

University of Agronomic Sciences and Veterinary Medicine of Bucharest Faculty of Land Reclamation and Environmental Engineering



International Conference "Agriculture for Life, Life for Agriculture"

BOOK OF ABSTRACTS Section 5

LAND RECLAMATION, EARTH OBSERVATION & SURVEYING, ENVIRONMENTAL ENGINEERING

2022 BUCHAREST

UNIVERSITY OF AGRONOMIC SCIENCES AND VETERINARY MEDICINE OF BUCHAREST

FACULTY OF LAND RECLAMATION AND ENVIRONMENTAL ENGINEERING

International Conference "Agriculture for Life, Life for Agriculture"

BOOK OF ABSTRACTS

Section 5

LAND RECLAMATION, Earth Observation & Surveying, Environmental Engineering

> 2022 BucharesT

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ENVIRONMENTAL SCIENCE AND ENGINEERING

3D FINITE ELEMENT ANALYSIS MODEL TO ACCESS THE SETTLEMENT OF SOFT SOIL TREATED WITH NANO-Mgo

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Abstract

In this study, a numerical model was developed to assess the settlement and the damaging mechanism of an old masonry church Adormirea Maicii Domnului located in Perisoru village, Romania by using finite element software Plaxis 3D. The main aim of this research was to simulate the ground problems and the structural failures observed. The rectangular foundation is placed on yellowish silty clay-loess, which was modelled and analysed in the present paper. Mohr-Coulomb soil model was used for the soil and the linear elastic model was used for the foundation. After computing the settlements, it was resulted the need of improving the soil. The soil was improved with cement, but some nano materials were considered as well, as an alternative. The results showed that the value of the settlements reduced with an increase in the amount (0.5%, 0.75%, 1%, 2%) of the Nano-MgO. The results have been compared with the soil treated with 2 % cement.

Key words: historic structures, Nano-MgO, Plaxis 3D, settlement, soft soil.

A REVIEW OF IMPROVEMENT GEOTECHNICAL CHARACTERISTICS BY NANO ADDIVITIES

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Abstract

This paper reviews and discussed soil stabilization by using the nanomaterials as additives; analyzed their effect on soil. With the urban development and the rapid increase in population, including projects to expand cities, the need has become urgent to implement various types of projects such as buildings, dams, highways, and others. The foundation soil on some sites is weak and do not have the necessary and required engineering properties. Because of that, the soil properties should be improved from "bad" soil to a better foundation soil, increasing the shear strenght parameters, reducing soil compressibility and reducing soil permeability. Therefore, soil improvement is an essential solution to enhance it characteristics. Nanomaterials can be described as materials with particles of at least one dimension between 1-100 nm. In recent years, nanotechnology has been used for improving the geotechnical properties of soils, and it has given a significant advantage in this field. The objective of this review arcticle is to analyze some of the publications using nanomaterials as additives to the soil.

Key words: nanoparticle, soil stabilization, Nano-MgO cement, Nano-Clay.

THEORETICAL RESULTS BY DETERMINING THE POWER OF THE DRIVEVIBRO-OIL PRODUCER

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Abstract

A vibratory oil maker to produce environmentally friendly butter is presented. A constructive scheme and design of a butter maker with a churning mechanism in the form of a flexible vibration drive (a membrane that is also the bottom of the container, which performs periodic oscillatory movements by means of a crank mechanism) has been developed, which reduces the energy intensity of churning and loss of butter due to its sticking to the churning mechanism. A force analysis is presented, in which the forces acting in the oil maker during its operation are considered and a formula is obtained for determining the power to drive the vibratory oil maker, considering the division of masses into rotational and reciprocating masses of the vibratory oil maker knocking down mechanism. The power for the drive of the vibratory oil maker was calculated considering the change in the angle of rotation of the crank $\varphi = 0...360$ degrees. The obtained values are presented as a graph of the dependence of the power on the drive on the angular velocity and radius of the crank at given angles of rotation of the crank. The maximum (peak) value of power per drive is determined - 125 W. At the same time, the energy intensity of butter churning of the vibratory oil maker was Es = 3.84 Wh/kg with a productivity of Om =11.25 kg/h, and the degree of use of milk fat S = 99.6%, which corresponds to the waste of fat into buttermilk 0.4% and does not exceed the requirements of GOST. The maximum (peak) value of power per drive is determined - 125 W. At the same time, the energy intensity of butter churning of the vibratory oil maker was Es = 3.84 Wh/kg with a productivity of Om = 11.25kg/h, and the degree of use of milk fat S = 99.6%, which corresponds to the waste of fat into buttermilk 0.4% and does not exceed the requirements of GOST. The maximum (peak) value of power per drive is determined - 125 W. At the same time, the energy intensity of butter churning of the vibratory oil maker was Es = 3.84 Wh/kg with a productivity of Qm = 11.25 kg/h, and the degree of use of milk fat S = 99.6%, which corresponds to the waste of fat into buttermilk 0.4% and does not exceed the requirements of GOST.

Key words: butter, crank mechanism, environmentally friendly, membrane, vibration drive.

ROLE OF ENVIRONMENTAL PARAMETERS IN THE DISTRIBUTION OF MEIOBENTHIC FAUNA (OSTRACODA AND FORAMINIFERA) IN THE ROMANIAN BLACK SEA SHELF

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Abstract

With limited research undertaken on the distribution and biodiversity of meiobenthic fauna (living Ostracoda and Foraminifera) in the Black Sea, the present study has focused to create the baseline data for the Romanian Black Sea continental shelf. For this purpose, 9 short core samples were collected using a multi-corer in water depth ranging from 27.8 m to 41.8 m in May 2018 around the Sf. Gheorghe area (map sheet L35-120B). A total of 14 species were found belonging to Ostracoda (7 families), Cercozoa (one family), Foraminifera (5 families). The highest density of meiobenthic species was correlated with the highest concentration of CaCO₃ where the substrate is dominated by a clayey silt or sandy silt while TOC concentrations were negatively correlated with the low densities occurring in the western part of the perimeter silt clav substrate is found. The density of soft-shelled foraminifera has a positive correlation with the concentration of salinity in the bottom water samples, and depth and a negative correlation with the bottom water temperature. The density of Ostracoda has a positive correlation with temperature and depth but a negative correlation with salinity in the bottom water samples. The relationships between high concentrations of CaCO3 and increased abundances of meiobenthic fauna and high concentrations of TOC and low meiofauna abundances, respectively, reinforce the hypothesis according to which the dispersal of meiofaunal species is strongly influenced by environmental gradients. The data collected from Romanian Black Sea Shelf (Sf. Gheorghe Area) in the perimeter of the map sheet L35-120B, suggest another record of soft shelled monothalamous Foraminifera and Gromiidae group.

Key words: Black Sea, Cercozoa, Foraminifera, Ostracoda.

EXTREME TEMPERATURES RESPONSES OF OCIMUM BASILICUM L. PLANTS

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Abstract

Plants may encounter various environmental stresses at any time. Biotic and abiotic are generally environmental stresses, harming plants growth, development, and productivity. In the field, plants are often exposed to abiotic stresses. Plants are very vulnerable to climate change, including changes in temperature, water status (drought, flooding), rising atmospheric CO_2 concentration, the attacks of herbivores and pathogens. Among these climate changes, increased temperatures have the most negative impact on the rate of plant development (Cavaliere, 2009; Hatfield and Prueger, 2015; Zhao et al., 2017). Ocimum basilicum, also known as sweet basil, is a member of the Lamiaceae family, which grows in several temperate regions worldwide. The plants are used extensively in food products, perfumery, and religious ceremonies. This study aimed to analyse the effect of extreme temperatures on Ocimum basilicum plants on the photosynthetic parameters. Experiments were carried out using six weeks plants of basil, sawn in plastic pots filled with commercial garden, and growth in special chambers, under controlled conditions. The foliage photosynthetic characteristics were monitored for both control and treated plants using a Portable Gas Exchange Fluorescence System, Walz, Germany. This work was supported by a grant of the Romanian Ministry of Education and Research, CNCS - UEFISCDI, project number PN-III-P1-1.1-PD-2019-0349, within PNCDI. III. References Cavaliere, C., 2009. The effects of climate change on medicinal and aromatic plants. Herbal Gram, 81: 44-57. Hatfield, J.L. and Prueger, J.H., 2015. Temperature extremes: Effect on plant growth and development. Weather and Climate Extremes, 10: 4-10. Zhao, C. et al., 2017. Temperature increase reduces global yields of major crops in four independent estimates. Proceedings of the National Academy of Sciences, 114(35): 9326.

Key words: Ocimum basilicum, extremes temperatures, photosynthetic parameters.

A LONG-TERM MONITORING OF VOLATILE ORGANIC COMPOUNDS PARTICULATE MATTER, CARBON DIOXIDE AND FORMALDEHYDE IN A GENERAL SHOP

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Abstract

People spend more than 80% of their time indoors. Indoor air quality has a considerable impact on human health. People who spend a long time in buildings with poor indoor air quality can be affected by various symptoms or even diseases like cancer. The most studied indoor pollutants are particulate matter (PM), formaldehyde (HCHO), volatile organic compounds (VOC), and carbon dioxide (CO₂). Our paper aims to monitor the modifications of volatile organic compounds, PMs, formaldehyde, and carbon dioxide in different departments of a general store for a year. The particulate matter (PM₁, PM_{2.5}, and PM₁₀), formaldehyde, and carbon dioxide concentrations have been determined daily in the morning at the store's opening and a peak hour every month for a year using a multiparameter. Volatile organic compounds (terpenes, aldehydes, ketones, and alcohols) have been monitored using a gas chromatographymass spectrometry technique. The values of pollutants are changing within the daytime, the influx of buyers, type of department. In the present research work, we demonstrated that different pollutants could be presented in the market. Their values depend on the influx of buyers, departments, and the cleaning schedule.

Key words: carbon dioxide, formaldehyde, indoor air quality, particulate matter, volatile organic compounds.

THE VARIATION ON TYPES OF MICROHABITATS ON TREES IN A NATURAL FOREST - "IZVOARELE NEREI" NATURAL RESERVE - CASE STUDY

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Abstract

The aim of the paper is to highlight the variation of the frequency and types of microhabitats on trees, in a natural beech forest, depending on different stand characteristics and site condition. The research was carried out in the "Izvoarele Nerei" Nature Reserve from Caras-Severin County, Romania, the previously announced aim being achieved by fulfilling objectives such as: identifying the types of microhabitats on trees (according classification from specialty literature) on altitudinal levels, establishing the influence of altitude on the frequency of microhabitats, identification of other stand characteristics and site conditions having an influence on the frequency of microhabitats on trees. The research was carried out on four altitudinal levels (800, 1000, 1200 and 1350 m), trees characteristics determination and microhabitats identification being carried out in sample areas of 2500 m², two on each altitudinal level. The most frequent microhabitats were branch rot hole (length >= 5 cm), cracks and scars (length >= 100 cm), root buttress cavities (length >= 5 cm), epiphytic lichens (coverage > 25 %), root buttress cavities (length >= 10 cm), branch rot hole (length >= 10 cm).

Key words: biodiversity, beech forest, rot hole, buttress cavities.

SEASONAL HETEROGENEITY OF SOIL MICROCLIMATE IN *FAGUS SYLVATICA* FOREST IN RELATION WITH STAND AGE

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Abstract

The heterogeneity of soil temperature (Tsoil) and soil moisture (Usoil) is recognized as bearing an influence on plant communities, due to the variability of vegetation-specific resource requirements. We tested the temporal differences of heterogeneity of the soil microclimate in an even aged beech forest with four different stand age (10, 30, 80, 120 years) located in the southern part of Romania. The bimonthly measurements of Tsoil and Usoil, made over almost a year (April-December) aimed to investigate the interaction between the age of the trees and these climatic variables in the soil. Both climatic parameters were calculated for each experimental plot for each season and for the entire measurement period. The one-way analysis of variance (ANOVA) was used to test the differences between the plots with trees of different ages for the temporal variability of the soil microclimate. The temporal patterns of soil microclimate differ significantly between tree ages, being more sensitive to Usoil compared to Tsoil. The analysis of our data showed a decrease in Tsoil with the age of the tree in the spring and similar trends in the rest of the measurement periods. On the other hand, the Usoil model showed less seasonality compared to the Tsoil, probably being more receptive to the characteristics of local conditions, such as the slope of the land, the thickness of the litter layer, the porosity of the soil or the degree of closure of the forest canopy. These results can conclude that, the ability of forest at small stand ages will increase seasonal the soil microclimatic parameters (Tsoil and Usoil) at highest levels.

Key words: forest, heterogeneity, soil temperature, soil moisture, stand age.

ECOLOGICAL RECONSTRUCTION OF THE STANDS AFFECTED BY DROUGHT FROM MEADOWS OF INLAND RIVERS

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Abstract

The surface of the stands affected by drying, located in the meadows of the inland rivers is in continuous growing due to the modification of the hydrological parameters under abiotic, biotic and anthropogenic factors. The forest species frequently used in the past (1970-1990) for afforestation were the hybrid black poplars or the selected willows. Currently, they are less used, due to the change of environmental conditions but also by including them in protected areas, for the detriment of native species. In the paper, are presented data regarding on the characteristics of the stands affected by drying located in research plots from Bužau and Lower Siret meadows. The results bring the environmental potential of the lands by restoration of the affected stands from forest-steppe areas using adequate species adapted to resist on different types of soils, being able to face the new ecotope conditions. The ecological reconstruction of these stands is an urgent need and is the only way to maintain the ecological balance, biodiversity and, at the same time, to capitalize on these categories of land unsuitable for other destinations.

Key words: ecological reconstruction, meadow, restoration, riverside coppice, riparian forests.

EVALUATION OF POTENTIALLY TOXIC ELEMENTS IN BLACK SEA FISHERY RESOURCES: A REVIEW

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Abstract

Environmental pollution is a worldwide problem and heavy metals (HM) constitute one of the most important challenges. Due to industrialization and urbanization, Black Sea is considered as one of the most polluted seas in the world. The aim of the current study is to provide a state-of-the-art review related to the evaluation of potentially toxic elements in fishery resources from Black Sea. As a result, various data sources were revised and the appropriate information was centralized to acquire a clear sight on concentrations dynamics and accumulation tendency of the most hazardous HM and metalloids, as it follows: Ni, Cd, Zn, Hg, Fe, As, Cr and Pb. Accordingly, the aforementioned multitude of chemical pollutants bio-accumulates in fishery resources and are being a particular concern in relation to their harmful effects on human health.

Key words: heavy metals, fishery resources, Black Sea.

OVERVIEW OF THE BULGARIAN NATIONAL ENERGY TRANSITION TARGETSBY SECTORS

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Abstract

The publication presents an overview of the national energy targets by sectors, emphasizing the goals of energy transition by analysing the national legislation, strategic documents and action plans in Bulgaria. A brief introduction is presented on the current energy data, what actions in terms of energy efficiency, savings and decarbonisation have been implemented so far and their impact. The publication analyses the government's action plans to move to a low-carbon economy by implementing short-term and long-term measures in the different economic sectors. For the purposes of the analysis, the energy consumption sectors are defined according to the guidelines of the Sustainable Energy Development Agency for the development of municipal plans and programs to promote the use of energy from renewable sources and biofuels and energy efficiency, as well as the guidelines for developing a Sustainable Energy and Climate Action Plans of the Covenant of Mayors, as follows: Buildings, Industry, Transport and Agriculture sectors.

This review will serve for further analysis and assessment of energy transition scenarios. The expected impact from the implementation of the national plans for achieving the European targets is analysed.

Key words: energy transition, energy targets, energy strategies, sustainable energy, climate plan.

THE INFLUENCE OF ELEVATED CARBON DIOXIDE ON *RAPHANUS SATIVUS* PLANTS

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Abstract

In the last years, the global concentration of carbon dioxide has risen more than ever, from 385 ppm in 2010 to 416 ppm in December 2022. This increase represents a 47 percent increase since the beginning of the Industrial Age. The high concentration of CO_2 is beneficial for the plants due to the rise in the rate of photosynthetic carbon fixation. But the high carbon dioxide concentration comes with increasing global temperature by more than 0.5 degrees. In order to study the influence of carbon dioxide on plants, we used different varieties from Raphanus sativus, grown at 400, 800, and 1200 ppm CO_2 . We have shown the photosynthetic parameters as assimilation rates and intracellular carbon dioxide increase for plants grown at elevated CO_2 while the concentrations of the primary and secondary metabolites decrease. This work was supported by a grant of the Romanian National Authority for Scientific Research, CNCS – UEFISCDI, project number PN-III-P4-ID-PCE-2020-0410.

Key words: climate changes, abiotic stress, secondary metabolites, elevated carbon dioxide.

THE LOGGING IMPACT ON THE SEEDLINGS FROM LOGGING SITES IN SOUTHWESTERN ROMANIA

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Abstract

From thinning to regeneration works, stand management works, can only be applied through logging, which become a vector of maintaining biodiversity through forest regeneration, but also a vector of reducing it, through the damage it causes to forest ecosystem and to seedlings. This paper analyzes the impact of logging works on the seedlings and its biodiversity in 96 sample plots located in 24 wood harvesting sites in southwestern Romania (8 logging sites for each relief form). The impact of logging works on the seedlings was studied by analyzing the evolution of seedlings damages and the impact of these damages on their further development, but also by analyzing the composition of the installed seedlings and comparing it with the composition of the exploited tree. The highest degree of seedling damage was recorded at final cuttings. The most accelerated seedling healing pattern was recorded for barkings. We have observed a maintaining diversity of species after logging that can lead, to a stable diversity of the species from the stand. The obtained results were discussed and compared with other research in the field, highlighting the most important aspects observed.

Key words: logging works; logging technology; damages; regeneration areas.

THE USE OF *PECTINATELLA MAGNIFICA* AS BIOINDICATOR FOR HEAVY METALS POLLUTION IN DANUBE DELTA

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Abstract

Water pollution with heavy metals is a persistent and hazardous issue, due to these pollutants incapacity to decompose and their tendency to accumulate in biota. These effects extend on the aquatic ecosystems from Danube Delta, which are subjected to anthropogenic pressures, due to intensive agriculture practices, intense tourism activities and the lack of sewage systems. In the context of global warming effects, alien species are developing in the waters of Danube Delta, such as Pectinatella magnifica. The present study explores the hypostasis according to which the aforementioned bryozoan can be used as a suitable bioindicator for heavy metals pollution in Soschi Lake, Danube Delta. Samples of water, sediments and biota were collected from the study area and the following metals were analysed: cadmium, lead, nickel, chromium, iron, zinc, copper, manganese and cobalt. The bioaccumulation factor was calculated, in order to highlight the accumulation potential of the bryozoan. The obtained values of metals concentration were compared to the national regulation related to the quality of surface waters. following accumulation trend identified The was in the brvozoan: Fe>Zn>Mn>Cu>Ni>Cr>Co>Cd>Pb.

Key words: bioindicator, Danube Delta, bryozoan, heavy metals.

THE INFLUENCE OF ELEVATED CARBON DIOXIDE ON PLANTS DROUGHT TOLERANCE

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Abstract

Human activities` total CO_2 release in the atmosphere exceeded 43.1 billion tons in 2019. Consequently, the global carbon dioxide concentration has been 417 ppm in January 2022. For plants, the high concentration of CO_2 is, on the one hand, beneficial because it leads to an increase in the rate of photosynthetic carbon fixation, which causes an increase in biomass production. On the other hand, the rise in carbon dioxide concentration comes with the rising temperature and periods of drought, which determines plant stress. We used different plant species from Brassicaceae family (Brassica oleracea, variety capitate, Brassica oleracea, variety botrytis, Raphanus sativus, Brassica oleracea, variety italica) grown at high carbon dioxide to test their resistance to drought. The photosynthetic parameters, volatile organic compounds emission, chlorophylls, and flavonoids contents of the leaf have been disturbed by short periods of drought stresses than those produced at 400 ppm CO₂. This work was supported by a grant of the Romanian National Authority for Scientific Research, CNCS – UEFISCDI, project number PN-III-P4-ID-PCE-2020-0410

Key words: climate changes, drought stress, volatile organic compounds.

FIELD ELM (*ULMUS MINOR* MILL.) STANDS THE MOLDAVIAN PLAIN

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Abstract

Field elm is a tree species widespread in many areas from Europe, including the Moldavian Plain. Due to its multiple qualities, field elm represents a valuable wood resource even though it has a reduced areal. The present article describes the environment and stand conditions for this species in the Moldavian Plain and is based on an inventory of all stand elements from this area that were extracted from forest management plans dating from the last decades. Field elm is present in all forest districts from the Moldavian Plain, occupying a total surface of 369 ha. From an altitudinal perspective, the species is widespread from 25 m up to 440 m. The largest percentage is found between 100 and 200 m. The stands' age ranges between 5 and 100 years, with the largest percentage at 21-40 years. The stands have an average productivity, a relatively even-aged structure and a crown density of 0.8-0.9 with a current average growth of 0.5-0.7 m³/ha. The characteristic soils are cambic chernozem and stagnic luvisol, while the forest types are represented by tug forests and tug holm.

Key words: age, altitude, field elm, productivity class, soils.

ENVIRONMENTAL POLLUTION DUE TO ROAD VEHICLES, ALTERNATIVE SOLUTIONS (ELECTRIC VEHICLES, HYBRIDS, BICYCLES) SUSTAINABILITY OF CROWDED CENTERS OF CITIES

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Abstract

Currently, the level of air pollution, especially in big cities, is above the allowed limits and this affects the health of the inhabitants and the environment. High levels of air pollution can cause a few respiratory and cardiovascular diseases. Based on these considerations, we draw attention to the major importance of research in the field of pollution, finding solutions to improve and minimize the negative effects of air pollution in general on the planet. Greater attention needs to be paid to actions to identify the sources of air pollution and its chemical composition, as well as to establish measures to monitor and improve the quality of the atmosphere. It is known that the level of air quality is influenced by the level of pollutant emissions.

In the air we breathe, these emissions come from both stationary and mobile sources of pollution. Mainly road traffic, but also heating installations that use fossil fuels are the main suppliers of polluting emissions.

The rapid evolution of technology, as well as fierce competition from car manufacturers, is having an increasing impact on global consumption trends, and in the coming years, until 2025, several major changes are announced. Carbon dioxide emissions are expected to decrease due to fuel efficiency and the use of ultra-efficient hybrid cars. It is estimated that by 2025, almost a third of the car's carbon dioxide emissions will be reduced, so a natural question about the resource consumption of these cars will be higher or lower. Europe is made up of 50 states, in 31 of which natural gas, compressed or liquefied, is used as fuel for light or heavy commercial vehicles.

According to studies carried out by the European Environment Agency, it has been concluded that the change in pollutant emissions is directly related to the speed of traffic. Thus, the carbon emissions increase 1.5-2 times during the acceleration/braking cycles and up to 25 times in the case of idling and the concentration of the emission of noxious substances increases in proportion to the speed.

Key words: alternative transport, electric, environment, hybrid, pollutant emissions.

STUDY ON THE OPTIMIZATION OF CONCRETE SCREEDS IN ZOOTECHNICAL FARMS

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Abstract

Nowadays we are faced on a daily basis with the idea of being involved as much as possible in assuring the wellbeing of our planet. We are striving to implement a way of thinking that would eventually be a way of life, present in the zoo-technological farms as well. Our aim is to accomplish two main goals, firstly to have a civic contribution by strengthening the 3RE principals (Recycle - Reuse - Reduce) recycling used tires, giving them a brand-new purpose. Second, we want to improve the comfort of livestock by changing the mortar screed quality, found in cattle's stables. Optimizing the Screed Mortar, we will manage to satisfy the needs of both farmers and livestock, all being an integral part of this research.

Key words: concrete screed, recycling, waste.

MODELING OF INDICATORS OF ECONOMIC EFFICIENCY OF SECTORAL LAND USE

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Abstract

This article provides an in-depth analysis of the calculation of gross domestic product (GDP) by the production method which is based on gross value added by type of economic activity. The dynamics of indicators that determine the directions of state economic policy is studied. Multivector use of GDP creates a basis for financial support from the IMF, the Maastricht convergence criteria, the forecast of public defense spending.

Assessing the contribution of each type of economic activity and each institutional sector of the economy to the creation of GDP, the study identified the following types of economic activity: agriculture; forestry; industry; construction; trade, transport; IT field; financial and insurance activities; scientific and technical, administrative activities; public administration, defense, education, health care and social services; other services (taxes, arts, entertainment and recreation).

An important stage of the study was to find the relationships between economic indicators of profitability (average GDP per unit area) and the use of land resources, considering the institutional sectors of the economy. The analysis shows the level of dependence of the income of a particular sector of the economy on the area of land use involved in the formation of national economic benefits. Dependences of profitability of economic sectors on land resource potential are revealed. It is established that to ensure high economic indicators (GDP indicators), it is necessary to develop economic sectors that have a significant impact on the formation of national wealth.

Key words: economic efficiency, GDP, land use, nature management.

TOXICITY OF COPPER ON THE SINAPIS ALBA AND TRITICUM AESTIVUM PLANTS

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Abstract

In this paper, we studied the effects of soil pollution with copper on the biomass production, the fractal surface of leaves and the elongation of the roots of white mustard (Sinapis alba) and wheat (Triticum aestivum) plants. The soil used in our experiments was polluted with CuSO₄·5H₂Osolutions in concentrations ranging from 200 mg/kg to 1200 mg/kg. Wheat was the most affected by soil pollution with copper. At the maximum concentration of pollutant in the soil, i.e., 1200 mg/kg, it did not germinate. Compared to white mustard, wheat had a lower plant biomass, i.e., between 28% and 34%, depending on the concentration of soil pollutant. Regarding the length of the roots of the two plants, there is a 50.82% difference between them at the maximum pollutant concentration applied, i.e. (1200 mg/kg), compared to the control sample. The measured fractal surface of the white mustard leaves decreased, as well as the length of the roots, as the copper concentration in the soil increased.

Key words: toxicity, concentration, biomass, root elongation.

THE ROLE OF CIRCULAR ECONOMY IN DECARBONIZING DANUBE DELTA

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Abstract

The role circular economy has in decarbonizing waterborne activities, is better captured in a port infrastructure. Ports have a major role in the global production and distribution network, being a good example of inter-modality: road-rail-waterborne. In the context of current concerns about climate change and considering the need for sustainability, ports need to be permanently reinvented to cope with new environmental requirements and to easily adapt to changes taking place globally. Port of Tulcea is an important port by the lower Danube and qualifies as a case-study to test the principles of a circular economy within a Carbon context. Activities such as loading and unloading imported and exported raw materials take place in the industrial port, while the commercial port is intended for passenger traffic and serves the whole Danube Delta area. An approach to circular economy is needed to understand ways in which the carbon footprint associated with the port's activity can be reduced. Thus, we have developed a framework which needs to be tested in further activities and surveys. Considering the continuous reduction of natural resources and associated carbon footprint, it is necessary to revaluate options for waste management and explore the power of circular economy. Several waste production flows are identified in Danube Delta, for which recycling and reuse are priorities, such as scrap metal, reed and organic waste. The examples will help testing the Framework for validation.

Key words: climate change, circular economy, decarbonizing waterborne, sustainability.

MONITORING OF ENVIRONMENTAL POLLUTION AS A RESULT OF THE ACTIVITY OF REARING AND PRODUCTION OF SWINE

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Abstract

The Danish company Premium Porc Group is the second largest producer of pork on the local market, the production activity being carried out in the 12 pig farms in Vrancea, Brăila, Constanta, Olt, Sibiu, and Brasov and since 2013 also within the Negreni farm in Olt County. The two lagoons for the storage and biological treatment of the liquid dejections have the bottoms and the soles waterproofed with geotextile membrane, and, to prevent the distribution of odours in the village, the dejections stored in these two ponds are permanently covered with a waterproof membrane. The solid dejections storage platform is located at 35 m from the two liquid dejections storage lagoons. To highlight how the activity of rearing and production of swine within Premium Porc Negreni Company from Olt County affects the quality of environmental factors, samples of air, rainwater and groundwater were collected during 2018-2020 and subjected to analysis. The following quality indicators were analysed and monitored: NH_3 and H_2S emission (long-lasting 24 h and short-term 30 minutes averages), pollutant emissions from combustion gases from the natural gas thermal power plant (particulate, CO, NO_2 and SO_2) and the noise in the air; pH, total suspended particulates (TSM) and total petroleum hydrocarbons (THP) from meteoric/pluvial water discharged into the Negrișoara stream; pH, nitrites and nitrates species in groundwater.

Key words: air, rearing, swine, waste, water.
PHYTOREMEDIATION CAPACITY AND PHOSPHORUS MASS BALANCE IN A BASIL-STURGEONS AQUAPONICS INTEGRATED RECIRCULATING SYSTEM

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Abstract

The long-term increased demand for animal-based protein had determined the practice of intensive farming technologies, strategy that may rise environmental sustainability issues. Aquaculture food production industry manages both to satisfy market demand for fish and contributes to restocking programs conducted in order to support biodiversity conservation programs. Integrating aquaponics techniques into already existing recirculating aquaculture production systems may represent a solution for limiting the environmetal impact, while maintaing a high production intensity. The present study targets to identify the basil phytoremediation potential by evaluating its phosphorus removal capacity from the technological water resulted by practicing intensive sturgeons aquaculture. The P mass balance is identified in order to determine the sustainability of the tested, aquaponics based, water treatment solution, by considering the P concentrations of fish feed, solid waste, wastewater, technological water, fish and plants biomass. The results indicates that basil presents high P removal capacity and both hydraulic parameters and regimes are important parameters to be considered in the phytoremediation technology optimization process. Similar studies are recommended to be performed by testing both aquaponics deep water and nutrient film techniques.

Key words: phytoremediation, basil, phosphorus, aquaponics, mass balance.

BIOACCUMULATION AND DISTRIBUTION OF HEAVY METALS, MACRO AND MICROELEMENTS IN *ODONTARRHENA CHALCIDICA* FROM BULGARIAN SERPENTINE SOILS

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Abstract

Comparative research has been carried out to determine the accumulation of heavy metals, macro, and microelements in the vegetative organs of Odontarrhena chalcidica, collected from serpentine soils from the Eastern and South Rhodopes Mountains (Bulgaria). The content of metals in the plant varies depending on the sampling location and, above all, on the content of their mobile forms in the soil. In Odontarrhena chalcidica plants, the maximum concentrations of Ni were up to 873.1 mg/kg in roots, 924.9 mg/kg in shoots, 8317 mg/kg in leaves, and 6693 mg/kg in flowers. Ca/Mg ratio in plant tissues were up to 6.2 (roots), 7.4 (stems), 10.2 (leaves), and 7.4 (flowers). There is a distinct pattern in the accumulation of heavy metals in the leaves and flowers, K and P in the flowers. There is no clear trend for Pb, Zn, Cu Fe, Mn, Cr and Co. This study shows that Odontarrhena chalcidica from serpentine soils of Bulgaria appears as a strong Ni hyperaccumulator and can be used for phytoextraction purposes.

Key words: serpentine soils, nickel hyperaccumulator, heavy metals, Odontarrhena chalcidica, Bulgaria.

HEAVY METAL ACCUMULATION AND CHEMICAL COMPOSITION OF ESSENTIAL OIL OF JUNIPERUS OXYCEDRUS L. (CUPRESSACEAE) GROWN ON SERPENTINE SOILS IN BULGARIA

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Abstract

This study investigated the heavy metal concentrations and chemical compositions of the essential oils of Juniperus oxycedrus L. (Cupressaceae), growing on serpentine soils in the Eastern Rhodopes Mountains, Bulgaria. Elevated Ni content in soils does not affect the development of Juniperus oxycedrus L. and the quality and quantity of oil obtained from it. Sixty components representing 98.10-98.92% of the total oil were identified. The major compounds were determined limonene (12.10-13-84%), γ -himachalene (7.47-12.58%), manoyl oxide (6.60-12.80%), α -pinene (6.41-8.78%), dibutyl phthalate (1.48-8.14%), δ -cadinene (2.93-6.33%), γ -cadinene (3.64-5.00%), β -bisabolene (2.98-4.29%) in needles oil. The Juniperus oxycedrus L. can be considered as "excluder plant," containing relatively low metal concentrations in the needles even in cases of high elemental concentrations in the soils. Metal concentrations for toxic elements in plants and oils were below the permissible limits for pharmaceutical purposes. Therefore, Juniperus oxycedrus L. found on serpentine soils is recommended to be collected for pharmaceutical purposes.

Key words: serpentine soils, essential oil composition, heavy metals, Juniperus oxycedrus L.

EFFICIENCY OF NEW FERTILIZERS BASED ON SEWAGE SLUDGE OF URBAN TREATMENT FACILITIES IN THE FODDER CROP ROTATION IN THE WESTERN FOREST-STEPPE OF UKRAINE

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Abstract

Sewage sludge (50-52% moisture) of a large regional city in the western part of Ukraine is characterized by a complex of agronomically valuable traits, but their direct incorporation into the soil as a non-traditional organic fertilizer is ecologically impractical due to several unfavourable factors, therefore, they should be processed into quality fertilizers of the new generation. The composition of complex organo-mineral fertilizers based on sewage sludge with mineral additives of different origin is developed and new three- and two-component organo-mineral fertilizers of prolonged action for multi-purpose use are obtained. In a field experiment (2017-2019) with a comparative study of the effectiveness of different types of fertilizers in the fodder crop rotation, it was found that new organo-mineral fertilizers with the main application in optimal doses on light gray forest soil in the Western Forest-Steppe of Ukraine had the same effect in the year of action and aftereffects as traditional and non-traditional organic fertilizers, as well as complete mineral fertilizers (in equivalent doses), and allow with a single application of the first crop rotation crop to grow the second and third crops without fertilizers 110% and 45% according to the control without fertilizers.

Key words: efficiency, new organo-mineral fertilizers, fodder crop rotation, Western Forest-Steppe, Ukraine.

OAK REACTION TO FUTURE CLIMATE CHANGES IN CENTRAL AND EASTERN ROMANIA

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Abstract

The extent of changes in future climatic conditions for oak forest ecosystems has been determined using a climatic modelling software. The HYPE software is able to forecast how certain climatic factors that lie behind extreme climatic phenomena affect forest ecosystems. The software was used to study oak forest ecosystems across sample surfaces within the Transylvania and the Moldova plateaus. The following step was to create simulations for two future climatic scenarios. In the first scenario, the increase of green house gases would be moderate (rcp-4.5), while in the second scenario, the increase would be accentuated (rcp-8.5). After the data processing, there resulted an analysis which focuses on the future changes within the climate which affect forest ecosystems located in the studied area. By analyzing all six oak stands, we can conclude that the Traian stand will be the most vulnerable one. The oak forests will be more affected in Moldova plateau then in Transilvania plateau in the future decades. These results can be used for applying the best management measures for current stands as well as for establishing decisions for installing future stands at the regions studied.

Key words: climate change, forest ecosystems, oak, Transylvania plateau, Moldova plateau.

SUSTAINABLE DEVELOPMENT OF RURAL AREA

REASONS FOR MAINTAINING AND/OR INTRODUCING TREES ON GRASSLANDS

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Abstract

Grasslands with sparse trees are a high biological and cultural value agroforestry system, which are not enough promoted in Romania. In this article, a grassland with sessile oak and pedunculate oak and one without trees were studied. Data were collected from several 7 sample areas distributed randomly with an area of 100 m^2 . In these surfaces were taken soil samples from the layer 0 - 10 cm deep and samples of grassy species, about 200 grams. Also, in the grassland with sparse trees all the trees were inventoried and were measured the diameter of the trunk at 1.30 m, the height of the trees and the projection of their crown.

From the analysis of the data, the grassland with trees is superior to the tree-less grassland, from all points of view: productive, protective and aesthetic, which is why this agroforestry system in the temperate zone of our country plays a very important role in maintaining a balance between the quality of the pastures and the quantity and quality of the animal products obtained.

Key words: agroforestry system, grasslands with sparse trees, grassy species, trees, protective.

ELABORATION THE SUBSTANTIATING STUDIES FOR THE NECESSITY OF FOREST SHELTERBELTS TO PROTECT THE FIELD, PREMISE FOR OBTAINING FUNDS FOR THEIR REALIZATION

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Abstract

Forest shelterbelts are the most widespread and efficient type of agroforestry system in Romania used for the crops protection. Following the contracts signed with the Ministry of Agriculture between 2005-2006, substantiation studies for the establishment of forest shelterbelts were carried out for seven counties from Romanian Plain and Dobrogea. At different stages of the Nucleus Program, funded by the Ministry of Research, in the period 2011-2021 studies were conducted to substantiate the need of realisation of forest shelterbelts to protect the field in other nine counties located in the mentioned area. The aim of these studies was to establish: the land areas occupied by the forest shelterbelts; the network of forest shelterbelts using GIS techniques, current rectified aerial images and detailed pedological maps; the afforestation compositions; the number of forest seedlings and to estimate the costs necessary for their installation and maintenance, until the canopy is close. For practical reasons, it was established that the width of the curtains should be 10 m, thus resulting in a percentage of occupation of the agricultural land with forest vegetation of approximately 2%.

Key words: agroforestry system, forest shelterbelts, GIS techniques, the afforestation compositions, forest seedlings.

A NEW STRATEGIC APPROACH USED FOR THE REGENERATION OF SOIL FERTILITY, IN ORDER TO IMPROVE THE PRODUCTIVITY IN ECOLOGICAL SYSTEMS

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Abstract

The constant pressure to increase food, fiber, and fuel production in order to meet the increasing global demand and prevent malnutrition has put significant pressure on soil resources. Minimal attention to soil protection and conservation, inadequately aggressive management, as well as climate change have resulted in abandoned, degraded, and the expansion of agricultural marginal areas with major agricultural limitations. Agricultural production on degrading land necessitates increasing amounts of chemicals such as fertilizers and pesticides with a negative long-term effect. In recent years, many activities have been proposed to improve soil characteristics starting with the change of cultivation methods, grazing, mulching, composting, soil conservation, green manuring, soil remineralization, however no clear strategies are known to integrate all these measures in a unitary way. which helps farmers to restore degraded soils, while obtaining high yields in organic farming. To reverse these trends, fundamental adjustments in productive systems are required, including the implementation of sustainable natural resource management. Our study proposes a strategy that successfully integrates several soil regeneration techniques, as well as design new planning that allow farmers to benefit from the services offered by agroecosystems.

Key words: soil regeneration, strategies for organic farming, healthy ecosystems.

THE TOURISM DEVELOPMENT OF THE SUREANU MASSIF BY VALORISATION OF THE NATURAL POTENTIAL

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Abstract

The extraordinary complexity of the natural setting, the excellent geographical position, the diversity of landforms, the multitude of tourist resources resulting from human creations (cultural, historical, technical, economic, etc.) within the Şureanu Massif are favorable conditions for tourism development. The uneven distribution of the elements of the tourist potential has determined the creation of tourist concentrations with an easily observable territorial distribution: the natural tourist potential is found mainly in the central, less anthropized part of the massif, where it abounds in various tourist objectives. As we move away from the high central area and approach the hearth of the meadow settlements, the spectacular relief decreases, the natural tourist elements being replaced by the anthropic tourist potential, consisting of unique anthropic buildings, of a special beauty. The diversity of resources with tourist attractiveness was the basis for the development of a varied mountain tourism (winter sports, speotourism, weekend tourism, adventure tourism, integrated tourism, cultural tourism, etc.).

Key words: GIS, development, natural potential, tourism planning, valorisation.

MICROBIAL DIVERSITY IN SOILS FROM HIGH NATURAL VALUE AGRICULTURAL SYSTEMS WITH PASTURES AND NATURAL MEADOW IN SUCEAVA COUNTY

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Abstract

Agriculture with High Natural Value (HNV) is a new concept, develped in the last two decades to describe those agricultural systems in Europa owing the widest biodiversity. Its main characteristics are the low intensity and the presence of semi-natural vegetation. Romania has one of the most important resource of areas classified as HNV due to the great variety of species associated to agricultural land utilised as permanent meadows, by traditional mowing and grazing activities. The aim of this paper is to present the results of research carried out to evaluate the biodiversity of microbial communities in three soils under traditional management of HNV pastures (Vicovu de Jos, Comănești) and natural meadow (Valea Moldovei), Suceava county. The total counts and species of bacteria and fungi (estimated by dilution plate), soil respiration (by substrate-induced respiration method), diversity index of Shannon (H) and similarity index between habitats were calculated and presented as Venn diagram. Biodiversity of microbial communities consists in 6 to 9 species with important roles in main processes in plant rhizosphere, soil organic matter recycling, cellulose decomposition, soil aggregation, biocontrol.

Key words: *HNV agricultural systems, biodiversity, microbial communities, pastures, natural meadow.*

RESEARCH ON THE EFFICIENCY OF NIGHT HERBICIDE IN SMART FARMS IN ROMANIA

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Abstract

In recent years, agricultural lands have become increasingly vulnerable to climate change globally, which is felt at the national level in Romania as well, and the growth of agricultural production could be significantly reduced. In addition, plant diseases create another constraint on good agricultural production. Thus, the balanced and optimal use of herbicides contributes to the management of plant protection and development, and its excessive use can decrease crop yields, causing damage to agricultural land and the environment. Since herbicide is a complex process of operations, it must be applied precisely on agricultural land with a significant area, in which the farmer is constrained by time and weather, this action began to take place at night. This paper presents research on the efficiency of night herbicides in smart farms in Romania. The paper presents a synthesis of the benefits of night herbicide and the problems of farmers related to this activity. This will lead to savings in herbicide use, better weed control, less impact on the environment and, indirectly, increased crop productivity.

Key words: night herbicide, smart famrs, trends.

THE RISKS OF LAND FRAGMENTATION OVER THE QUALITY OF LIFE IN RURAL AREAS IN ROMANIA

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Abstract

Agriculture, as the basic branch of the economy and as biological branch of the material production, is an economic sector of national priority. We aim to capture aspects related to risk management in agriculture, in the dynamics determined by the lack of coherent agrarian, economic, social, unitary policies, complementary to the reality on the spot, and to facilitate the merger of agricultural lands in Romania. Through a comparative analysis, we show the perspective of specific Romanian trends, leading to perpetuation and development of several major risks with a significant impact on the performance of Romanian agriculture, as well on the quality of life in rural areas. Is there a pattern that leads to an inertia of agricultural activities? How can the negative effects be overcome? What needs to be changed to generate performance and economic progress in agriculture? The methodology used is based on NIS, Eurostat results, documenting broader perspectives described in specialized literature through which we illustrate the general picture of the quality of Romanian agriculture, namely the merging of agricultural lands.

Key words: land merging, risk management, technology, agriculture, globalization.

CONSEQUENCES OF FRAGMENTATION OF AGRICULTURAL LAND ARRANGEMENT WITH DRYING-DRAINAGE WORKS

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Abstract

Agriculture plays a strategic role in all countries, as it is the main sector responsible for food security of the population, while also making a special contribution to the overall process of sustainable economic development and environmental protection. Land improvement works, in all the states of the world, have a very important contribution in the food supply of the population. Despite the special agricultural potential of the lands in the meadow and terraces of the River Moldova, arranged with surface and subsurface drainage works, the deficient organization of this sector, after 1991, by the increased fragmentation of the agricultural lands, the exploitation on small plots located improperly compared to the network of absorbent channels and drains, the lack of advanced agricultural technologies, led to the practice of a subsistence agriculture, depending on the weather conditions. The modelling of the land inconsistent with the position of the absorbent drains and the network of canals favoured the stagnation of water in ditches and micro-depressions, the prolongation of excess moisture, which led to delays and improper performance of soil works and, implicitly, to low yields.

Key words: canal network, excess moisture, surface and subsurface drainage, shaping in ridges and furrows.

DISASTER MANAGEMENT

SUSTAINABLE SOLUTIONS IN BUILT ENVIRONMENT SAFETY

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Abstract

The paper presents the current level in the development of an integrated system to ensure the security of the built space, with semi-automatic generation of PGA maps from seismic actions or other vibrating sources and rapid assessment of the vulnerability of instrumented/monitored buildings. The integrated and automated system is an essential step for the early detection of damage to future earthquakes. As performance benchmarks are listed: identification and acquisition of specialized software, an instrumentation campaign of public utility buildings belonging to NIRDs at national level, some case studies. The obtained results are transferable and of special technical and legal importance, the elaborated documents representing the basis for the Technical Book, and the archived data constituting initial records for the future data obtained after a major earthquake. Finding a reliable solution for a quick analysis after an earthquake, by generating a report with the dynamic parameters of the monitored buildings behaviour, is a challenge of a strategic and logistical nature, of acquisition, storage and continuous processing of data, elaboration of analytical models for validation, in context of digital approach for structural engineering.

Key words: built environment, digitization, integrated system, security, structural dynamic parameters.

THE IMPACT OF TURNkey SEISMIC MONITORING NETWORK IN BUCHAREST

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Abstract

The paper presents the seismic monitoring network of the TURNkey Project (Towards more Earthquake-resilient Urban Societies through a Multi-sensor-based Information System enabling Earthquake Forecasting, Early Warning and Rapid Response Actions) in Bucharest. TURNkey aims to contribute to the mitigation of earthquake risks through European and global scientific collaborations. To reach its objectives the project brings together a strong multi-disciplinary team of experts (geophysicists/seismologists, geologists, engineers, disaster risk managers and sociologists) from 21 partner institutions covering 10 European countries. "Testbed 1" (Bucharest) is described in the paper, with its five monitored locations and the deployed seismic sensors and GNSS. The choice of monitored buildings is based upon the characteristics of the design code used in their construction. The paper considers the possible influence of local conditions at the sites of the monitored buildings.

Key words: GNSS, seismic sensor, seismic network, testbed, TURNkey.

ANALYSIS OF THE EFFECT OF DEFORESTATION ON LAND STABILITY BY GEOMATIC METHODS -CASE STUDY ANALYZED IN THE GeoSES PROJECT

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Abstract

From 2005 to 2009, in Maramureş, over 1,000 hectares of forest area were cleared, although the entire area is part of the integral protection area of the Maramureş Mountains Natural Park. Although, worldwide, the main cause of deforestation is the development of land for agricultural purposes, in Romania, from the beginning, the main purpose has been to obtain timber. Thus, in Maramureş, and in the year of the 2020 pandemic, more than 104,000 cubic meters of illegally cut wood were reported in a communiqué of the Ministry of Environment, practically 340 hectares of forest being severely affected. The effect of deforestation on land stability can be viewed from at least two points of view: 1. Deforestation causes climate change that in turn causes landslides, 2. Deforestation causes land instability by eliminating stabilizing roots leading directly to landslides.

The analysis of these effects, directly on the case studies made in the field is currently carried out by means of Geomatics. The paper analyses the techniques and tools that can be used, the technological flow and the results, using one of the case studies analysed in the GeoSES Project, located in Sighetu Marmației, the most affected by the more or less legal deforestation practices taking place in Romania.

Key words: deforestation, geomatics, landslides, 3D Model, orthophotoplan.

LANDSLIDE ANALYSIS USING GIS TOOLS -CASE STUDY ANALYZED IN THE CROSS-BORDER GeoSES PROJECT

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Abstract

The international cross-border project GeoSES-Extension of the operational "Space Emergency System" towards monitoring of dangerous natural and man-made geo-processes in the HU-SK-RO-UA cross-border region HUSKROUA 1702 /8.1. / 0065 was included in Thematic objective 8. TO -Common challenges in the field of safety and security, Program priority 8.1 Support to joint activities for the prevention of natural and man-made disasters as well as joint action during emergency situations of the HUSKROUA ENI CBC Program 2014-2020. Technical University of Cluj Napoca was one of the participants in the project together with the Project Leader Uzhhorod National University, Ukraine and Pavol Jozef Šafárik University in Košice, Budapest University of Technology and Ecomomics, Self-government of Szabolcs-Szatmár-Bereg County. The overall objective of the project is geo-monitoring of natural and man-made processes in the cross-border territory with the aim of preventing emergency situations. The project specific objectives are the following: 1. Reduction of the risks of natural disasters by means of geomonitoring of dangerous landslide and mudflow processes in the valley of the Tisza River; 2. Forecasting the occurrence of heavy rainstorms in cross-boundary areas with the aim of preventing unexpected river floods, 3. Development of a joint innovation strategy for preventing ecological disasters and adopting to change climate in the Carpathian Region. Located at the foot of Solovan Hill, Sighetu Marmatiei was subjected to numerous landslides. In these conditions, the role of the Romanian partner in the project was to monitor this situation, operations carried out both globally, for the entire municipal territory and neighborhoods and privately through six locations chosen both due to the gravity of events over time and the fact that these landslides had different causes. The paper presents the GIS mechanisms used to generate the landslide risk analysis.

Key words: Landslide, GIS, Maxent, 3D model.

WATER RESOURCES MANAGEMENT

ASSESING THE OPORTUNITIES OF DELIVERING SUSTAINABLE DRAINAGE SYSTEMS IN ROMANIA

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Abstract

Rainfall and surface water runoff are valuable resources, and this should be reflected in the way it is managed and used in our cities and towns in Romania. It can provide beauty, enhance biodiversity, improve buildings, places, and spaces. Also, it helps making them more adaptive and resilient to climate change, which is one of the biggest challenges in the world. The SuDS philosophy is about maximising the benefits and minimising the negative impacts of surface water runoff from developed areas. Moreover, SuDS are designed to manage the flood and pollution risks resulting from urban runoff but also to contribute wherever possible to environmental enhancement and place making. With this in mind, the multi-functionality and multiple benefits of SuDS should always be considered. Going forward, in most of the towns and cities there are opportunities to better manage surface water – replacing the old systems that discharge rain and runoff to the drains and sewers with new ones which capture rain, manage surface water runoff, and deliver multiple benefits.

Key words: environmental, drainage, multiple benefits, rainfall, runoff.

STUDY OF THE INFLUENCE OF MANNING PARAMETER VARIATION FOR WATERFLOW SIMULATION IN DANUBE DELTA, ROMANIA

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Abstract

The paper aims to present the results of the influence of variation of Manning parameter in 1D water flow simulation on one of the most important channels in the Danube Delta, located in Tulcea county, Romania. The data used for the 1D simulations include water velocity, discharge, depths and was measured using the RiverSurveyor ADCP system in the summer of 2021, on the Magistral A.P. Chilia channel located in the north of the Danube Delta. The field data were collected in two measurement stations located along the Magistral A.P. Chilia channel. The uniflow cross-section model use Cross-Section Hydraulic Analyzer which is a model developed by the United States Department of Agriculture. All the simulations were performed using the unidirectional water flow model for the measured cross-sections by varying the manning parameter. The variation of the Manning parameter used in the simulations was based on the information found at the time of the field measurements and used according to other study findings. The results of the study show the importance of the Manning parameter in the 1D water flow simulation on medium channels, also underline the importance of water flow simulation regarding the water level regime that can have an important effect on channel morphology and also on the biodiversity of the area.

Key words: uniflow simulation, 1D water flow simulation, Manning parameter, roughness, Danube Delta.

SEDIMENTATION RATE OF LIQUID-SOLID SUSPENSIONS, AS A PARAMETER OF WASTEWATER TREATMENT

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Abstract

The need to separate the solid phases from the liquid ones is probably the most common requirement for separation in the wastewater treatment process, the most common method being by gravity, called sedimentation. Sedimentation rate is an important hydrodynamic quantity for the characterization of particle motion and for the technological design of equipment used to separate heterogeneous systems through the sedimentation process. Our work aims is to determine the sedimentation rate in the case of three types of suspension consisting of water-calcium carbonate, water-soil, water-blue clay, with concentrations of 2%, 4%, 6%, 8% and 10%. The particle size for calcium carbonate and blue clay was 0.2 mm and that of the soil was 0.4 mm. Stokes' law was applied to determine the sedimentation rate of solid particles and the following parameters were determined: material particle density (using the pycnometer), dynamic density and viscosity of the suspension (using the Hoppler viscometer). The obtained results showed that the sedimentation rate is influenced by the concentration, size and density of solid particles, these results being correlated with the results obtained from the literature.

Key words: wastewater treatment, sedimentation rate, dynamic viscosity, density.

THE EFFECTS OF OPTIMIZING A SIMULATED WASTEWATER TREATMENT PLANT ON EFFLUENT QUALITY

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Abstract

Wastewater treatment plants with activated sludge behave like a filter to protect the aquatic environment and also the health of those who use and consume the water. These treatment plants are used to remove nutrients from wastewater, such as nitrogen, that can have a great impact on the evolution of the aquatic ecosystem if we consider the eutrophication process that is intensified worldwide due to agriculture and other industrial activities. In this study, a wastewater treatment plant model called Benchmark Simulation Model No. 2 (BSM2) was used to regulate ammonium and nitrate concentrations by implementing a control strategy. The strategy optimization was performed by applying the relaxation method. The reference data considered are the results of the simulation with the BSM2's base control strategy in a closed loop. Also, the data obtained in the first attempt of optimizing the treatment plant were considered. This study aims to identify if the optimization of the simulated wastewater treatment plant can improve the effluent quality thus reducing the risk of aquatic environment pollution with nutrients.

Key words: aquatic environment, effluent, simulation, optimization, wastewater.

MONITORING THE PHYSICOCHEMICAL PARAMETERS OF WATER QUALITY FROM LAKE HERĂSTRĂU BUCHAREST - 2015-2020

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Abstract

Water is the most valuable natural resource and the protection of its quality is necessary. Water is a unique vital resource, without which life as we know it could not exist. Water is also a transport corridor and a very efficient climate regulator. The aim of this paper is to evaluate the effects of physicochemical indicators on water quality of Herăstrău Lake from Bucharest. Water samples were taken bi-monthly, from 2015 to 2020, 12 samples from each point and were monitoring 8 parameters, in order to design a monitoring network. Physicochemical analyzes of water samples are performed according to standardized methods. The analyzed parameters are: pH, EC, NTU, DO, BOD and COC-Mn, the concentration of nitrites and nitrates by spectrophotometry. Following the statistical analysis, a significant difference was found between the values of the studied parameters, and their correlation was verified by determining some regression functions. The results of the analyzes obtained can be used to generate thematic models on water quality monitoring and management to improve and protect biodiversity and quality of life.

Key words: monitoring, physicochemical indicators, thematic models, water quality.

CONTINUOUS ADJUSTMENT WITHIN WASTEWATER TREATMENT PLANTS OPERATION TO MEET NATURAL RECEPTORS DISCHARGE CONDITIONS

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Abstract

Wastewater treatment plants are designed for input data considered constant and are checked for maximum values according to the imposed loads. During operation, the values of flows and loads at the wastewater treatment plant entrance point change within wide limits. In order to achieve the treatment efficiency, exploitation measures are adopted to ensure the water discharge within the legal admissible limits. These safety measures involve additional operating costs or risk in discharging water with quality indicators not allowed compared to those required by current legislation. Technological adjustment mechanisms must be provided in the design and operation stages.

The present paper highlights a procedure for technological processes regulating when occurs significant loads variation at the wastewater treatment plant entrance point and demonstrates its importance.

Key words: natural receptors discharge conditions, wastewater treatment plant, treatment efficiency.

THE STUDY OF HYDROLOGICAL REGIME MODELING USING HEC-RAS MODEL. CASE STUDY RIVER BASIN BAHLUEŢ

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Abstract

This paper presents the results of a hydrological simulation using HEC-RAS model within the Bahluet river basin. In this study, the basin was modeled from the headwaters to the Târgu Frumos hydrometric station. Six date profiles were processed between the source and Târgu Frumos hydrometric station. Precipitations were measured directly at the 2 stations considered, Cârjoaia and Târgu Frumos. Data recorded by rainfall stations over 3 days, in May 2021, were taken into account for hydrological modeling. Values reach up to 175 mm/h were recorded during the rain. At the Târgu Frumos station were recorded rainfall values of 12 mm/h, which proves the heterogeneity of the rain. Also, it is observed that the rain starts in Târgu Frumos around 16:00, stopping around 18:00. The rain continues measured at the Cârjoaia rainfall station from 18:40, with values of 175 mm/h being recorded. The data recorded at both rainfall stations shows that the river basin is subject to a variable rainfall in space and time.

Key words: hydrological simulation, HEC-RAS, precipitations, runoff.

QUALITATIVE ANALYSIS AND STATISTICAL MODELS BETWEEN SPRING WATER QUALITY INDICATORS IN ALBA COUNTY, ROMANIA

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Abstract

Based on contemporary environmental issues, related to water scarcity, the research outlines the current situation regarding the quality of spring waters in Alba County. Spring water is an alternative that is less and less investigated and exploited if it is a free, natural, untreated source. The quality of spring drinking water is regulated by Law no. 458/2002 (transposing the Directive 98/83/EC on the quality of drinking water). Five areas with 132 water sources were monitored, and for the most representative and polluted springs, their monitoring (physicochemical and microbiological indicators) was performed for a period of 3 years. Most sources are microbial contaminated regardless of the season or the water catchment and spring arrangement. There is also a diffuse microbiological pollution in some localities, which indicates that the phenomena of natural purification no longer occur. It was found that in Alba County the percentage of drinking spring water sources is relatively low as follows: Alba Iulia-Teius area - 37%, Sebes-Cugir - 48%, Câmpeni-Zlatna - 72%, Blaj - 25%, Aiud-Ocna Mures -20%. The correlative analysis shows that between the total viable count and other physicochemical parameters (ammonium, nitrates and nitritesions) of spring water there are appreciable correlations. The correlation coefficients between these parameters vary between 0.67 and 0.92. The equations of the statistical models can approximate the variation in time of the microbial growth. These represent a control and prediction tool for the appreciation of the spring water quality in time, knowing only the physico-chemical parameters.

Key words: contamination, nitrogen cycle, quality, spring water, statistics.

THE POSITIVE EFFECTS OF CHANNELS RESTORATION IN THE DANUBE DELTA BIOSPHERE RESERVE

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Abstract

Ecological restoration in the Reservation of Danube Delta Biosphere is a method of sustainable development of nature and local communities, for the medium and long term. The topography and structural variety of bed channels influence the hydraulic network and ecological restoration processes. To understand the general comportment of ecological restoration processes it is important to survey the channel from a bathymetric and topographic point of view. Modeling the ecological restoration processes commonly includes measures of water level, discharge, and velocity of channel transect. The present study aims to collect and analyze the topo-bathymetric survey data obtained for two periods for the channel Ivancea and Cordon Litoral, from the Reservation of Danube Delta Biosphere. This area was come under an ecological restoration phase by dredging it. The first survey expedition was made before the dredging (august 2021), and the last expedition was made after the dredging (after august 2021). The result shows that the use of modern method and equipment for the survey, ensure the highest accuracy for water circulation system data analysis. The data analysis highlights that ecological restoration increases the discharge and the water velocity. In conclusion, the dredging process is important for ecological restoration, in the context of deltaic systems. Also, the time-to-time monitoring of this process, let us understand the sedimentation rate, and how it influences the hydraulics overall.

Key words: ecological restoration, discharge, water velocity, hydro morphological monitoring, *ADCP survey*.

IDENTIFICATION AND CHARACTERIZATION OF PLASTIC PARTICLES FOUND IN THE LOWER DANUBE RIVER

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Abstract

Excessive production and use of plastic materials, followed by the mismanagement of plastic waste have favored the increase of plastic particles occurrence in aquatic ecosystems. Ingestion of plastic fragments (especially micro- and nanoplastics) by aquatic fauna can lead to various diseases and disorders, which is why monitoring of plastic presence in the aquatic environment is vital. To identify the presence of plastic particles in environmental samples, several methods such as Fourier transform infrared spectroscopy (FTIR), Raman spectroscopy, microscopy, thermal extraction desorption-gas chromatography-mass spectrometry and pyrolysis-gas chromatography-mass spectrometry have been applied in the literature. In the present paper, attenuated total reflectance - FTIR spectroscopy was used to identify and characterize plastics debris found in the Lower Danube water, near the Galati City. Plastic particles collected had different shapes (i.e. fragments, films, granules) and colors (blue, red, colorless). Based on infrared spectra obtained, polyethylene (PE) and polypropylene (PP) were the main polymers identified in the collected samples.

Key words: plastic particles, FTIR spectroscopy, Lower Danube water, polyethylene, polypropylene.

THE CURRENT STATE OF WATER IN CIRCULAR ECONOMY IN ROMANIA

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Abstract

The circular economy approach has an increasing interest in water reuse, reclaimed water, or recycled wastewater in connection to water scarcity concerns and increased water demands by all sectors.

Given pollution and degraded ecosystems, inequity, and low numbers or, in some cases, the lack of a sustainable urban drinking water and sewerage service, in response to the closure of the water loop and to extend the life of water resources, consider water reuse, with economic costs, social and environmental benefits. Circular economy initiatives can also help attract the private sector by creating new business models, adding new funding sources.

The European Union policy identifies the use of treated wastewater as one potential solution to water scarcity. The International Water Association (IWA) developed the 5Rs approach to water management - Reduce, Reuse, Recycle, Restore and Recover - for companies to consider and adopt as common practice.

This paper explores the relationship between the principles of the circular economy and sustainable water management, identifying the opportunities that are offered through applying these principles to water systems in Romania.

Key words: circular economy, water, EU policy.

POLLUTION CONTROL, LAND PLANNING

CADMIUM ACCUMULATION IN SOME LEAFY VEGETABLES FROM PRIVATE GARDENS IN COPŞA MICĂ

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Abstract

Many previous studies have reported high levels of cadmium content in soils and vegetation from area affected by historical contamination in Copşa Mică area. Furthermore, cadmium can be slowly and consistently transferred from contaminated soils into food crops increasing Cd exposure to human beings in the long-term through the food chain. Regarding individual gardens from contaminated area, humans can be exposed via ingestion/inhalation of soil particles and consumption of contaminated vegetables. Therefore, this study attempts to quantify quality and safety of some leafy vegetables grown in individual gardens from contaminated area, Copşa Mică. The cadmium contents in leafy vegetables were positively correlated to total contents of cadmium in soil. Additionally, models were developed to predict the accumulation of Cd in different leafy vegetables (parsley, celery and lettuce) based on cadmium content in soils. The results of this study are important to estimate the Cd accumulation in vegetables from individual gardens, while also improving the safety of foodstuff produced in contaminated areas.

Key words: cadmium, accumulation, vegetables, Copsa Mica.

ESTIMATION OF THE OPTIMAL THICKNESS OF THE SOIL MASS BULK LAYER IN THE LAND RECLAMATION PROFILES

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Abstract

The lands disturbed by iron open pit mining are undergoing a long process of restoration. It is possible to create special-purpose lands in manmade landscapes by varying the thickness of the bulk layer of the black soil mass. The thickness of the applied soil layer on rocks or their mixtures is determined by the genetic parameters of zonal soils, the physical and biological properties of the soil mass, the soil excavation technology, and the adaptive potential of cultivated crops. The potential fertility of the same soil layer of the main mass of the first transitional horizon is 69%, the second transitional horizon is 38%. The mixing of soil masses of the humus and the first transitional horizons (H+Hp) forms the fertility at the level of 90%, the three-humus horizons (H+Hp+Phk) - 72% of the fertility of the humus horizon, but lower than in the humus horizon. The yield of cultivated crops largely depends on the thickness of the bulk layer of soil mass, on the contribution of mineral fertilizers. The optimal thickness of the bulk layer should correspond to 50 cm.

Key words: open pit mining, soil bulk layer, land reclamation profile.
TOPOGRAPHY AND CADASTRE

TOPOGRAPHIC AND GEODETIC SUPPORT FOR THE DEVELOPMENT OF THE GIS REGISTER OF POLISH BURIALS CASE STUDY ON BAIKOVE CEMETERY IN KYIV

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Abstract

The purpose of this paper is to elaborate of creating a web-GIS of Polish burials at the Baikove Cemetery in Kyiv. Achieving this goal involves the following tasks: to develop the structure of the geographic information system, its framework and to fill the file database. For fulfilment of established tasks, a technological scheme consisting of 12 stages is offered. In the first stage, field surveys were performed to determine the coordinates of each grave of the Polish burials of the Baikove Cemetery using a GIS tablet. The total number of point coordinates was 565, which were concentrated in 7 sections of the cemetery. At the eighth stage of the technological scheme the structure of layouts of each html-page of the created online GIS was developed. In the case of the Baikove Cemetery scheme, plots with Polish burials were marked. At the tenth stage, 5 sheets of topographic plans of burials were generated. The eleventh stage is devoted to the creation and filling of a file database on Polish burials. This database contained the following structure: photo of the burial, coordinates, surname and name, years of life, additional photographs, sex of the buried person, interpreted inscription on the tombstone, as well as, if possible, detailed information and profession of the buried person, its outstanding achievements and accomplishments. At the last stage, the hyperlinks of the transition between the pages were configured and the system was tested. The scientific novelty lies in the development of the concept of joint use of various applications of geoinformation and nongeoinformation purposes. The technological scheme of creation of WEB-GIS of Polish burials of the Baikove Cemetery in Kyiv is offered. The implemented geographic information system is designed for inventory of burials, analysis of the condition of tombstones and their spatial location in the cemetery.

Key words: WEB-cartography, Polish burials, Baikove Cemetery, historical GIS, file database, burial inventory,

EARTH OBSERVATION AND GEOGRAPHIC INFORMATION SYSTEMS

ADVANTAGES OF USING GNSS TECHNOLOGY AND QGIS SOFTWARE IN INVENTORY STANDS EXPLOITERS

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Abstract

The inventory of the production fund aims to determine its size, structure and growth, starting with the determination of the dendrometric characteristics of each component tree. This inventory is done both for the purpose of regulating the production and protection process and for controlling the production fund and its evolution.

The inventory methodology is based on the application of the methods of mathematical statistics and especially on the application of selective methods, as well as by scientifically based dendrometric estimations.

In the case of these inventories, will be determined: the average diameter, the average height, the specific composition, the number of trees per hectare (density), the density index, the current growth by species, classes of diameters and quality classes, the volume of the trees.

The trees that have reached the age of exploitability must be inventoried to determine the volume. Stands with a consistency of more than 0.4 and a surface area greater than 4.0 ha will be inventoried by the 12.62 m radius of circle and a 500 m² area, uniformly located in the entire layout, and those with consistencies of less than 0.4 will be fully compiled by the forest district, as they will enter the first-ever decennial plan.

The only condition is the existence of a digital layout map, which can be obtained from the parcel and parcel construction work with the redevelopment works in the Stereographic 70 projection, where the position of each circle can easily be materialized with QGIS software.

Key words: QGIS software, forests maps, topographic details, inventory stands.

GIS HYDROLOGICAL MODELING IN AN AGRICULTURAL RIVER BASIN WITH HIGH POTENTIAL FOR WATER EROSION

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Abstract

This paper presents a study on the use of GIS technology in determining the leakage caused by water erosion in a river basin of 370 ha. The research presented in this paper is carried out in the Sulita hydrographic basin from Botosani County.

The main objective is represented by the spatial analysis of the processes that take place in the hydrological system and of the physical-geographical factors that determine their variability. This GIS system developed under ArcGIS 9.2 can be considered a basic research in structuring a hydrological GIS and in creating an appropriate geospatial database.

The approached method is based on the digital analysis of the terrain, determining the morphometric parameters and the hydrological parameters. Using the ArcGIS 9.2 software, the calculation of slopes and directions is done at the pixel level, in a 3×3 pixel window, on all 8 directions from the central pixel to the neighborhoods. The important part of the paper is the determination of the parameter called flow accumulation, which in the study of water erosion, that indicates the way in which the actual flow is carried out on the slopes.

Key words: Database, water erosion, GIS, hydrological modeling.

OPEN-SOURCE GIS FOR TERRITORIAL PLANNING -SOLAR MAP OF TIMIŞ COUNTY, ROMANIA

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Abstract

The space regarded as land, as the primary support of mankind has undergone continuous evaluations as the source of raw materials, means of agricultural production, forestry source to the location of social and urban activities being thus an invaluable asset. The land's potential is invaluable, so that its efficient, correct, accurate management is a sine qua non condition for keeping it with all its benefits. In modern times, its management can best be done through the Geographical Information System. The territorial arrangement combines the balanced development of the exhaustible geophysical elements, respecting the cultural, social, traditional (historical) elements of the environment and helps to harmonize them and to avoid the negative evolutions. Territorial planning is the basis of sustainable development policies. The theoretical notions that support the realization of the case study - creating the solar map of Timiş county, Romania using open source GIS programs - are thoroughly documented, including aspects regarding solar energy mapping and the methodology of solar irradiation calculation as well as the current global context in which emphasis is put on the use of renewable energy.

Key words: Open-source GIS, planning, solar map, sustainable development.

THE USE OF GEOGRAPHICAL INFORMATION SYSTEMS FOR ISSUES OF FOREST LAND RETROCESSIONS

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Abstract

This paper aims to highlight the advantages of using Geographical Information Systems in the complicated problems of forest land retrocessions. The study is focused on an area of about 400 hectares in Poiana Mărului, Brasov county. This forested area has been identified on the appropriate forestry map, measured in the presence of landowners using two Trimble GPS receivers and parcel plans were created, in order to be sent to OCPI Brasov for approval. Sensible issues hindering the successful completion of this operation were evidenced, with four categories of problems being identified. Each category involves a number of situations which were individually analyse. Besides the technical and judicial knowledge necessary in find the optimal solutions, the benefits offered by Geographical Information Systems are presented, benefits which give specialists significant opportunities to identify critical issues and make overall verification's. Therefore, the conclusion of this paper is that this modern instrument can be successfully used even in projects of this nature.

Key words: land retrocession, GIS, GPS, mountainous forests.

PILOT MONITORING SERVICE FOR CULTURAL HERITAGE BASED ON SATELLITE DATA AND PRODUCTS

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Abstract

The potential of Earth Observation (EO) data for cultural heritage documentation and systematic monitoring is currently widely recognized. Considering the large spectrum of threats and the high importance of safeguarding, cultural heritage requires sustained monitoring that can efficiently be done based on a combination of satellite images having adequate spatial, spectral and temporal resolution, in-situ data and a broad-spectrum of ancillary data such as historical maps, digital elevation models and local knowledge. The present study showcases the features of a pilot cultural heritage monitoring service that was developed for several Romanian representative sites such as the Castle of Hunedoara, the Palace of Magna Curia, the Medieval Ensemble of Deva Fortress, the Alba Carolina Citadel, the archaeological sites of Micia and Germisara, etc., but can be upscaled at national or regional level. The monitoring service is composed of a Results Platform (based on open-source GeoServer and OpenLavers) and a nearreal time Monitoring Platform (cloud computing through Google Earth Engine). The products that are ingested in the first platform are obtained using an approach tailored for each property type. Examples include old cartographic maps, historical satellite images, remote sensing radiometric indices, Copernicus products, displacement maps and many others. The products that are continuously generated within the second platform enable the early identification and assessment of natural and anthropogenic risks, thus representing a key element for cultural heritage protection. The pilot monitoring service was developed considering the requirements of the cultural heritage authorities that are administrating the above-mentioned sites, representing a reliable source of unparalleled knowledge regarding the potential threats and degradation risks.

Key words: Earth Observation, satellite imagery, cultural heritage, geospatial information, pilot monitoring service, GeoServer, Google Earth Engine.

MISCELLANEOUS

OPPORTUNITIES TO APPLY NATURE-BASED SOLUTIONS IN ROMANIA IN THE CONTEXT OF EUROPEAN COMMON AGRICULTURE POLICY

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Abstract

The agriculture is facing different pressures linked to diffuse pollution from nutrients and chemicals, water abstraction and hydromorphological changes. According to information reported under the Water Framework Directive, around one third of surface water bodies fail to achieve good status because of one or several of these pressures. Using sustainable management practices based on agroecological principles, organic farming, and nature-based solutions, with multiple sustainability benefits, can contribute to reducing the magnitudes of pressures on water, enhancing the long-term resilience of agriculture to climate changes and benefit biodiversity. Investing in treatment plants, pipes, and conveyance schemes, is often the most trusted solution, but conventional engineered methods represent end-of-pipe solutions that do not address pollution at the source. The paper is presenting opportunities for green infrastructure and nature-based solutions application in Romania to aid in addressing some of the situations mentioned above.

Key words: agriculture, green infrastructure, nature-based solutions, diffuse pollution, Romania.

THE IMPACT OF SHEEP WASTE WOOL ON THE ENVIRONMENT

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Abstract

The present study focuses on the impact of sheeps' wool on the environment if it becomes waste. Wool is a keratin-rich by-product that is resistant to degradation, and appropriate management plans for this type of waste should be carefully considered. Some studies consider hydrolyzation of wool, but these processes are implying the use of harsh chemicals for the environment. Therefore, different methods for the valorization of wool waste refer to composting, obtaining fertilizers for using them in agriculture, producing cosmetics, or for thermally-isolating of houses. Special attention is paid to the extraction of keratin from wool, as this is the most valuable by-product resulting from the process of sheep shearing.

Key words: waste wool, environmental pollution, valorisation, wool keratin, extraction.

ISOLATION AND CHARACTERIZATION OF NEW YEASTS STRAINS FROM BARLEY SAMPLES

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Abstract

Due to their diversity and versatility, yeasts are considered of current industrial interest, as they can easily cover a wide range of industrial applications such as baker's yeast, brewer's yeast, nutritional yeast, distillation yeast, wine yeast or probiotic yeast. The purpose of this article is to isolate and characterize new barley yeast strains to obtain yeast biomass for the development of new fish feed recipes. Using the technique of decimal dilutions and inoculation by the "lawn" technique on DRBC Agar medium, the isolated strains were tested specifically to identify they're taxonomically. Colonies considered representative of a particular species or genus were isolated in pure culture and maintained on YPD Agar culture medium and cryopreserved in 20% glycerol at -20°C. 11 yeast strains belonging to the genera Saccharomyces, Candida, Cryptococcus, Torulaspora, Metschnikowia pulcherrima, Pichia etc. were isolated. Further research will focus on the use of isolated strains of Saccharomyces cerevisiae mixed with strains of other non-Saccharmomyces to obtain yeast biomass as a potential source for fish feed.

Key words: biomass, barley, isolation, yeasts strains.

YEAST BIOMASS - A NUTRITIOUS AND SUSTAINABLE SOURCE FOR FISH FEED - REVIEW

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Abstract

Usually, for the protein and lipid intake of fish feed recipes, the main ingredients are fishmeal and fish oil. In order to protect biodiversity and to use all natural resources in a sustainable way, it is desirable to obtain alternative ingredients in fish feed, with a nutritional value at least as high as the usual ones. Thus, the use of yeasts is a solution to improve the economic profitability of aquaculture, as well as to reduce the impact on the environment. Using the nutritional potential of yeast strains creates sustainable opportunities for new sources of protein. Therefore, this paper aims the studies and scientific achievements on the use of yeast biomass as an excellent source of protein, carbohydrates and lipids and an alternative source to the use of fish meal/oil and soy derivatives in fish feed. It has been found that the administration of glucans (MOS) in the yeast cell wall enhances immunity and many other types of immune responses, resistance to bacterial, viral infections and environmental stress on some fish species. In addition, this paper provides useful data on the beneficial effects on the health, growth rate and immunity of fish by using yeast biomass in their feed.

Key words: yeast, fish feed, aquaculture, sustainable.

P-ADIC NUMBERS AND APPLICATIONS IN AND OUTSIDE MATHEMATICS - AN OVERVIEW

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Abstract

The concept of p-adic number was first introduced by Hensel in 1897, but it can be found in some previous works of Kummer. The main motivation for their introduction was the use of some techniques of mathematical analysis in number theory. For example, they play a keyrole in proving Fermat's Last Theorem. The p-adic numbers have important applications in physics (quantum physics, string theory), but in the recent years they have been used in other domains such: computer sciences, cognitive sciences, psychology, sociology, biology and genetics. In this paper we explain the notion of p-adic number and we briefly present some applications with references.

Key words: p-adic numbers, applications, string theory, quantum physics, biology.

COMBINE HEADER ACTIVE SIDE DIVIDER

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Abstract

The headers of modern combine harvesters are mainly equipped with passive side dividers. When harvesting lodged and tangled crops (for example, peas), plant mass accumulates on passive side dividers, the harvested strip is poorly separated from the rest of the field, which leads to a decrease in combine productivity and an increase in losses of the grown crop. To eliminate these shortcomings, the design of an active field divider is proposed, the main working body of which is a disk cutter. The article describes the design of the active side divider, provides a laboratory setup and describes the methodology for laboratory research to justify the optimal design and operating parameters of the proposed divider. The studies were carried out using the theory of multifactorial experiment. The optimization criteria are the completeness of separation of tangled stems and the amount of losses of the grown crop. The completeness of the separation of tangled stems is determined visually and by photographing, and the losses are determined by the method of collecting and weighing crumbled grains. As the results of laboratory studies show, the smallest losses are provided with the number of teeth of the disk cutter z = 8 pieces, the frequency of rotation of the disk cutter n = 125 min⁻¹ and the operating speed of the feed conveyor vp = 2.0 m/s. At the same time, the active side divider works stably, the completeness of separation of tangled stems is 100%. The smallest losses are provided with the number of teeth of the disk cutter z = 8 pieces, the frequency of rotation of the disk cutter n = 125 min⁻¹ and the operating speed of the feed conveyor vp = 2.0 m/s. At the same time, the active side divider works stably, the completeness of separation of tangled stems is 100%. the smallest losses are provided with the number of teeth of the disk cutter z = 8 pieces, the frequency of rotation of the disk cutter n = 125 min⁻¹ and the operating speed of the feed conveyor vp = 2.0 m/s. At the same time, the active side divider works stably, the completeness of separation of tangled stems is 100%.

Key words: legumes, peas, harvesting, combine harvester header, active side divider, disk cutter, laboratory tests, significant factors.

DIGITAL APPLICATION FOR REMOTE CONTROL OF BACTERIAL ENDOPHYTES GROWTH IN BIOREACTOR VIA INTERNET AS A DESIGN SOLUTION TO A VIRTUAL LABORATORY

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Abstract

Defining and delimiting the notion of biotechnology is becoming increasingly complicated, as this field is connecting various branches of science and technology. Biotechnology advances are inextricably linked to the successes of bioengineering, as well as the development and implementation of equipment and means to control these processes.

The present paper aims to create a real time monitoring system for bacteral endophytes production carried out in the bioreactor. The advantage of this application allows not only locally monitoring of the process but also via INTERNET.

The practical applicability of this system should be mentioned due to the effective possibility of using the bioreactor monitoring program in the educational process. Therefore, developing a software application for remote and real-time monitoring the technological process at bioreactor level is a central point of a virtual laboratory, an important element in achieving a quality educational process in the current pandemic context, a framework that has led to an increased need of digitization processes in all sectors of society.

Key words: bioreactor, digitalisation, endophytes, INTERNET monitoring, virtual learning.

BIOTRANSFORMATION OF EXPANDED PERLITE IN ORGANIC-LIKE SUBSTRATE BY CHEMOTROPHIC CONSORTIA

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Abstract

Expanded perlite, resulted by in heating process of a naturally occurring perlite ore, make it an versatile and law-impact material for greenhouse, soil amendment, hydroponics, and which offers advantages such as aeration, drainage, water retention, resistance, reuse. By bioaugmentation with chemotrophic microorganisms that decompose natural/manufactured rocks, expanded perlite can be biotransformed into an organic-like substrate. In the present study, the microorganisms responsible for the biotransformation of expanded perlite into organic-like substrates were analized for compatibility, interspecific synergy (bacteria, fungi, diazotrophs), the organic content by chromatography, humic-like fractions, siderophores, enzyme complex, seed germination and the growing of plantlets. The results reflected the effect of living organisms synergism in the ascendent evolution of organic compounds accumulation. The secondary exomethabolites are involved in humic-like acids fractions formation and biotransformation of the rock, increasing polyphenoloxidase activity, in conversion towards organic-like substrate and in association with colloids. Also, increse in time the siderophores and IAA content in substrate, intensity of physiological and biochemical processess, the seed germination and the plantlets's biomass.

Key words: expanded perlite, bioaugmentation, biotransformation, organic-like substrate, consortia.

THE ROLE OF BIOSYNTHESIS HUMIC-LIKE PRECURSORS IN SOIL PROCESSES DYNAMICS

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Abstract

Microorganisms are involved in biosynthesis of the exogenous compounds with role in the dynamics of edaphic processes. A variety of such biosynthesized exometabolites, such as enzymes, phenols, carbohydrates, proteins, can be released into the soil, where they undergo biochemical interactions, form precursors involved in the synthesis of complex polymers and in determining a priming effect of biogeochemical processes. The research focused on the influence induced by humic precursors, extracted from the previously selected C1-C4 consortia, on the dynamics of bioprocesses in two soil types (Albic Luvisol and Fluvisols), respectively on enzymatic activities, biomass evolution, soil respiration and nitrifying microflora. Exometabolites from the C4 consortium showed the greatest diversity and complexity as humic-like precursors, followed by those the C3 consortium. In Albic Luvisol, the qualitative differences induced by precursors from consortia are well highlighted in the fulvic acid (FA) chromatograms. Enzymatic activity, DNA content, biomass and potential respiration level were influenced differently by the precursors in the C1-C4 consortia. Qualitative and quantitative analyzes for phenols and polysaccharides showed the influence of precursors on edaphic bioprocesses, in close correlation with soil type.

Key words: chromatograms, exometabolites, humic-like precursors, microbial consortia, soil processes.

ASSESSMENT OF WATER AND SEDIMENT QUALITY IN DUNAVĂŢ-DRANOV, RAZIM-SINOIE AQUATIC COMPLEXES

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Abstract

Measures to protect and conserve the Danube Delta Biosphere Reserve are a priority, as it hosts a wide and unique variety of birds, fish, amphibians, reptiles, mammals and plant species. Anthropogenic activities and hydromorphological changes have a negative influence on aquatic fauna and flora by degrading their health and habitats, which is why regular assessment of the ecological quality of aquatic ecosystems is essential. The main objective of the present study is to evaluate the quality of water and sediments in the area of Dunavăţ-Dranov, Razim-Sinoie Aquatic Complexes. Specifically, the salinity, oxygen and nutrient regime of the water samples taken from several sampling stations located on different channels in the study area were analyzed. Based on the experimental results, the Water Quality Index (WQI) was calculated and depending on the values obtained, the water quality was included in classes I and II (Excellent and Good). For the evaluation of the sediment quality, the concentrations of heavy metals (Cu, Ni, Zn, Pb) were determined, Ni being the metal for which there were slight exceedances of the maximum allowed concentration (35 mg/kg) imposed by Order 161/2006.

Key words: Danube Delta Biosphere Reserve heavy metals, water quality, sediment.

