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Heavy Metals Contamination of Local and Imported Rice in Semarang, Central Java, Indonesia

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Abstract

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Abstract

This study defined the heavy metal concentration in rice, a commonly consumed staple food in Indonesia that is domestically produced and also imported from other countries due to its high demand. A total of six rice samples, comprising of four domestic and two foreign were randomly taken from Semarang stores and analyzed using the Atomic Absorbance Spectrometer (AAS). The laboratory results revealed that three varieties of rice, two from Indonesia (MW and PW; 0.561 and 0.456 mg/kg, each), and one from the United States (B; 0.307 mg/kg), exceeded the Indonesian dietary standard for lead (Pb) (SNI). Furthermore, the concentration of chromium (Cr) in two rice that are imported (B, 0.241 mg/kg and J, 0.723 mg/kg) were greater than the 0.2 mg/kg threshold established by the Chinese government. However, all samples had acceptable levels of As and Hg, and none had detectable levels

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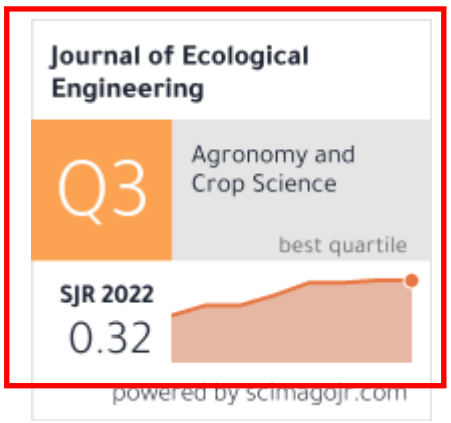

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Mina Aylaj, Mhammed Sisouane, Soufiane Tahiri, Yassine Mouchrif, Mohammed El Krati

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Abstract Article (PDF)

Effect of Tree Shelters and Regeneration Method on Survival and Growth of Cork Oak Plantations in the Maamora Forest, Morocco

Sanae Lahlimi El Alami, Ahmed El Aboudi, Salwa El Antry, El Ayyachi El Mnouar, Youssef Dallahi, Ameur Rabhi

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Abstract Article (PDF)

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Monitoring Research on Invasive Species of Bedbug (*Corythucha ciliata* Say) in green areas of Kyiv

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ABSTRACT

Samples for research were selected in the course of route surveys of plants of the Botanical Garden named after. acad. A.V. Fomin, National Botanical Garden. N. Grishko National Academy of Sciences of Ukraine and parks, squares, street plantations of plane trees in Kyiv. Platanus identification using the lacemaker's bug (*Corythucha ciliate* Say), uses a light microscope and a smartphone with the «Magnifier Cam software». For the first time, we found damage to the leaves of the plane tree Platanus x acerifolia (Ait.) by the bug *Corythucha ciliata* Say in Kyiv. This is the northernmost border of the phytophage distribution in Ukraine. The phytophage was found in six of the nine surveyed habitats of Platanus acerifolia (50°41'83'' N, 30°56'37'' E; 50°43'99"N, 30°51'83"E; 50°26'99'' N, 30°94'99'' E; 50°26'42"N, 30°32'01"E; 50°39'35"N, 30°50'66"E; 50°38'22"N, 30°47'73"E). The bug was not found in the Botanical Garden named after acad. A.V. Fomin. A high degree of sycamore bug damage was observed on plants growing in habitats. 50°39'35"N, 30°50'66"E (4.7 point) and 50°38'22"N, 30°47'73"E (2.9 point). Bedbugs prefer the south side of the trunk for wintering (72.3% of individuals). The ratio of females and males on the southern side was 2,5/1, on the northern side – 1,7/1. The bug *Corythucha ciliata*, being under the cork cambium in winter, survives in the natural environment when the temperature drops to -22 °C (duration – four days).

Keywords: sycamore lace bug, *Corythucha ciliate*, *Platanus*, invasion, megalopolis.

INTRODUCTION

Accelerated rates of expansion of alien species of phytophages and phytopathogenic organs of woody plants of urban cenoses are observed, this is due to global climate change and intensive intercommunal trade relations [Chumak P.Y. et al., 2020; Bondareva & Chumak, 2020; Kliuchevych et al., 2020a, 2021b; Lesovoy et al., 2020]. In recent years, bugs (Heteroptera: Tingidae) have been distinguished among invasive phytophages by their rapid expansion [Blummer, 2021; Golub, 1999; Putchkov, 2013].

Family of lace bugs (Tingidae Laporte, 1832) includes from 2000 [Lis, 2013] to 2600 recent species. Many types of lace bugs are common in North America.

An analytical review of bugs [Putchkov, 2013] recorded 14 species that entered the European continent from North America. The plane lace bug (*Corythucha ciliata* Say, 1832) is a common and harmful bug. This invasive species is widespread in Europe and in some Asian countries, where species of the genus *Platanus* L. (Platanaceae) are present [Kalinkin, 2020; Blummer, 2021]. The area of invasion of this species is quite wide, most often the sycamore lace bug was found in the middle latitudes with a temperate climate.

In Russia, the range of the phytophage covers the western, central parts and almost the entire Black Sea coast of the Krasnodar Territory [Kalinkin, 2002]. Until now, the northern limit of the distribution of the bug in Ukraine has reached

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Comparison of the Effect of Flurochloridone and Fluoranthene on the Root and Shoot Anatomy and Morphology of Pea Plants (*Pisum sativum*)

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ABSTRACT

Despite current efforts to minimize the impact of industry on ecosystems, the environment is polluted by a range of foreign substances, that can have a negative impact on the living organisms. Examples of widely studied substances are polycyclic aromatic hydrocarbons (PAHs) and recently, substances commonly used in conventional agriculture. In our study we focused on the morphology and anatomy of the vegetative organs of pea plants treated with the active substance of herbicides, flurochloridone (FLC), in concentration representing the residual amount in the soil (5 µM), and PAH fluoranthene (FLT) in concentration representing the middle to high environmental load (5 µM). During the long-term cultivation in nutrient solutions modified by the mentioned pollutants, the growth parameters of roots and shoots were observed in the three growth phases (4 and 8 fully developed leaves and the flowering phase). The growth parameters and observation of the morphology were supplemented with root and stem anatomical analysis using the transverse cross-sections. Both xenobiotics caused the decrease in the biomass production, while the more significant inhibition of growth, compared with control plants, was detected in FLC-treated plants, where the root system was reduced up to 75% and growth parameters of the shoots were reduced about more than 50%. The decrease in root biomass production was accompanied by changes in root branching. FLT treatment caused milder growth inhibition, it was observed about 50% reduction of the root system induced by the shortening of the main and lateral roots. Less pronounced, was also the decrease in stem length caused by FLT. Similar information was obtained about the different degrees of effect of FLC and FLT using anatomical analysis. Both studied substances increased the main root diameter accompanied with increase of the average number of the primary cortex layers. Their influence also caused the more intensive formation of exodermis. Changes in anatomical architecture were also observed in stem, where the FLC treatment changed the arrangement of the vascular bundles and decreased their average number. Our elementary morpho-anatomical study suggests that FLC despite its trace concentration could be more detrimental to plants than FLT, known for its harmful effect on living organisms, in relatively higher concentration.

Keywords: anatomy, flurochloridone, fluoranthene, pea, primary cortex, root branching, shoot, vascular bundles.

INTRODUCTION

The wide spectrum of chemical substances that can have a negative impact on individual components of ecosystems enters the environment in connection with industry and traffic expansion, such as polycyclic aromatic hydrocarbons (PAHs). Other foreign compounds are released into the environment by targeted application in conventional agriculture systems, where they are used as fertilizers or pesticides. However, residues of their active substances or products of their transformation can also affect non-target organisms [Nikoloff et al. 2014]. Because plants are, in general, sessile organisms without the possibility of moving from the place to place, the impact of environmental pollution is often manifests itself in metabolic and morpho-anatomical changes related to stress reactions which can lead to the fatal damage of the affected plants [Hernández-Vega et al. 2017; Tomar and Jajoo 2014].

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Flood Vulnerability Mapping and Risk Assessment Using Hydraulic Modeling and GIS in Tamanrasset Valley Watershed, Algeria

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ABSTRACT

The paper is focused on the integration of the US Army Corps of Engineers Hydrologic Engineering Center (HEC) models, particularly the HEC-RAS (River Analysis System) 1D hydraulic model, into a decision support system for predicting the effects of floods. The study was conducted in the Tamanrasset Valley watershed in Algeria, where the HEC-RAS model was used to calculate water flow profiles for various flood events that occurred downstream. The objective of the study was to generate flood maps for extreme river flood events in the area, which could help assessing the risk of flood vulnerability in the area study. The process involved using the HEC-RAS 1D model to simulate the water flow in the river, taking into account the various flow and boundary conditions. The results of the simulation were then exported and analyzed in GIS-based software, HEC-GeoRAS, to prepare the flood inundation maps. The flood maps were based on the water level at each cross-section, which was calculated using the water surface profiles generated by HEC-RAS. The study aimed to identify flood zones using a combination of HEC-GeoRAS and GIS. The HEC-GeoRAS extension was utilized in a GIS environment to determine flood zones associated with 10-year, 20-year, 50-year, and 100-year return periods. The results of the study confirmed the effectiveness of the integration of GIS and HEC-RAS and demonstrated the performance of the model. Based on these findings, the study recommends the application of this model in planning and management programs for both residential and agricultural areas, to ensure appropriate measures are taken for future flood defense.

Keywords: HEC-RAS; flood prediction; GIS; flood inundation maps; flood zones.

INTRODUCTION

Natural disasters are taking a toll on people and their properties, with floods and drought being the most frequent and impactful of them all. Floods, in particular, can happen in different areas, such as rivers, wadis, and also can occur in coastal regions, causing severe damage and loss of life when the water flow surpasses the maximum capacity of the river channel. Addressing the issue of inundation risk estimation and mitigation is therefore crucial in our current times (Zhang et al., 2014).

Floods are considered one of the most frequent types of natural disasters that can have catastrophic impacts on both, local communities and infrastructure. (Porter et al., 2021). They can cause fatalities (Petrucci et al., 2019), significant economic damage (Merz et al., 2010), and disruptions to socioeconomic activities (Giannaros et al., 2020). For sustainable development, it is imperative to have reliable flood risk assessment and resilient urban planning. Despite advancements in flood mitigation techniques and technology, floods continue to pose a significant threat to human lives. (Sassi et al., 2019). This can be attributed to the increase in human settlements and also to the increase of economic assets situated in flood-prone areas, alterations in land usage, and the influence of the climate crisis (Sassi et al., 2019).

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Forecasting the Flow Coefficient of the River Basin Using Adaptive Fuzzy Inference System and Fuzzy SMRGT Method

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ABSTRACT

In hydrology and water resources engineering, predicting the flow coefficient is a crucial task that helps estimate the precipitation resulting in a surface flow. Accurate flow coefficient prediction is essential for efficient water management, flood control strategy development, and water resource planning. This investigation calculated the flow coefficient using models based on Simple Membership functions and fuzzy Rules Generation Technique (SMRGT) and an Adaptive Neuro-Fuzzy Inference System (ANFIS) model. The fuzzy logic methods are used to model the intricate connections between the inputs and the output. Statistical parameters such as the coefficient of determination (R^2), the root mean square error (RMSE), the mean absolute error (MAE), and the mean absolute percentage error (MAPE) were used to evaluate the performance of models. The statistical tests outcome for the SMRGT model was (RMSE:0.056, MAE:1.92, MAPE:6.88, R^2:0.996), and for the ANFIS was (RMSE:0.96, MAE:2.703, MAPE:19.97, R^2:0.8038). According to the findings, the SMRGT, a physics-based model, exhibited superior accuracy and reliability in predicting the flow coefficient compared to ANFIS. This is attributed to the SMRGT's ability to integrate expert knowledge and domain-specific information, rendering it a viable solution for diverse issues.

Keywords: ANFIS; SMRGT; flow coefficient; fuzzy logic; surface water.

INTRODUCTION

The flow coefficient is an important parameter in hydrology that describes the flow ratio to the total amount of rainfall (Chow et al., 1988). It is typically used in hydrological models to estimate the amount of surface flow from a catchment or watershed. Accurate estimation of the flow coefficient is essential for various hydrological applications, including flood forecasting, water resources management, environmental impact assessment, and designing efficient stormwater management systems, flood control structures, and urban drainage systems. Therefore, there is ongoing research on developing and evaluating new methods for modeling this parameter. There are various methods for estimating the flow, including empirical methods, such as the Soil Conservation Service (SCS) method (USDA-NRCS, 1972), and physically based methods, such as the Green-Ampt model (Green & Ampt, 1911). The choice of method depends on the availability and quality of data and the complexity of the modeled hydrological system.

In recent years, researchers have explored the use of Machine Learning (ML) techniques such as ANN and fuzzy logic methods for improving the accuracy of hydrologic modeling estimation, such as; (Hsu et al., 1995; Hu et al., 2007) demonstrated the effectiveness of artificial neural networks in modeling the rainfall-flow process. This investigation used fuzzy logic-based models to calculate the flow coefficient rate for the Aksu River basin in Antalya-Turkey. Fuzzy logic-based methods are preferred in modeling hydrological events due to their ability to handle uncertainty

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The Effects of Various Organic Materials on *Dactylis glomerata* Yield and Content of Selected Macroelements

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ABSTRACT

The aim of the experiment was to assess the effects of various organic materials on *Dactylis glomerata* yield, on the content of selected macroelements (K, Ca and Mg) and on K:Ca, K:Mg and K:(Ca + Mg) ratios. As a valuable forage plant, *Dactylis glomerata* (cocksfoot grass) is a common grass in Poland both in grassland and in arable fields. Its rapid spring growth and its resistance to drought, low temperatures, but also to frequent mowing and pests, makes it a common species in meadows, pastures and grassland, both permanent and alternating. In order to achieve the research goal, a three-year pot experiment was established in a greenhouse. The experiment was conducted in a completely random design, in four replications. In the autumn before the experiment, soil was mixed with organic materials (chicken manure, mushroom substrate and rye straw) and put into pots. To selected units, an additional amount of mineral N was applied in the first year and NPK fertilizers in consecutive years. Mineral fertilizers were applied at the beginning of the growing period. Compared to control, the application of mineral and organic fertilizers resulted in a significant increase in *Dactylis glomerata* yield. The highest biomass yield (average over the growing periods) was recorded on the unit treated with manure, straw and mineral fertilizers (27.64 $g \cdot pot^{-1}$) and on the one with mushroom substrate applied together with rye straw and mineral fertilizers (26.47 $g \cdot pot^{-1}$). The K:(Ca+Mg) ratio in the forage was normal and averaged 0.933, but mineral fertilizers, compared to other treatments, narrowed it.

Keywords: *Dactylis glomerata, y*ield, organic materials, K, Ca, Mg.

INTRODUCTION

One of the effective ways to improve the fertility of soils, especially of light soils, is the use of various waste substances like straw, spent mushroom substrate or chicken manure. Safe management of waste intended for natural purposes, including agriculture, can result in measurable economic effects, at the same time preventing environmental pollution (Malinowska, 2016a, 2016b). Because of the low quality of Polish soils, and thus their poor resistance to various chemical pressures, efforts are being taken to improve their properties through the use of various waste substances, which is a highly rational procedure (Kalembasa and Wysokiński, 2004). Due to a decrease in the content of organic matter in intensively farmed soil, it is necessary to periodically introduce organic substances in various forms. Humus is a derivative of decomposed matter of plant and animal origin, and its content can be increased by applying organic fertilizers to soil. It promotes the formation of soil crumbly structure, positively affecting soil physical, biological and chemical properties. Organic fertilizers in turn promote humus formation and provide nutrients to plants. For example, in the first year after the application of mushroom substrate, crops can use 20–25% of its N, 100% of P and 90% of K.

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High Porous Ceramic for Oil/Water Separation: Calcite as a Sintering Aid

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ABSTRACT

The effects of calcite ($CaCO_3$) as sintering aid on the preparation of local aluminum silicate microfiltration membranes were characterized in terms of morphology, thermal shrinkage behavior, porosity, permeation performance, and pure water permeate flux for the membrane. Material selection is based on availability and formability. In order to create a suspension, an organic solvent (N-methyl-2-pyrrolidone) and a polymer binder were added to a mixture of aluminum silicate and calcium carbonate. The coagulant bath consisted of water, and the suspension was extruded into a hollow fiber using a spinneret. The membrane precursor is subjected to high temperatures up to 1250 °C and this process called the sintering process gets strong hollow fiber with high mechanical stability. The addition of the $CaCO_3$) to the dispersion altered the structure of the resulting sintered membranes. The obtained finding demonstrates that carbon calcium addition to aluminum silicate has an affirmative on overall porosity in contrast to those made from purely natural aluminum silicate, as a result the aluminum silicate calcite ceramic microfiltration membrane, which had a high porosity of above 50%, shows the highest permeability of 35.8 ml $m^{-2} \cdot s^{-1}$ and above 97% oil rejection when operating at 0.15 MPa trans-membrane pressure in oil-in-water separation experiments. The results show that low-cost aluminum silicate-calcite component of ceramic membranes and the manufactured ceramic microfiltration membrane can handle emulsified oily wastewater.

Keywords: porous ceramic membrane; sintering aid; calcite.

INTRODUCTION

Recently significant attention in the application of membranes in separation processes due to the membrane processes is compact, further economical, and more efficient than the normal separation process (Saboyainsta and Maubois 2000). The process of membrane separation is assorted as nanofiltration, ultrafiltration, microfiltration, etc. Among the membranes process, microfiltration has the main variety of utilizations in many industries, due to the separation process of low energy consumption and high efficiency (Liu et al. 2016).

Features unique to the inorganic membrane, have placed it as a competitive alternative and a commodity sought for use in a variety of industries (Hubadillah et al. 2018). The membrane hollow fiber produced from ceramic material has become widespread, not only because of their comparatively superior chemical and thermal resistance, as well as mechanical stability, but also due to otheir relatively higher surface/volume ratio in comparison to other geometric forms such as tubular and flat sheet (Sanchez et al. 2005).

Ceramic membranes are widely used in various industrial applications such as water treatment, food and beverage processing, pharmaceuticals, and biotechnology. However, the high cost of ceramic membranes has reduced their use in applications. In recent years, researchers have been working on developing low-cost ceramic membranes that can be used in various applications.

Traditionally, the majority of membranes prepared from ceramic material are made from costly metal oxides for instance zirconia, alumina, titania, or integration combination of these

KOMITE ETIK PENELITIAN KESEHATAN
HEALTH RESEARCH ETHICS COMMITTEE
POLTEKKES KEMENKES SEMARANG

KETERANGAN LAYAK ETIK
DESCRIPTION OF ETHICAL EXEMPTION
"ETHICAL APPROVAL"

No. 0289/EA/KEPK/2020

Protokol penelitian yang diusulkan oleh :
The research protocol proposed by

Peneliti utama : Dr. Nur Endah Wahyuningsih, Dra., MS; Dr. Henry Setiawan, M.Sc
Principal Investigator

Nama Institusi : Universitas Diponegoro
Name of the Institution

Dengan judul:
Title

"Analisis Kadar Logam Berat dan pH Beras (*Oryza sativa L.*) Impor dan Lokal Indonesia"

"Analysis of Heavy Metal Levels and pH of Imported and Local Indonesian Rice (Oryza sativa L.)"

Dinyatakan layak etik sesuai 7 (tujuh) Standar WHO 2011, yaitu 1) Nilai Sosial, 2) Nilai Ilmiah, 3) Pemerataan Beban dan Manfaat, 4) Risiko, 5) Bujukan/Eksploitasi, 6) Kerahasiaan dan Privacy, dan 7) Persetujuan Setelah Penjelasan, yang merujuk pada Pedoman CIOMS 2016. Hal ini seperti yang ditunjukkan oleh terpenuhinya indikator setiap standar.

Declared to be ethically appropriate in accordance to 7 (seven) WHO 2011 Standards, 1) Social Values, 2) Scientific Values, 3) Equitable Assessment and Benefits, 4) Risks, 5) Persuasion/Exploitation, 6) Confidentiality and Privacy, and 7) Informed Concent, referring to the 2016 CIOMS Guidelines. This is as indicated by the fulfillment of the indicators of each standard.

Pernyataan Laik Etik ini berlaku selama kurun waktu tanggal 2 Mei 2020 sampai dengan tanggal 2 Mei 2021.

This declaration of ethics applies during the period May 2, 2020 until May 2, 2021.

May 2, 2020
Professor and Chairperson,

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KOMISI ETIK PENELITIAN KESEHATAN (KEPK) POLTEKKES KEMENKES SEMARANG

Dr. M. Choiroel Anwar, SKM, M.Kes (Epid)