a result of the protection and coloring of the wood material by chemically, especially the indoor contamination causes negative effects on human health. Recently, several researches have been conducted on the causes of indoor air pollution and it has been determined that these sources of pollution are largely volatile organic compounds (VOC). The main objective of this study is to use the wooden product in wooden child toys, hospitals, sterile areas, pharmacies, wood-based materials used in the kitchen (fork, knife, serving plates and chopping boards etc.), playgrounds, dining table surfaces, nursery and kindergarten furniture, beehives etc. In addition, it will be recommended to use on all surfaces where there is an antibacterial / antioxidant effect, as well as on the surfaces with collective contact such as door handles, cabinet handles, elevator buttons and cash dispenser keys.

In research, extracts of Ferula and Labada herbs (1% concentration) from medicinal aromatic plants were prepared. and spruce and mahogany wood were used as wood type. According to ASTM D 143-76 principles, retention and bending resistance properties were determined by impregnation. According to the results of the experiment, the highest retention (0.55%) and bending resistance (100.20 N/mm²) were determined in Labada, and the optimum increase was determined when the results were compared with the control sample.

Keywords: Human/Environmental, Medicinal Aromatic Plants, Wood, Health, Toys, Furniture.

*



VARIOUS PROTECTIVES IN THE WOOD INDUSTRY AND TECHNOLOGICAL CHANGE (PRESSURE STRENGTH)

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Abstract:

In the early ages, forests created a suitable area for life. Utilization of forests is also based on ancient history. The first signs of the use of wood were found in the pictures carved on the walls of the tombs between B.C 1350 and 1500 in Ancient Egypt. The first processing of the logs obtained from the forests started with the production of boards cut by hand saw. Later, manual sawmills used by two people were developed. Throughout history, the forest products industry not been able to show the same progress compared to the advances in various industries. As environmental pollution increases in our country and in the world, the measures taken for it were increased. Efforts are being made to ensure that the chemicals used in wood do not cause environmental pollution. However, the applied methods brought high costs. Therefore, many features of wood are improved with a single application in wood modification. Another method used for the long-lasting of the wood material is the impregnation process. Although they are durable and long-lasting tree species, tree species with low natural strength must be impregnated to increase the lifetime. Many chemicals are used in the impregnation process of wood material. One of these chemicals is boron compounds. Today, boron compounds used as impregnations are one of the reliable chemicals. The use of boron compounds is increasing as the harm to human and environment is minimal. They are used as an effective method not only against damage caused by living things but also against burning.

In the scope of the research, the pressure strength change was determined by impregnation process of scotch pine in 40 minutes vacuum and different diffusion (20, 40, and 60 min.) times using various mordants according to ASTM D 143-76 principles. Boric acid, aluminum sulfate, sodium chloride, water-based varnish, water-based varnish + aluminum sulfate, water-based varnish + sodium chloride, water-based varnish + boric acid were applied as a single or combination of two products. According to the results of the experiment, it was determined that the highest pressure strength is 40 min. vacuum and 40 min. diffusion time in boric acid (68.53 N / mm²) whereas the lowest pressure strength is 40 min. vacuum and 40 min. diffusion time in water-based varnish + aluminum sulfate (47.50 N / mm²).

Keywords: Keywords: Environmental, , Treatment, Aluminum Sulphate, Sodium Chloride, Vacuum.

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MEDICAL AROMATIC PLANT EXTRACT IMPREGNATION EFFECT ON THE ANATOMIC STRUCTURE OF WOOD

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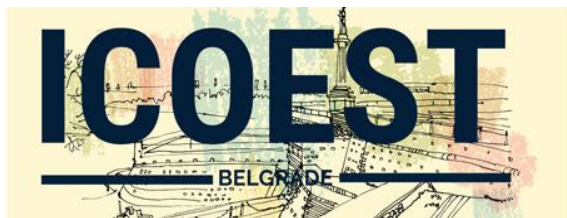
Abstract:

Since the beginning of history, the global world structure and medicinal aromatic plants in our country have been used in very rich areas (medical, cosmetic, food, spice, agriculture, animal husbandry, spice, paint industry, etc.). New human / environment friendly wood protective materials are being developed, thus efforts are made to create an antioxidant / antibacterial product structure in various areas such as hygienic furniture structure, children's toys, hospitals, etc. It has been reported by the World Health Organization (WHO) that the number of herbs used as medicinal and spice in the world is around 20,000. Preparing extracts from plants and using them as medicine, in China in BC. It dates back to 2700 BC. Rapid depletion of forest resources and exposure to synthetic / chemical effects in the environment in which human beings have lived pose serious threats. The anatomical properties of this material, which was aimed to create a much more organic structure by obtaining extracts (1%, 3%) of various medicinal and aromatic plants (meadow onion, chives) and bringing it into relationship with borax by double process, were examined and the scale of attachment was determined in relation to this.

Due to its anatomical structure, the level of adhesion on spruce wood cross-sectional surfaces was observed in SEM and the net amount of dry impregnation was calculated; it was determined as the highest 1.64% borax in spruce wood and 0.35% in the lowest 1% bleach extract. In spruce wood, especially the passage aspiration structure is known to be among the most important elements that make it difficult to hold the material in the impregnation process.

Keywords: Keywords: Wood Anatomy, Medicinal Aromatic Plant, Impregnation, Adhesion.

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VARIOUS MEDICAL AROMATIC PLANT EXTRACT IMPREGNATION ABILITY AND TGA / MUSHROOM TESTS IN WOODEN MATERIAL

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Abstract:

In the study, the wood of Eastern beech (*Fagus orientalis* Lipsky) and Scotch pine (*Pinus sylvestris* L.) was impregnated with "Lightning Plant" extract (1% -3%) in accordance with ASTM 1413 76 standard and the wood was impregnated with Thermogravimetric Analyzer (TGA) and brown rot fungus (ASTM-1413-071 standard) change was observed. Rapid depletion of forest resources and exposure to synthetic / chemical effects in the environment in which human beings have lived pose serious threats. Distilled water was used as a solvent in the preparation of extracts in order to create a healthier / environmental environment for various medicinal and aromatic plants. All chemical compounds are effective on the burning, physical and mechanical properties of wood material. The flammability, color, density, odor, taste and resistance to pressure resistance of wood vary depending on the amount of extractive substance. As the amount of extractive substance in wood decreases, its burning capability decreases. The increase in lignin and inorganic material (ash) ratio decreases the burning resistance. According to the experiment results; % retention was determined as 3% extract in the highest beech, 25 minutes vacuum and 30 minutes diffusion (0.49%). While 1% structure of Isgin plant gave negative results in terms of burning degrees, decomposition temperature points and residue amount in TGA experiment, 3% wild plant extract gave optimum result in brown rot tests.

Keywords: Keywords: Wood Anatomy, Medicinal Aromatic Plant, Impregnation, Adhesion.

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NATURAL POLYMER-BASED COMPOSITE HYDROGEL BEADS FOR ADSORPTIVE REMOVAL OF REACTIVE DYES FROM WASTEWATER

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Abstract:

Wastewater management has become a major global environmental and public health concern due to the rapid growth of industrial activities that generates high volume of wastewater containing hazardous substances. Among the toxic substances usually found in industrial effluents, the reactive dyes that are essential in different industries such as textile, plastic and paper industry, exhibits adverse effects to biological organisms and ecology due to their carcinogenic and mutagenic effects. Therefore, the wastewater must be treated before discharging into the environment, in order to reduce the negative effects of organic dye molecules. Up to know, several techniques have been used for the removal of dyes from industrial effluents and among them adsorption is an effective treatment process due to its simplicity, effectiveness and economical advantage. In adsorption applications, the utilization of cost-effective, high-strength and environmentally friendly adsorbents such as natural polymer based composites is receiving much attention nowadays.

In this study, the adsorptive removal of a highly toxic textile azo dye, crystal violet (CV), from aqueous solutions has been studied. For this purpose, novel high-strength and highly cost-effective composite hydrogel beads with high dye adsorption capacity were prepared with sodium alginate and hydroxyethyl cellulose to be used as an adsorbent. The incorporation of graphene oxide (GO) to the structure increased the mechanical strength and the adsorption capacity of CV onto composite hydrogels, as expected. The effects of various factors such as initial dye concentration, adsorbent amount, contact time and the effect of changes in pH have been investigated. Furthermore, the adsorption process showed a good fit both Langmuir and Freundlich model, and was expressed better by the pseudo-second-order kinetic model. These environmentally friendly composite hydrogel beads could be promising candidates for dye removal.

Keywords: Wastewater, Adsorption, Composite Hydrogel Beads, Crystal Violet

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SYNTHESIS AND CHARACTERIZATION OF GRAPHENE OXIDE NANO-SHEETS AND ITS APPLICATION AS ADSORBENT FOR WASTEWATER TREATMENTS

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Abstract:

Recently, there has been a great attention in the use of graphene oxide (GO) as an adsorbent in wastewater treatments. GO is a novel two-dimensional carbon material with a honey-comb structure synthesized from graphite. It is biocompatible and has excellent mechanical strength, also it is obtained by easy preparation methods. GO nano-sheets have large surface area and abundant oxygen-containing functional groups such as carboxylic, hydroxyl and epoxide groups. Therefore, GO shows hydrophilic property and can be easily dispersed in water [1]. Moreover, these groups can act as anchoring sites for metal ion complexation or provide binding sites for dye molecules through hydrogen bonding, dipole–dipole interaction, ionic interaction, etc. As a result, all these properties make GO attractive to use in the adsorption of both heavy metal ions and dye molecules from wastewaters. However, it is difficult and costly to separate and recover GO from treated water due to its small size and high dispersibility in water. To overcome these limitations, GO is incorporated into a polymeric matrix as a nanofiller, resulting in polymer nanocomposites like hydrogels used as adsorbents in water treatment [2, 3].

In this study, GO nano-sheets were synthesized modified Hummer method [4]. It was aimed to increase the number of oxygen-containing functional groups of GO nano-sheets for the increment of its adsorption capacity. The obtained GO were characterized by FTIR, UV, XRD and SEM analysis methods. The lateral size of the sheets was also determined dynamic light scattering method. Then, the GO incorporated nanocomposite hydrogel with acrylic polymer matrix was prepared. The adsorption capacity of this nanocomposite was determined for Pb²⁺ ions and azo dyes in aqueous medium.

Keywords: Wastewater Treatment, Graphene Oxide, Adsorption

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STRUCTURAL, TERRAIN AND CLIMATE EFFECTS ON WOOD PRODUCTIVITY IN NATIVE MIXED BEECH AND FIR FORESTS

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Abstract:

The aim of research is to analyze structural, terrain and climate effects on stand productivity represented by the wood volume current annual increment (CAIv) in native high mixed beech and fir (with spruce) forests on low productive soils. Here are used data from the Second national forest inventory in Bosnia and Herzegovina (B&H) obtained on 153 geo-coded sample plots across the west and central Bosnia.

As stand structural data are used relative density and conifer's and broadleaf's basal area per area unit. The terrain data (altitude, slope and hill-shade) were extracted from digital elevation model. Climate variables (averages of minimal, maximal temperature and maximal precipitation) are co-kriging spatially modelled on B&H area using meteorological data. The multiple linear regression (MLR) and canonical correlation analyses (CCA) were used for statistical analysis.

The MLR and CCA identified structural and climate variables as significant. The CCA confirmed relationships between conifer's and broadleaf's stand productivity and structural variables (conifer's basal area and relative density) and two climate factors (average minimal temperature and average maximal precipitation). The shared variance between the two variable sets, across all functions was 86.7% (FWilks lambda = 27.4, $p < 0.001$). The first canonical function holds very strong correlation with 76.4% shared variance. Conifers CAIv seems to be the most contributing variable with 85.3% influencing by conifers BA related to structural variables ($R = 0.92$). The second canonical function complemented shared variance with 23.6%. The broadleaf's CAIv has the highest loading on the productivity side ($R = 0.78$). The higher conifers CAIv is related to higher participation of conifers BA and higher relative density while significant influence of terrain and climate effects were not obtained. Higher broadleaves CAIv is related to higher relative density and higher maximal precipitation. The lower broadleaves CAIv is registered with minimum temperature decreasing. Thus, the climate effects on broadleaves CAIv were manifested dominantly and the terrain effects were not significant. The research indicates significant climatic influence on the productivity of mixed stands, which should consider in management planning of these stands.

Keywords: Stand Current Annual Increment, Relative Density, Basal Area, Extreme Temperature And Precipitation, Terrain Variable, Canonical

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THE CURRENT STATE OF MARINE RESOURCES IN THE BLACK SEA

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Abstract:

The Black Sea is one the important sub-areas of the Mediterranean Basin and one of the most complex ecosystems in the region. The structure of the Black Sea ecosystem differs from the Mediterranean in that the diversity is low and the dominant groups are different. On the contrary, the abundance, biomass, and productivity of the Black Sea are higher than the Mediterranean. In this presentation, riparian countries of the Black Sea (Bulgaria, Georgia, Romania, Russia, Turkey, and Ukrania) are compared by means of catch statistics, the number of fishing vessels, targeted and landed species. For this purpose, FishStat Plus - Universal software for fishery statistical time series data (1950-2018) and Turkish Statistical Institute's (TurkStat) data were used to generate the long term landed catch plots. Fishing mortality (F) and exploitation rates (E) were reviewed from published papers and scientific reports. Among riparian countries, Turkey uses some advantages such as long coastline, the number of fishing vessels and fishermen, modernized fishing fleet, etc. Turkey seems obviously leader with numerical domination by the fishing fleet and landings. Black Sea fishery has a special role in the living marine resources of Turkey. Fish caught in the Black Sea constitutes approximately 80% of the total production of Turkey. From the marine resource perspective, European anchovy (*Engraulis encrasicolus*), European sprat (*Sprattus sprattus*), Atlantic bonito (*Sarda sarda*), bluefish (*Pomatomus saltatrix*), whiting (*Merlangius merlangus*), red mullet (*Mullus barbatus*), and turbot (*Scophthalmus maximus*) are the most landed species over a long time period. However, most of these important and traditional marine resources are over-fished by means of fishing mortality and/or exploitation rate and total landings. In the overall, to solve the fisheries-related problems in the Black Sea, a basin-wide fishery management perspective joint by all riparian countries is needed.

Keywords: Black Sea, Marine Resources

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ADSORPTION STUDY OF ERIOCHROME BLACK T ONTO TiO₂ / SWCNT FROM AQUEOUS PHASE

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Abstract:

Today, human beings are faced with the waste problem brought about by industrialization. The dyes and pigments that make up

the majority of these wastes come from the textile industry. It is necessary to eliminate these wastes. In this study, it is aimed to remove Eriochrome Black T indicator from wastewater. For this purpose, TiO₂ /SWCNT composite was synthesized using the impregnation method after single-walled carbon nanotube (SWCNT) was modified with nitric acid. The surface morphology of the composite with SEM analysis, while semi-quantitative analysis of composite was performed with EDX. In addition, the groups in the structure of the composite were illuminated by FTIR analysis. The structural crystallinity of the composite was determined by XRD analysis. In order to explain the effect of pH in the adsorption process, point of zero charge analysis was also performed. To determine the adsorption rate, pseudo-first order, pseudo-second order, Elovich and intra- particle diffusion models were used. In addition, isotherm models of Langmuir, Freundlich, Temkin and Dubinin-Radushkevich were applied to the experimental data in order to understand the interaction between the Eriochrome molecule and the TiO₂ / SWCNT surface.

Keywords: Eriochrome Black T, Adsorption, Kinetic Study, Isotherms, TiO₂

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