2022

ABSTRACT BOOK

INTERNATIONAL SOIL SCIENCE SYMPOSIUM on

SOIL SCIENCE & PLANT NUTRITION

(7th International Scientific Meeting)

2 – 3 December 2022

Samsun, Türkiye

Editors
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Dr.Coşkun GÜLSER
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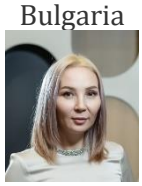
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Preface I

Dear colleagues,

The Federation of Eurasian Soil Societies (FESSS) and the Erasmus Mundus Soil Science Program (emiSS) welcome you to "Soil Science and Plant Nutrition" (EURASIAN SOIL Symposium 2022). It is a great pleasure for us to see you at this great event. We hope that the speeches that will take place here in the field of soil science will be of great importance. It is a great honor for us to represent our country here.
The symposium "Soil Science and Plant Nutrition" is about applied research and new approaches to integrating soil, plant and environmental aspects across different ecosystems for the integration of scientific data and the physical, chemical and biological properties of soil, plant nutrition. and topics related to fertility mechanisms and processes under study. will cover topics of different scales - from molecular to field - on the diversity of experiences, opinions and scientific knowledge. The symposium will provide a great opportunity to learn and discuss the latest achievements in the field of soil science in general, and to establish contacts and cooperation with various participants. The symposium will focus on a multidisciplinary approach to soil science, with a particular interest in key research, the latest and most technological research. Scientific sessions will also highlight key concepts about land. The symposium will also provide numerous opportunities for interaction between public and private scientists.

Prof.Dr.Garib Mamadov
President, FESSS

Preface II

Distinguished colleagues and friends,

Good morning and on behalf of Federation of Eurasian Soil Science Societies (FESSS) welcome to this Symposium on the "Soil Science and Plant Nutrition".
Let me begin by thanking our co-organizer, Erasmus Mundus Joint Master Degree in Soil Science Programme (emiSS) and its Coordinator, Dr Coskun Gulser for being here with us. This is the 7th International Scientific Meeting under our federation (FESSS) structure and the first we have co-organised with emiSS. Also, FESSS is the associate partner in emiSS Project. I am pleased to welcome again our colleagues from University of Agriculture in Krakow in Poland, Agricultural University Plovdiv in Bulgaria and participants from many countries participating in the symposium. I believe this event has helped that collaboration develop.
This year we will discuss the importance of Soil Science and Plant Nutrition. The symposium titled "Soil Science and Plant Nutrition" sets up the ambitious goal of integrating scientific background, applied research and novel approaches to link soil, plant and environmental aspects over various ecosystems. Physical, chemical and biological soil properties, plant nutrition and fertility mechanisms and processes studied at different scales - from molecular to field - will feed the diversity of experiences, opinions and scientific knowledge. The symposium will provide a great opportunity to learn and discuss recent advances in the soil science in general and to establish contacts and collaborations with participants from many different parts of the word. The symposium will focus on multidisciplinary approach to soil science, with special interest on basic research, latest and technological developments for soil science and plant nutrition. The scientific sessions will also emphasize basic concepts of soil. The symposium will also provide multiple opportunities for interaction among scientists from public and private institutions.
Federation of Eurasian Soil Science Societies (FESSS) with its unique organization of 8 Member countries, can help in the critical areas of Soil Science and Plant Nutrition. The Federation of Eurasian Soil Science Societies was established by the collaboration of Soil Science Societies of four different countries which are Turkey, Russia, Azerbaijan and Kazakhstan in 2012. After 2016, Romania, Kyrgyzstan, Bosnia & Herzegovina and Serbia Soil Science Societies joined to FESSS. The primary goal of the Federation is to share knowledge on the most dynamic part of earth-soils and to "bridge the gap" between soil science, policy making, and public knowledge both nationally and internationally in the region.
I would like to thank our programme steering committee for arranging an excellent line-up of speakers, and I thank the speakers and moderators for their contribution. Let me also thank all of you the participants. As always, we appreciate your support and look forward to your contribution to the discussion.
I wish you all a most enjoyable and productive symposium.
Thank you

Prof.Dr.Rıdvan Kızılkaya
Chair, Organization Committee

Preface III

Dear participants,

It is my great pleasure to attend the International Soil Symposium on "Soil Science & Plant Nutrition" as a part of organizing committee. This symposium has been organized by the Federation of Eurasian Soil Science Societies (FESSS) collaborating with ERASMUS MUNDUS Joint Master Degree in Soil Science (emiSS) programme. I would like to express my grateful thanks to FESSS and Prof. Dr. Ridvan Kizilkaya, who is the Chairman of the Symposium, giving us chance to represent emiSS programme in this International Symposium. The emiSS programme has been founded with the support of the Erasmus+ Programme of the European Union and organized by a consortium of the four Universities: Ondokuz Mayıs University (OMU-Türkiye), University of Agriculture in Krakow (UAK-Poland), Agricultural University Plovdiv (AU-Bulgaria) and Jordan University of Science and Technology (JUST-Jordan) in 2019. The aim of emiSS programme is to raise and meet the need for qualified and skilled soil scientists at the master level through a higher educational programme under the training in soil science, soil management, soil fertility, soil ecosystem with intercultural competence and language skills. So far, there are 50 international emiSS programme students from the different geographical parts of the World. Some of emiSS students will be among us and make an oral presentation during the Symposium. I think that the mission of the symposium will be successful with sharing novel access that fulfill the needs of applications in soil science and plant nutrition field, and identifying new directions for future researches and developments in soil science area. At the same time, this symposium will give researchers and participants a unique opportunity to share their perspectives with others interested in the various aspects of soil science. I hope this symposium also will be helpful to increase young soil scientists' knowledge and their presentation skills front of the audience. Once more I would like to thank the organizing committee and all participants to their helps and sharing their scientific knowledge in this symposium.

Prof.Dr.Coşkun Gülser
emiSS Coordinator


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Family net vessel compost technology: Best way to manage Kitchen waste

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ABSTRACT

In India rapid urbanization, escalating population and food consumption rate led to increase in city waste (CW) generation in India. Per capita generation of CW ranges from approximately 0.17 kg to 0.62 kg per person per day in small towns and cities respectively with a mean of 0.4 kg per capita. About 40% of CW is considered to be organic and biodegradable, of which only 14% (9.1 Mt) being composted. Organic CW (OCW) mainly comprised of discharges from household and can be better designated as Kitchen Waste (KW). The KW contains high moisture content and is characterised by about 60% carbohydrates, 20% protein and 10% lipid. Thus, a strong technology is needed to segregate KW at source level and convert it into stable and nutrient enrich compost. ICAR-Indian Institute of Soil Science, Bhopal, has developed Family Net Vessel Compost (FNVC) technology using three epigeic earthworms (*Eisenia fetida, Eudrilus eugeniae* and *Perionyx excavatus*) for recycling of KW into valuable compost. In this technology, vessel is made of nylon net with 90cm length and 35cm diameter containing 10-15 kg capacity plastic basket placed inside the vessel. This vessel can be hanged with the help of nylon rope in the available space of the house or on the branches of the tree planted around the house. KW were cut into small pieces (3-5 cm length) and kept inside the vessel followed by well decomposed cattle dung spread over the wastes. About 100-150 nos. of adult epigeic earthworms of three species in equal numbers is kept in the basket. Whole material is covered with jute bag and kept moist by adding water regularly to maintain the moisture. After 30 days the vermicompost gets ready for field application. The compost had organic carbon to total nitrogen ratio of 10-12: 1; 1.2% total nitrogen, 2.0% total phosphorus and 0.8% total potassium. This FNVC is an efficient technology and can be easily adopted to convert KW into valuable compost.

Key words: Epigeic earthworms. FNVC. Kitchen waste. Organic city waste. Vermicompost

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Young scientists: The new international union of soil sciences' working group

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ABSTRACT

The number of current environmental and social challenges related to global change has considerably increased with effects in the economic, political, and cultural spheres. So far, it is demonstrated that soils play an important role in controlling these challenges. Nevertheless, it is still missing a well-stablished platform to exchange ideas among generations about the epistemology, pedagogy, study, and applied soil science. In Europe and the Americas, there are some examples of young soil scientists' programs. In general, it is stated the lack of spaces dedicated to the youth within national soil science societies and the International Union of Soil Sciences (IUSS) itself. Although, the youth's potential in soil educational projects is recognized by the IUSS. For example, the Youth Action Commission of the Mexican Soil Science Society has successfully developed soil contests, workshops, symposiums, infographics, and podcasts with international success. In this way, the "Young Scientists and Early Career Scientists" Working Group considers the youth presence for the very first time. The main is to share knowledge, promote research cooperation, develop events, protect the youth, and transfer skills to the next generations, which will motivate fresher ideas. This proposal -supported by 34 countries- is and will continue suturing the gap between beginners and expert soil scientists. Also, it will promote the Group as a fertile and friendly platform to cultivate ideas and support the youth in its scientific path as an inherent necessity to green up the National and Regional Soil Science Societies and the IUSS itself.

Key words: Education, Inclusion, Soil Science Societies, Youth

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Agroecological significance of ecofertile biostimulant on tropical soils and crop improvement

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ABSTRACT

The environmental degrading effects of synthetic chemical fertilizers have triggered the search for sustainable alternatives to resolve the global food crisis exacerbated by Covid-19. This has led to the development of biostimulants from plants, animals, or organic mineral salts. Biostimulants from these sources enhance plant growth through benefit nutrient uptake, nutrient use efficiency, tolerance to abiotic stress, pest and disease suppression, or crop quality and yield. Scientific research to produce and validate biostimulants from these sources is increasing in scope and number. Microfertile® plant biostimulant produced from coal is capable of all biostimulant functions defined by the European Union on fertilizers aside from being environmentally friendly. Microfertile® plant biostimulant from coal is rich in mineral nutrients and beneficial microorganisms. While biostimulants perform their role efficiently, their potential is limited to agroecological locations, edaphic factors, and crop types, as revealed by literature. Tropical soils, considered one of the oldest soils, have organic matter within a few centimetres of the topsoil, making them variable, highly productive, and poor at the same time, needing inputs mostly from none agroecological-friendly sources like synthetic chemical fertilizers. Understanding the relationship among biostimulants, agroecological locations, edaphic factors, and crop types could be exploited to improve agricultural plant production. Thus this review was carried out to examine the agroecological significance of microfertile® plant biostimulant on tropical soils and crop improvement.

Key words: Beneficial Microbes, Eco-Friendly, Mineral Nutrients, Organic Acids, Soil

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Direct sowing of rainfed winter wheat and in arid region of South Kazakhstan

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ABSTRACT

To feed the ever-growing population of the Earth, it is necessary to obtain higher grain yields per unit area. This requires intensive exploitation of arable land against the background of a reduction in their area, which ultimately leads to soil degradation. Currently, about 75% of the territories of the Republic of Kazakhstan are subject to an increased risk of desertification, more than 30.5 million hectares are subject to wind and water erosion, and 54% of these territories are located in the southern part of the country. In the arid climate of southern Kazakhstan, the main limiting factor of crops is the lack of soil moisture and availability of nutrients. In addition in recent few decades the cost of fossil fuels and lubricants are steadily growing. Resource saving technologies such as direct sowing, can significantly contribute in the problems of soil moisture loss, soil degradation due to tillage, wind and water erosion, CO2 emission due to mineralization etc. The effect of different doses and terms of application of growth stimulators, micronutrients, bio-fertilizers and mineral fertilizers, as well as their economic efficiency, was studied in ten variables of rainfed winter wheat grown with zero tillage technology. The use of a combination of growth stimulators and microfertilizers produced the highest grain yield and was the most cost-effective. The greatest value of the nominal net profit of 223.25 euro and 244.10 euro from one hectare was provided and calculated with the recommended target grain yield of 2.0 t/ha dose of mineral fertilizers, respectively; however, the production cost of one ton of grain in these treatments was also highest. Further research is continuing with a wider range and combination of amendments and various crops in a rainfed no-till winter wheat farm in southern Kazakhstan. The results have shown that in dry and hot climate conditions with a deficit moisture regime, direct sowing of rainfed winter wheat can be successfully applied provided an appropriate combination, dosage and timing of fertilizers and crop protection chemicals are applied

Key words:

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Sensitivity of soil organic matter indicators to long-term (<50 yrs.) application of mineral nitrogen in Cambisol in Serbia

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ABSTRACT

The goal of production of higher grain yield is predominantly achieved by higher doses of synthesised and mineral fertilizers. Intensive and long-term addition of mineral nitrogen, often adversely affect soil properties and ultimately the adequate ecological functioning of the soil and its sustainability. Labile organic matter fractions are most sensitive soil parameter. Their functional balance is controlled by soil microorganisms. They influence the ecological stability and biological productivity of ecosystems by participating in the biochemical transformation of mineral fertilizers and the synthesis of biologically active substances and nitrogen fixation. On the experimental station set 60 years ago by the Institute of Soil Science in Belgrade, Serbia, the effect of increasing doses of nitrogen fertilizer on biological indices of Cambisol on a bipolar crop rotation (wheat/corn) was studied. Soil basal respiration (BR), potentially mineralizable C and N (PMN and PMC), microbial biomass C and N (MBC and MBN) and light-fraction OM (LFN and LFC) on Cambisol were determined in five treatments with increasing doses of N fertilizer. The parameters studied were significantly affected by the long-term application of mineral fertilizer compared with both the control and the adjacent native soil. The highest amounts of nitrogen (N150) did not significantly differ from N120 and N90 for most of the parameters studied. Potentially mineralizable C represented the largest labile carbon pool, while microbial biomass N was the largest labile nitrogen pool. The mineralization rates for C and N were oppositely distributed over the seasons. The sensitivity index correlated with the amount of light-fraction OM. The results give a deeper insight into the behaviour and distribution of different pools of labile SOM in the agro-landscapes and can serve as a reliable basis for further research focused on zero soil degradation.

Key words:

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Feasibility of re-involvement of the fallow soddy-podzolic soil in cultivation

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ABSTRACT

Transformations of the soddy-podzolic gleyic clay soil in a long-term agricultural use (> 200 years) was studied in Leningrad region, northwest Russia. This feasibility study investigated the possibility of re-cultivation of these soils after long term fallowing. Morphological structure, particle size distribution, content and ratio of ferrous and oxide forms of iron in the profile of virgin (indigenous forest) and arable drained soil were analysed. In addition, changes in the organogenic-profile were traced in the course of long-term agrogenesis (>200 years). In virgin forest soil, during its pedogenesis the loss of fractions <0.01 mm from the eluvial layer was 877.4 kg m^{-2}, and the loss of <0.0001mm was 287.5 kg m^{-2}, as compared with parent material not affected by the processes of pedogenesis. However, long-term agrogenesis (>200 years) led to increased eluvial losses of fine earth particles. The loss of fraction <0.01 mm from the arable horizons was 1244.8, and < 0.0001 mm was 570 kg m^{-2}, respectively. This was due to multiple yearly tillage that increased the porosity of the soil and thus intensified lessivage, which led to increased leaching and eluvial losses. The total loss of colloids from the entire profile of virgin soil was 262.1 kg m^{-2}, and from the arable layer of drained soil - 290.1 kg m^{-2}. The humus enrichment of the colloids of the plough (P) horizon of the arable soil was two times lower than that of the surface (AY) horizon of the virgin soil. The relative share of the participation of colloids in the fixation of humus by the soil was the same (11.6 and 10.9%, respectively). In the subsurface horizons, the absolute content of humus in the colloids decreased, and the share of participation in the fixation of humus increased. When soddy-podzolic gleyic clay soil is brought to cultivation then the water-air regime is improved, content and composition of humus, depth of arable horizon is increased and the soil acidity decreased. At the same time the leaching of fine earth materials is accelerated. When this soil was withdrawn from crop production, the positive changes achieved as a result of cultivation were gradually lost. For the first time we could qualitatively calculate the losses of the fine earth fractions for the given soil from top soil. Taking into account the high costs of re-cultivation of the former land and a high cost of re-installation and maintenance of an optimal hydrological regime (drainage network) we concluded that repeated ploughing and involvement of arable soddy-podzolic gleyic clay soil into cultivation is economically unreasonable

Key words:

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Soil organic carbon stock in post-mine sites after reclamation with various tree species: A review

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ABSTRACT

Mining, a major cause of damage to surface morphology and soil structure of lands. Indeed, mining activities damage the natural ecosystem in numerous ways, e.g. by distorting the landscapes, discharging massive quantities of hazardous tailings and depositing pollutants in the atmosphere and water bodies. Thus, resulting in considerable detrimental influence on the quality of the air, water and soil, along with the loss of biodiversity. The restoration of vegetation at post-mining areas is an efficient approach of conserving soil, water and environment. Many restoration methods using several vegetation types have been executed to tackle this concern. In the current article, we analyzed numerous research studies concentrating on the influence of mine sites reclamation on soil organic carbon (SOC) accumulation. We also analyzed the influence of various tree species such as, common Birch (Betula pendula Roth), European Larch (Larix decidua Mill.), Black alder (Alnus glutinosa) and Scots Pine (Pinus sylvestris L.) on SOC in reclaimed mine sites (RMS). Consequently, the SOC in RMS was prominently increased as a result of several restoration techniques. Several factors e.g. the age of restoration, tree species and type of vegetation, the reclamation type or substrate used, were some of the factors which significantly influenced the SOC in RMS. Furthermore, the Cstock levels proved to be higher in the litter horizons of Pine trees while in mineral horizons, the Cstock levels were high in that of Alder trees. The most efficient reclamation techniques were regarding, NPK fertilization and liming. The amount of SOC accumulation in restored mining sites was observed to be improved from 0.37 - 5.68 Mg/ha/yr. Thus, the suitable reclamation techniques, restoration age, appropriate tree species selection and the type of vegetation are the core components of high SOC accumulation rate in soil.

Key words: Organic Carbon Stock, Post-Mines, Reclamation Techniques, Tree Species

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Comparison of physical soil quality of surface and subsurface soils affected by long-term cultivation based on SOC-stock

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ABSTRACT

The aim of this study is to determine some relationship between surface and subsurface physical soil qualities (soil compaction, crust formation and K-erodibility of subsurface soils) affected by long-term continuous cultivation in terms of soil organic carbon (SOC) content. In this current study, it was investigated six different soils formed under in "mesic" temperature and "xeric" moisture regime soil environmental conditions. The results of the study showed that soil compaction, crust formation, erodibility K are very important ($P < 0.001$) for organic carbon (OC), organic carbon stock, and organic matter (OM). The research also determined that the study area generally has silt texture, neutral pH, high amount of $CaCO_3$, high amount of OC and OM, medium level in the upper layer and the lower layer. No significant differences were detected between soil properties in the surface and subsurface soil layers.

Key words: Soil Organic Carbon, Compaction, Crusting formation, Erodibility K-value

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Effects of rhizosphere microbiome on alleviate environmental stress on strawberry crop: A review

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ABSTRACT

Strawberry (Fragaria x ananassa Duchesne) is cultivated widely in most regions of the globe, growing outdoors in open fields or controlled environments, such as polytunnels or greenhouses. Strawberry production and quality primarily depend on soil fertility, mineral fertilization, mineral ratio, and climatic conditions. Organic fertilizer inputs are necessary to boost crop output and preserve soil organic matter. Whereas using organic fertilizers is beneficial in increasing plant resistance against nutrient deficiency, which results in regulating different physiological processes such as decreased lipid peroxidation, high antioxidant enzyme activity, and increased osmotic regulation. Strawberry fruit quality is impacted by numerous pre-harvest factors, including picking time, fruit maturity, diseases, and fertilization. Furthermore, fruit quality can vary from season to season due to environmental factors influencing physical, chemical, and sensory properties. Fluctuations in the ecosystem, especially fluctuations in temperature and light, will considerably influence the growth of strawberries. The temperature factor is one crucial objective effect on strawberry growth. Low temperatures (below 7 °C) raise the probability of damaged fruits and changes in color and size. Also, Higher temperatures influence the electron transport chain and photosynthesis process. Moreover, elevated temperatures on the fruit surface can accelerate maturation, and a high rate of ripening could be a factor that decreases the duration of the crop cycle. Thus, high strawberry growth has been maintained at day temperatures of 23–28 °C, and the optimum night temperature is between 5–10 °C. It is well-known that changes in environmental conditions affect the development of strawberry plants, influencing flowering, producing fruit, and the quality of strawberry berries, among other characteristics. On the other hand, high temperatures decrease the plant's photosynthetic ratio by up to 44%, reducing crop yield and causing a decrease in sugars at the fruit level and, consequently, dropping sweetness. In this review, we will discuss a series of studies that have indicated that organic amendments significantly affect microbial communities in agricultural soil and alleviate Environmental Stress on Strawberry crop.

Key words: Strawberry, Rhizosphere Microbiome, Organic Manure, Environmental Stress, Climate Factors

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Determination of desertification risk for pasture areas under semi-arid ecological conditions using DIS4ME model and estimation with artificial neural network

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ABSTRACT

The purpose of this study, which was prepared using the Desertification Indicator System for Mediterranean Europe (DIS4ME) model developed for Mediterranean countries, was to calculate the desertification risk of the basin with semi-arid ecological features within the borders of Çorum province and to estimate the results obtained by ANN. The desertification risk potential of the pastures spread in the micro basin was estimated 5.83 index value as high level based on the results of 40 soil samples collected from the research area. However, the model's outcomes were also predicted by ANN and R2 values, with the best validation being 0.2040 in the fourth epoch; 90% for training, 91% for validation, 95% for testing, and 85% for all data. As a result, distribution maps of DIS4ME model and ANN showed parallel patterns. In addition, the approach aimed at reducing the area's risk of desertification revealed that developing soil protection policies in the model and implementing protective measures such as controlled grazing in the area would result in significant reductions in the risk of desertification in the study area.

Key words: Desertification, Desertification Risk, Artificial neural network, DIS4ME

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Determination of the agricultural use potential of bio additive organomineral fertilizers by incubation experiment

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ABSTRACT

Within the scope of the study, compost was obtained in accordance with the Organic and Organomineral Fertilizer Regulations from vegetable and animal wastes (cattle, sheep, poultry, pomegranate peel, grass, and tea wastes. In order to make organomineral fertilizer from the obtained compost, the materials were dosed at certain rates and pelleted under different pressures, and organomineral fertilizers in different formulations were obtained. The combination of nitrogen fixer, phosphate solvent, and plant hormone producing bacteria in the collection of Ankara University Faculty of Agriculture, Department of Soil Science and Plant Nutrition was inoculated into organomineral fertilizers and multiplied in the bioreactor. Microorganism counts of the biologically enriched organomineral fertilizers were performed for 6 months, and shelf life tests and content analyzes were made. According to the results obtained, it was decided to use 6N15P and 6N6P organomineral fertilizers inoculated with bacteria in the incubation experiment. When the results of the incubation experiment carried out to determine the dissolution process of biologically added organomineral fertilizers in the soil are evaluated; All fertilizer applications increased the OM, pH, and EC levels of the soil by $P<0.05$ compared to the control soil. In the incubation experiment, organomineral fertilizers made especially in bacteria-inoculated grass and tea litter compost at all times were the fertilizers that increased the nitrogen content of the soil the most compared to the control. In bacteria-inoculated applications, cattle compost-based organomineral fertilizer increased the phosphorus content of the soil the most compared to the control at all times ($P<0.05$During the incubation, 100kg/da applications of grass, tea litter, cattle, and poultry-based organomineral fertilizers increased all parameters measured in the soil more than 50kg/da organomineral fertilizer applications.

Key words: Bacteria, Incubation, Microbial fertilizer, Organomineral fertilizer

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Different tree species effecting the soil sorption properties of post fire areas; A comprehensive review

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ABSTRACT

Changes in vegetation brought on by fire events are immediately noticeable, however changes in soils take longer to manifest and may be either temporary or permanent in nature. According to studies, the physical, chemical, biological, and geochemical characteristics of soil can change depending on the size, length, and characteristics of the fire as well as the soil, after a fire event. Some of these characteristics play a big part in how well soil may absorb toxins. The effectiveness of remediation techniques used to clean up polluted soils and the soil sorption complex could both be impacted by changes in these qualities. The properties of soil like CEC, pH, Carbon (C), Nitrogen (N) and C:N ratio how they affect the sorption are discussed in this review. The information on fire-induced changes in soil characteristics by different tree species that affect soil sorption and the variables that control these changes is summarized in this review.

Key words: Post-fire Soils, Sorption, Forest soils, Remediation, Fire soils

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System of measures for soil erosion and protection

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ABSTRACT

Due to the cutting down of forests and the constant use of those areas under cultivation for the further development of agriculture, the process of erosion has spread and developed at a large speed. Most of the lands distributed on highly inclined slopes have been subjected to moderate to severe erosion. Also, in the forest zone, due to the fact that such sloping slopes are broken from end to end, and as a result of constant cattle grazing, a severe erosion process is observed. Due to non-observance of agrotechnical rules on such inclined slopes, the soil cover was completely washed away and became unusable. As it is known, the formation and development of the erosion process in any area is mainly related to several factors. Among them, natural factors - surface slope, steepness of slopes, depth of local erosion base, density of gob, flat gob and valley network have a great influence on formation of erosion process and its intensity. Jalilabad cadastral district (area 140471 hectares) included in the Republic of Azerbaijan was chosen as the research area. Based on the geographic information system of the research area we initially selected in order to implement protection measures against soil erosion, a slope and aspect map was drawn up in the ArcGis program, a product of the ESRI company. It should be noted that the tendency to develop the process of erosion and soil washing increases even more. When the surface slope map was drawn up, the area indicators of the areas with a slope of 0-50, 5-100, 10-200 and 20< were calculated according to the relief conditions of the area. Also, in order to draw a slope aspect map, each of the separated contours of the north, northeast, east, southeast, south, southwest, west and northwest slopes on the topographic map was measured separately in 3 repetitions and the distribution of the area according to aspect was determined. In the study area, the area of each species is shown separately.

Key words: Erosion, Geographic Information Systems, Cadastre, Slope, Aspect

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Remote estimation of the relationship between erosion risk classes using the Neutrosophic Fuzzy-AHP and RE-OSAVI for Sinop Province, Turkey

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ABSTRACT

With the population growth in the world, pressure on the lands is increasing. Erosion, which is a natural process that formed spontaneously, can also occur through human activities such as unsuitable land use and destruction of land cover. To decrease the role of erosion, it's crucial to determine the quantity of soil erosion of a region. For this, many methods have been progressed and one of them is called the Neutrosophic Fuzzy-AHP approach. With this study, the erosion risk classes were created with the use of Neutrosophic Fuzzy-AHP and Linear Combination Technique (LCT) using the 7 criteria such as geology, vegetation, land use, slope, depth, precipitation, and erodibility of the Sinop Province lands and observed the statistical relationship between the erosion susceptibility index values and Red-Edge Optimized Soil Adjusted (RE-OSAVI) vegetation index values derived from Sentinel-2A image. Results have been shown that with the 0.8101, 0.8138, 0.856, and 0.8179 r2 values of RE-OSAVI index have a high relationship between the erosion susceptibility index values for the low, medium, high, and very high erosion classes, respectively. From the results of this study, we have concluded that, to detect or monitor the soil erosion risk potential using the spectral vegetation indices is encouraging. It has been also recommended that spectral vegetation indexes on different vegetation types and areas on a broad scale can be evaluated using the abilities of Sentinel-2A and ESA-SNAP tool for future studies.

Key words: Neutrosophic Fuzzy-AHP, erosion risk, Linear Combination Technique, vegetation index, RE-OSAVI, Sentinel-2A

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Estimation of soil aggregate stability by different regression methods

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ABSTRACT

In this study; the estimation of aggregate stability, which is one of the erosion susceptibility parameters, was investigated by using some basic soil properties (sand, clay, silt, organic matter). Different regression methods (Linear, Ridge, Lasso, and Elastic Net), one of the machine learning algorithms, were compared as models. When the accuracy of the models was evaluated, the root means squarer error (RMSE) values obtained by linear regression in the estimation of aggregate stability were 3.76, while the others (Ridge, Lasso, Elastic Net) were 3.73, 3.74, and 3.65%, respectively. In the evaluation made according to the minimum and maximum accuracy method, the highest accuracy of 95.1% was obtained in the Elastic Net method. While all parameters were found to be important for the model in the Ridge regression method, the sand content of the soils was not included in the model in the Lasso regression. In the Elastic Net regression, the most important parameter in the estimation of aggregate stability was determined as clay. As a result of this study; The estimation accuracy of the regression methods examined was determined close to each other. However, with the determination of appropriate lambda and alpha values, the most successful estimation of aggregate stability was obtained with Elastic Net regression.

Key words: Lasso, Ridge, Elastic Net regression, structure, soil properties

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Effect of lantana based fertilizer enriched biochar application on soil properties and onion productivity

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ABSTRACT

Biochar is a fine-grained carbon-rich product obtained when biomass such as wood, plant remaining is burned in a closed container with absence of air. Effects of fertilizer enriched biochar on soil properties and crop productivity are the subject of interest in agricultural science in developing countries like Nepal due to the declining soil fertility status. To know the effects of nitrogen (N) enriched biochar on soil properties and onion productivity, four times replicated field experiment was conducted from 19th December to 29th April, 2021 in Bhaktapur, Nepal in Randomized Complete Block Design (RCBD) with six treatments prepared by combining 30 t ha^{-1} biochar with chemical and organic fertilizer. Treatments were: Control (T1), RDF (T2), 1/2 RDF+ Biochar (T3), RDF+ Biochar (T4), Vermicompost + Biochar (T5) and cattle urine+ Biochar(T6). The results showed a significant increase in the onion yield up to 18.62 tha-1 and NPK of soil to 0.49 kgha-1, 54.02 kgha-1 and 58.9 kgha-1 with the application of RDF incorporated in biochar (T3). The pH of the soil increased from 4.01 to 5.375 and the OM increased from 2.82 to 4.835 by vermicompost enriched biochar. The B: C ratio for RDF+ biochar (T5) showed a maximum value of 3.25. The study suggests that biochar can be best used as an amendment rather than just fertilizer in combination with RDF to get the best results with onion yield and soil NPK. The addition of biochar also helped to retain moisture for a longer period of time. Thus, biochar can be a viable option to improve soil health and onion productivity.

Key words: Biochar, RCBD, Treatment, Vermicompost

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Environmental problems of technogenic land pollution

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ABSTRACT

A microbiological assessment of gray-brown soil's ecological state of Surakhani oil field area of Absheron Peninsula was carried out. To do this, the total number of heterotrophic, hydrocarbon-oxidizing microorganisms and the ratio between them were determined in the studied samples. The content of hydrocarbons in the samples and the degree of their toxicity to green plants were also determined. The results of the studies showed that in soils with an increase in the content of hydrocarbons, the total number of microorganisms decreased, but the number of hydrocarbon-oxidizing microorganisms in the composition of soil microbiocenosis increased compared to pure soils. The ratio between the number of hydrocarbon-oxidizing and heterotrophic microorganisms in soils varied in the range of 0.07-0.21.This data indicates that in oil-contaminated soils with a high content of hydrocarbons, the structure of microbiocenosis changes compared to pure soils, and about 10-13% of it consists of microorganisms capable of decomposing petroleum hydrocarbons and participating in the processes of self-purification of these soils. Since one of the integral indicators of soil pollution is their toxicity to vegetation, we simultaneously studied the degree of phytotoxicity in soil samples in which the degree of hydrocarbon pollution was studied, which showed that the degree of phytotoxicity directly correlates with the degree of soil contamination with petroleum hydrocarbons. Thus, the data obtained on the total number of microbiota of various biocenoses indicate the creation of new adaptive mechanisms for them, allowing them to adapt to anthropogenic and technogenic effects on the environment, including soil cover, as a result, the biocenosis of oil-contaminated soils is gradually formed. This gives grounds to assert that the natural resources of Absheron as an arid region should be strictly regulated in order not to cross the ecological barrier of dynamic equilibrium between the exploitation of natural resources (soil, surface and groundwater, etc.) and their natural restoration.

Key words: Hydrocarbons, Microorganisms, Phytotoxicity, Pollution, Soils

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Peculiarities of the formation of grain sorghum hybrids biometric indicators with the application of microfertilizers and growth regulators

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ABSTRACT

The selection of elements of grain sorghum cultivation technology should be carried out taking into account its biological features, which are different from C3 crops of the photosynthesis type traditionally grown in the conditions of the forest-steppe of Ukraine. The laboratory similarity of the grain sorghum hybrids studied by us depended exclusively on the quality of the seed material, thats how for the Brigg hybrid it was 95.2%, and for the Yutami hybrid this indicator was 94.7%. The density of crops at the time of harvesting of grain sorghum plants was in the Brigg hybrid, the best indicators were obtained by treating plants foliar with microfertilizers Alpha-Grow-Extra 2 l/ha (1 treatment of 5 leaves, 2 - 9 leaves, 3 - throwing out panicles), or Intermag - Corn, 2 l/ha (1 treatment in the phase of 5 leaves, 2 and 3 - with an interval of 7 days). In the Yutami grain sorghum hybrid, the best level of conservation of crop density, similar to the other researched hybrid, was ensured by the use of foliar fertilization. By the end of the growing season, and in particular at the time of full maturity, the average height of the plants according to the experiment was 117.3 cm, and the use of additional elements of growing technology did not lead to a significant impact on the studied indicator at the later stages of the growing season. Thus, the height of the sorghum plants of the Brigg hybrid was within 118.5-124.1 cm, and in the Yutami hybrid - 111.7-117.2 cm.

Key words: Grain Sorghum, Hybrids, Micro Fertilizers, Growth Regulator, Laboratory Germination, Plant Density, Plant Height.

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Comparison of GIS-based interpolation methods for spatial distribution of soil properties: A case study of Jajmau, Kanpur

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ABSTRACT

A study was conducted to interpolate the analysis of spatial variability of soil organic carbon, pH and EC in Jajmau industrial area, Kanpur district. A total of 120 soil samples (0-25 cm) were collected grid wise at an interval of 250 m using GPS. After normalization, data were interpolated by Ordinary Kriging (Spherical, Exponential and Gaussian). The performance of methods was evaluated using Mean Absolute Error (MAE), Root Mean Square Error (RMSE) and Goodness of prediction (G) obtained from a cross-validation procedure. The best model is selected based on low MAE, low RMSE and highest G percentage. The results showed that Ordinary Kriging (Spherical Model) was the best method with strong spatial dependence to estimate soil organic carbon followed by Exponential and Gaussian model. Gaussian Model fits well with highest precision for estimation of soil pH and EC in this study area with moderate spatial dependence followed by Spherical and Exponential model. Cross validation of kriged map showed that spatial prediction of soil properties using semi variogram parameters is better than assuming mean of observed value for any un-sample location. Therefore, it is a suitable alternative method for accurate estimation of soil properties in unsampled positions as compared to direct measurement which has time and costs concerned.

Key words: Spatial variability, Cross validation, GPS, Semivariogram, Geostatistics.

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Response of microbial consortia on nutrient uptake and soil health under soybean crop in Central India

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ABSTRACT

The magnitude of agricultural intensification and use of agrochemicals leads to increase crop production but simultaneously led to an adverse effect on soil environmental quality and soil health. Microbial inoculation represents a new way of working towards a more sustainable and efficient agriculture. It is clearly beneficial for enhancing crop production and sustain soil health through boost the soil biodiversity. Therefore, an experiment was conducted at Research Farm of Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, during Kharif season of 2019-20 to assess the effect of different microbial consortia on crop production and soil properties in soybean crop. This experiment consisted of sixteen treatments, replicated thrice by comprising different seven beneficial microbial inoculants viz., Rhizobium sp., Bacillus sp., Streptomyces sp., Rhodopseudomonas sp., Lactobacillus sp., Saccharomyces sp. and Aspergillus sp. along with two types of control plots were maintained as fertilized uninoculated control (FUI) and unfertilized uninoculated control (UFUI). The crop was supplemented with recommended dose of fertilizers. The findings revealed that the treatment of microbial consortia T14 (combination of all seven inoculants) performed superior for nutrients uptake (Nitrogen, Phosphorus and Potassium) in seed and stover by 67.30, 95.10 and 116.87%; and 119.78, 70.28 and 81.85%. Similarly, this treatment performs best for the available nutrient's (Nitrogen, Phosphorus and Potassium) in soil by 50.28, 57.60 and 34.48% as compare to FUI at harvest stage of soybean crop. Thus, the microbial co-inoculation on seeds with different consortium plausibly influence to the crop through direct and indirect mechanisms viz., enhancing diazo-trophy, nutrient solubilization, siderophore formation, excretion of growth promoting enzymes, and anti-oxidants against phytopathogens. The enhancements in hormonal activity of auxins-cytokinin's, on root formation, growth and lateral roots leading to increase the solubility, and availability of nutrients in soil.

Key words: Available Nutrients, Microbial Consortia, Nutrient Uptake, Soil Health.

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Land evaluation for sustainable land management with multi-criteria decision making and linear combination technique: A case study in Samsun-Kavak District

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ABSTRACT

Aim of this study is to identify the potentially suitable agricultural areas for cultivated agricultural production using two widely used multi-criteria decision-making approaches such as Fuzzy Analytical Hierarchal Process (FAHP) and Linear Combination Technique (LCT) together in order to make use of the soil effectively and sustainably. In order for this a previously prepared soil map on a scale of 1/25000 was used. Physical properties such as soil depth, slope, erosion, stonyness, and soil texture using drainage, pH, EC, Organic Material, and polygene parameters were used from a 397.3 ha study area which consists of Seyitali, Kaya, İdrisali, Muhsinli, Beyköy and Çayırlı neighborhoods of Kavak district of Samsun province. According to the study results, no S1 level area was found in the approximately 397 ha area. Only 11.81 % of the area was found to be suitable at S2 level. 3.4 % of the area was found to be at class N, and the remaining approximately 84.79 % of area was found to be at S3 level.

Key words: B-AHS, linear combination, soil evaluation, Samsun.

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Sandy soils in Poland: Exploring research constituents

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ABSTRACT

More than 900 million hectares are covered by sandy soils on the Earth's surface. Nevertheless, because of their marginal status as often-low fertile soils, they have received limited research attention worldwide. Almost 55% of the soils of Poland are classified as Arenosols (29%) and Podzols (26%) according to WRB. However, the WRB itself has changed some concepts related to Arenosols and Podzols through the last three editions (2006, 2015, and 2022) such as Albic horizon and Claric material. There is a need to explore research constituents and intellectual structure of sandy soils in Poland in the extant literature. In this way, a comprehensive science mapping analysis was conducted using the bibliometrix R-tool with Scopus databases. During the last five years, China, the United States, and Poland have led as the most productive countries for sandy soils publications based on their corresponding authors. Meanwhile, Germany is the most average cited corresponding author's country followed by China and the United States. Among the keywords in sandy soils research conducted in Poland stand out biochar, soil organic matter, soil organic carbon, and heavy metals. Podzolization as a keyword is ranked in 10th place, which indicates lower interest in sandy soils formation than sandy soils biogeochemistry. This gap between the biogeochemistry and the pedogenesis of sandy soils has been recognized by the Commission for the Soil Genesis, Classification, and Cartography of the Soil Science Society of Poland which dedicated the year 2021 to Gleba rdzawa (Pol.) – the rusty soils. Finally, the research in sandy soil formation will contribute to the understanding of Polish and Central European soil geography.

Key words: Arenosols, Bibliometrix, Pedogenesis, Podzols.

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Influence of surfactant-based wetting agent applications on the content and distribution of extractable macronutrients and labile organic carbon fractions of a drip-irrigated sandy soil

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ABSTRACT

The present study was carried out as a consecutive study on the soils treated with the commercial wetting agent *H2Flo* (*ICL-SF, Inc*). The initially reported decreases in unsaturated hydraulic conductivity and slight significant increases in soil reaction along with a relatively more homogeneous distribution of soil organic matter, after *H2Flo* applications, were considered as possible manipulation factors in the distribution of nutrients and soluble carbon fractions. Additionally, despite their beneficial influence in terms of increased re-wettability and infiltration rate in water-repellent sandy soils, it was recently documented that some commercial surfactants may replace the organo-mineral coatings on sand surfaces. In this context, the contents of water-soluble organic carbon (C_w), hot water-soluble organic carbon (Chw), and potassium permanganate-oxidizable organic carbon (POXC) were investigated as labile organic carbon pools. The extractable K, Mg, Ca, and P contents were investigated together with mineral sources of N (NH_4^+-N and NO_3^--N). Related parameters were examined at different depths (0-15 cm and 15-30 cm) of potato grown sandy soils irrigated with subsurface drip system, to be able to have insight into nutrient mobility in the root zone. The *H2Flo* treated soils represented an increase in extractable K, Ca and Mg contents in top-soil; POXC were also found to increase significantly in the top soils, while C_w and C_{hw} were not quantitively influenced. Although the observed increases in NH_4^+-N and decreases in NO_3^--N of *H2Flo* treated soils were not significant, the considerably increased ratio of NO_3^--N / NH_4^+-N, resembled the favorably induced conditions of soil nitrification.

Key words: Extractable nutrients, organic carbon fractions, soil wetting agent.

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Exploring the soil fertility and plant nutrition potential of LAB isolated from palm wine and sha'a

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ABSTRACT

The degrading effects of synthetic agrochemicals on soil health and fertility have provoked a revolution for sustainable pathways to improve soil quality and productivity. Recent advances have proven and postulated soil fertility enhancement using plant growth promoting beneficial microorganisms without deleterious effects on soil health. Such beneficial microbes are lactic acid bacteria. LAB is a group of microorganisms that are non-motile, gram-positive cocci or bacilli, non-spore-forming, and finally produce lactic acid for the fermentation of carbohydrates through heterofermentative or homofermentative. LAB have shown to enhance soil fertility and plant nutrition through phosphorus solubilization, nitrogen fixation, siderophore secretion, and decomposition of organic matter. Due to LAB's role in soil quality augmentation, their isolation from different sources has increased in modern times. They are found to be dominant in fermented products such as compost, yoghurt, palm wine, and sha'a also known as corn beer. Palm wine and sha'a are drinks that's is been produced and consumed traditionally in most developing nations. They harbour an array of LAB with the potential to increase crop productivity and enhance soil quality. Nonetheless little is known about the isolation of LAB from palm wine and sha'a and their role in soil fertility and plant nutrition. This review is therefore set out to explore the potential roles of LAB from palm wine and sha'a on soil quality and plant nutrition.

Key words: Beneficial Microbes, Soil Health, Plant and LAB Sources.

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Determination of landslide susceptibility with the help of analytical hierarchical process- Suşehri example

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ABSTRACT

Landslides are defined as the movement of soil, rock, or rubble mass in the direction of a slope, causing great loss of life and property in our country as well as in the world. In recent years, many approaches and algorithms have been used to reduce the harmful effects of disasters, including landslides. The use of these approaches and methods has facilitated the development of early warning systems for disaster areas or areas exposed to disaster, as well as the production of sensitivity maps. The analytical hierarchical process approach, which systematizes the data and accelerates the decision-making process, is widely used in the evaluation of many criteria. This study was carried out within the borders of Suşehri district of Sivas province it was aimed to determine the landslide susceptibility with AHP by using slope, aspect, precipitation, slope direction, proximity to a stream, distance to fault lines, distance to roads, land use, soil, lithology, NDVI parameters.

Key words: Analytic Hierarchical Process, Geographic Information Systems, Landslide, Land Use.

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State of art approaches, insights, and challenges for digital mapping of electrical conductivity as a dynamic soil property

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ABSTRACT

Soil electrical conductivity (EC) as a measure of soil salt content is a good indicator of nutrient and water availability or excessiveness in soils, which in return affect the productivity of soils. Therefore, mapping the spatial distribution of EC under intense agricultural management is important for managing soil fertility (e.g., fertilization and soil salinity remediation). However, mapping soil EC with high accuracy and spatial resolution remains to be challenge among digital soil mappers due to being a highly dynamic soil property. In this study, random forest (RF) was applied to map soil EC in an agricultural plain around the lake Manyas in the northwestern Türkiye. Fifty soil samples and a unique set of environmental predictors (aka covariates) were used to build a predictive soil EC model. The covariates were produced from Sentinel-2 optical satellite images-based vegetation and salinity indices as well as produced from Sentinel-1 with different polarizations (i.e., VV and VH), and terrain attributes representing the topography at varying scales were produced. Twelve environmental variables were selected to be relevant to predicting soil EC after using a correlation-based feature selection procedure. Resulting model performance was evaluated by root-mean-square-error (RMSE) of 10-fold cross-validation (CV). RF predicted soil EC with an RMSE of 0.07 dS m^{-1}. Per each soil prediction in the final soil EC map, an uncertainty map was created using a sensitivity-based approach. The uncertainty map revealed the areas that were more difficult to accurately predict. Present study successfully mapped soil EC with acceptable error and can provide useful insights for managing soil fertility. In addition, an uncertainty map of soil EC can facilitate future soil sampling campaigns. For nearly a quarter of a century, while satellite-based remote sensing data has become the first choice for generating and updating soil survey information, in the near future, artificial intelligence techniques (e.g., ML) will be able to accompany soil surveyors in drawing map boundaries, especially in updating soil salinity phases.

Key words: A Digital soil mapping, Dynamic soil property, Random forest, Soil electrical conductivity, Uncertainty.

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Investigation of the effects of forest fire in the national park "Bohemian-Saxon Switzerland" near Hřensko on air, soil and vegetation in Bohemia Region using Remote Sensing Technology

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ABSTRACT

The recent increase of air temperature and drought due to global warming in the world is shown as one of the important reasons for the occurrence of wildfires that burn shrubs, forests, and grass. These fires threaten the lives of all organisms and cause serious damage to vegetation and human settlements or infrastructure. Soil vulnerability to erosion and desertification is increased by wildfires and reforestation is often difficult. In addition, harmful gases and solid particles are released into the atmosphere due to wildfires. Thus, harmful gases and particles enter the human body through respiration and cause health problems, whereas the living space of animals in nature is deteriorated as well and the ecological balance is adversely affected. In this study, regional effects of a forest fire that started on 24th of July in the National Park "Bohemian-Saxon Switzerland" in the Děčín district, Czech Republic, were investigated using different satellite datasets by Google Earth Engine platform in Bohemia region, Czech Republic. Land use - land cover (LULC) and normalized difference vegetation index (NDVI) were calculated using Sentinel-2A that has 10 m spatial resolution data for 2021 and 2022. Land surface temperature (LST) and soil moisture index (SMI) was analysed to compare differences before and after the fire by MODIS daily 1 km spatial resolution data. In addition, the distribution of SO_2 and NO_2 gases was extracted using Sentinel-5P TROPOMI data in the study region. The burnt area in the national park was detected using remote sensing data approximately as 1290 ha from the total area of 792 300 ha.

Key words: Land Surface Temperature, Normalized Difference Vegetation Index, Soil Moisture Index, Wildfire.

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Microelement composition of soils (Basegi Ridge, Middle Urals) and its spatial differentiation

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ABSTRACT

The studies were carried out in the undisturbed part of the Middle Urals (Basegi Ridge). The ridge is confined to a strip of the most ancient rocks resistant to weathering in the territory of the Middle Urals. Soil profiles were studied on different relief elements (m above sea level): mountain tundra (821-940) – crooked forest (715-816) – meadows (600-736) – swamp (492-578 m) – light forest (557-655) – taiga (315-590). We compared the content of trace elements with soil Clarks. Soils have an increased natural background of some microelements. So, at a height of 600-940 m, Br, Pb, Zn, Cu, Ni accumulate, in a dispersed state - Sr, Y, Ga, Rb .; soil-eluvium is enriched in Br, Pb, Zn, Zr, Ga, Ni. Taiga soils accumulate: Pb, Zn, Cu, Ni, Br; in the scattered state are Y, Sr, Ga; soil-eluvium is enriched in Pb, Zn, Cu, Zr. Pair dependences of microelement concentrations showed that at a height of >600 m, a significant high correlation was found in Ni-Cu, Ni-Zn, Zn-Cu, Zn-Rb vapors, which is associated with a large manifestation of physical and frost weathering in severe conditions. Pair relationships of microelement concentrations revealed the main elements that form geochemical conditions in high-altitude zones. With the help of geochemical indices [(Rb+Zr)/Sr, Zr/Rb, Rb/Sr, Zr/TiO2], it was found that the intensity of soil formation is higher in soils formed below 691 m a.s.l., and the intensity of sedimentation processes, on the contrary, it has the opposite trend. In soils in transitional ecotones and geomorphologically transitional zones, according to lithogeochemical indices, the chemical weathering of the substrate is minimally manifested at its maximum physical (frosty) weathering. Evolutionary-genetic features of soils and geochemical heterogeneity have been established. A number of soil types have been determined according to the intensification of chemical change and the degree of weathering.

Key words: Geochemical Indices, Microelements, Middle Urals, Soil Formation, Soils, Weathering.

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Evaluation of strawberry cultivars based on growth related attributes under open field condition

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ABSTRACT

In this study, short day and day-neutral strawberry cultivars were evaluated for different growth related characteristics under open field condition. The frigo plants of different strawberry cultivars were transplanted in 2 liter pots having a soil mixture of garden soil, peat moss and perlite (3:1:1). The analysis of data revealed significant variation among cultivars for growth related attributes of strawberry. The highest number of leaves plant-1, number of crowns plant-1, plant total fresh biomass, plant total dry biomass and leaf stalk length were recorded in strawberry cultivar Jive. The cultivar Roxana had highest value of root length, while the strawberry cultivar Petaluma showed maximum plant height. The value of chlorophyll content was significantly higher in cultivar Redlans Hope. In addition, the highest value of leaf area was noticed in cultivar Festival, plant canopy area in cultivar Fronteras, leaf area index in cultivar Totem and specific leaf area in cultivar Florance. The positive correlation was observed between different growth attributes of strawberry cultivars except chlorophyll content, leaf area index and specific leaf area. It was determined that cultivar Jive had the highest values in terms of growth characteristics compared to other strawberry cultivars.

Key words: Strawberry, Cultivars, Growth indexes, Short-day and Day-neutral, Open condition.

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Soil resistance to vertical penetration and saturated hydraulic conductivity of fine-textured agricultural soil under controlled drainage

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ABSTRACT

Drainage systems are present in almost 25% of agricultural land in the Czech Republic; approximately 1.1 out of 4.2 million hectares. Controlled drainage is a clever, sustainable water management method providing subsurface irrigation by artificial setting of the water level during dry periods of vegetation season. This study, carried out on agricultural field with controlled drainage, compares and relates experimental data of soil resistance to vertical penetration and saturated hydraulic conductivity (Ks) of the soil on part with and without regulation of the groundwater level in the system. In addition to that, supplementary characteristics such as field volumetric water content, saturated volumetric water content, porosity and dry bulk densities were evaluated. Relatively wide range of the Ks values was measured; from 0.26 to 99.07 cm/day. The Ks values measured on non-regulated part were approximately six times higher than those on the regulated area. This finding is corresponding with lower values of dry bulk density and higher values of porosity which were determined for the non-regulated part. Penetration resistance showed not only an expectable increasing tendency with increasing depth and/or with decreasing soil water content, but also revealed interesting multi-layered profile present at the locality. Significantly higher values of penetration resistance (for significance level $\alpha = 0.05$) were found on the regulated area, which corresponded with the lower values of measured saturated hydraulic conductivity.

Key words: Hydraulic Conductivity at Saturation, Penetration Resistance, Regulation of Groundwater Level, Soil Characteristics Relations.

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How does salt-stress affect on plant growth and yield?

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ABSTRACT

Salt stress is one of the major abiotic problems for arid and semi-arid region. Salt in soil or water retarded growth and yield of plant and reduce overall agricultural production. Salt can change the metabolism which affect the ultimate plant growth and development. Salinity dominated by Na+ and Cl decreases Ca2+ and K+ availability as well as Ca^{2+} and K^{+} transport and mobility to growth regions of the plant. High soil salinity reduces plant net photosynthetic capacity and results in physiological stress, which has a negative impact on agricultural productivity and sustainability. In case of cereals, the number of grain yield per plant, grains per panicles, grain yield, plant height, and relative water content all decline as a result of the elevated salt concentration. The inhibition of the enzyme activity could be caused by salt stress. It may affect a plant's ability to absorb minerals. However, during growth and development, a plant's sensitivity to salt stress also varies. Even mild soil salinity affects the physiological and biochemical pathways in plants. There are several ways to mitigate salt-stress problem. Despite of having other solution, organic amendments are optimistic solution for salt-stress problem. Additionally, biochar amendment has frequently been mentioned as a successful way to improve salt-stressed fields and raise plant resistance. Especially, improved soil cation exchange capacity, water holding capacity, soil nutrient retention, and increased soil enzyme activities and diversity of microbial communities. Moreover, composting salt-affected soils may speed up Na+ leaching, improve cation exchange and water infiltration, boost aggregate stability and water holding capacity, and reduce electrical conductivity and exchangeable sodium content. In conclusion, adding biochar and composting might be a potential strategy to lessen the negative effects of salt stress on plants.

Key words: Abiotic Stress, Plant Growth, Soil Conditioner, Biochar, Composting.

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Heavy metals in urban soils: A systematic literature review using R Studio

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ABSTRACT

Heavy metals in urban soils is a topic which can be investigated from different views. Based on 123 papers collected from the Web of Science and a bibliometric analysis done using R software and the R package Bibliometrix were obtained the most cited papers, the most productive authors, the most relevant sources, evolution of keywords, conceptual structure of articles, trending terms and topics. From this information, the following concepts were selected: pollution indices, trace metal, soil distribution, bioavailability, risk assessment, and toxicity; terms defined in this paper. The main aim is to achieve a systematic, specific, and contextualized review which allows a conceptual vision and understanding of the ongoing potential and available research around the concept of heavy metals in urban soils.

Key words: Bibliometric Analysis, Bibliometrix, Heavy Metals, Urban Soils.

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Vermicompost: A gateway to sustainable agriculture production

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ABSTRACT

There is a crucial problem of disposing bio-waste in a safer way. These wastes can be converted into valuable composts which have long been recognized in agriculture as beneficial for plant growth and yield and the maintenance of soil fertility rather than when they are directly applied. Therefore, the aim of this review is to emphasize the importance and use of vermicompost as a gateway to sustainable agriculture production. In this respect, efforts have been made to products of nutrient rich high-quality food in feasible way to ensure bio-safety towards sustainable agriculture. Sustainable agriculture is an alternative farming to agrochemicals, which means meeting society's present food and textile needs, without compromising the ability of future generations to meet their needs. Use of Vermicompost is an eco-friendly approach that not only ensures food safety but also adds to the biodiversity of soil and improve plant tolerance against plant stresses. Vermicompost is an essential component of organic farming and play crucial role in maintaining long term soil fertility and sustainability and would be a viable alternative for farmers to increase productivity per unit area in organic farming for an era of prosperity and clean environment.

Key words: Biotic and abiotic stress, Eco friendly, Organic farming, Sustainable agriculture production, Vermicompost.

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Potential role of salicylic acid on drought stress tolerance of strawberry plants

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ABSTRACT

Drought is considered as one of the main environmental stresses across the globe that adversely affect plant growth, economic outcome, and environmentally sustainable productivity. Drought stress is characterized by reduction of water content, diminished leaf water potential and turgor loss, closure of stomata and decrease in cell enlargement and reduces plant growth by affecting various physiological and biochemical processes, such as photosynthesis, respiration, translocation, ion uptake, carbohydrates, nutrient metabolism and growth regulators. To navigate this environmental stress, salicylic acid (SA), an endogenous plant growth regulator that is known to be significantly affecting the productivity, growth, photosynthesis, plant water relations, and antioxidant enzyme activities of plants exposed to various biotic and abiotic stresses. Nowadays, one of the most widely grown and demandable fruit plants among people is strawberry. Strawberry plants require extreme water and are vulnerable to drought. Strawberry has a shallow root system, large leaf area, and high water content in fruits, therefore, it uses large amounts of water. Water deficit will limit plant growth, particularly during the vegetative and reproductive stages in strawberry plants. This review was aimed to determine the potential role of salicylic acid on growth, yield and drought stress tolerance of strawberry plants.

Key words: Drought stress tolerance, Growth, Physiological and biochemical processes, Strawberry, Salicylic acid, Yield.

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Relationship between land surface temperature and moisture of soils in Shamakhi District

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ABSTRACT

Land Surface Temperature (LST) and moisture of soils is one of the considerable pointers to understand the changes of surface processes estimate of environmental modifications. These indicators help us to evaluate land use/land cover changes and climate processes. Monitoring of relationship between LST and moisture values of soils is necessary to make an appropriate decision about environmental status of regions. In this paper, generally show correllation between Land Surface temperature and moisture of soils and vegetation for Shamakhi District. To find out moisture of soils and vegetation we used Normalized Difference Moisture index (NDMI). That uses NIR and SWIR bands and to display moisture. To do this task we take Landsat Operational Land Imager (OLI) and the Thermal Infrared Sensor (TIRS) datas with help of remote remote sensing, geographic information system (GIS) techniques. The research is based on the data of September. The results show the relationships between land surface temperature and moisture in the study area. The spatial distribution of LST ranged from 13˚C to 38˚C. The relationship between Land Surface Temperature and NDMI is an inversely proportional relation (R2 = 0.5788) and on the grounds 500 random points were selected. In the plain areas of Shamakhi LST indicators are high respectively 27° and 39° but NDMI indicators are low. Whereas temperature indicators are low, NDMI indicators are high here. These indicators are suitable for forest and agricultural areas. As a result, that correlation between LST and NDMI data will allow to determine both the drought monitoring and the suitability of the area during planting.

Key words: Land surface temperature, Normalized Difference Moisture index, ecology, remote sensing.

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Field-scale digital soil mapping of mobile zinc: Combining different digital covariates and comparing geostatistical and machine learning models

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ABSTRACT

It is well documented that the yield of cultivated crops decreases when the amount of mobile zinc in the soil is insufficient. Digital mapping techniques are needed to identify areas with a shortage of plant nutrition elements. In the present research, data collected from the Novosibirsk region (Russia) (50 observations) were used to compare the accuracy of geostatistics (Ordinary kriging (OK)) and machine learning approaches (Lasso Regression (LR) and Random Forest (RF)) to map the concentration of mobile zinc in the upper horizon of the soils in order to determine which method generates maps more accurately. The effectiveness of vegetation indices and morphometric relief factors for digital mapping was assessed using machine learning methods. Fifteen vegetation-based indices were calculated by Landsat 8 OLI (resolution 30 m). Ten morphometric relief parameters were calculated using the digital elevation model SRTM v.3. In the determination of mapping performance of the machine learning and geostatistics techniques for soil mobile zinc, coefficient of determination (R^2), root mean square error (RMSE), and normalized root mean square error (NRMSE) were used through the k-fold cross-validation (n:10, repeated:5). The results of the three models showed that the LR model with lower RMSE (0.43 mg kg^{-1}) and NRMSE (17%) was the best for soil mobile zinc content prediction. The LR and RF models had the advantage of spreading the prediction results over a large area and can be used with fewer samples. The method of OK does not have such advantages, since a large number of samples are needed for its implementation, therefore is not economically profitable. The use of digital mapping methods in agricultural practice is justified since it allows for the management of plant production processes by detecting soil boundaries with a deficit of particular plant nutrition elements on the maps and considered to be key agronomic strategies.

Key words: Covariates selection, Digital soil mapping, Lasso regression.

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Recyclable organic amendments to improve soil quality

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ABSTRACT

In this study, about a pot incubation experiment will be discussed, where four kinds of organic wastes (banana peel, egg-shell, tea waste, and vermicompost) were applied in a sandy loam soil. The main objective of this study is to determine the effect of these amendments on enhancing soil quality. The soil was treated with nine treatments such as CR (control), BP (banana peel), ES (eggshell), TW (tea waste), VC (vermicompost) with two application rates of 4%, and 8% respectively. A randomized complete block design (RCBD) was used with three replicates for each treatment. After 38 days and 120 days of incubation, pH, electrical conductivity (EC), soil organic carbon (SOC), and soil organic matter (SOM) content of the air-dried soil were measured and these amendments showed significant results on soil properties. With increasing the application doses, soil pH increased in BP and ES, and slightly increased in TW and VC-amended soil; BP and ES helped in increasing EC, where there was no effect of TW, and decreased with increasing doses of VC. Both SOC and SOM content increased by the application of BP, TW, and VC, whereas there is no effect of ES on SOC and SOM. Regarding the incubation period, the pH of BP and ES-amended soil has significantly increased and slightly increased in VC-amended soil with time whereas, that of TW-applied soil has decreased. The effect of BP, ES, and VC was similar during 38 days and 120 days on soil EC; however, TW showed a significant role in improving soil EC with the passage of time. SOC and SOM both have increased with time in all of the amendments applied to the soil. Irrespective of the incubation period, $TW_{4\%}$ and $ES_{4\%}$ were the best for increasing the pH of this nutrient-poor soil; $BP_{8\%}$ was the best option for improving EC. BP, TW, and VC three of these amendments significantly increased SOC and SOM content.

Key words: Amendment, electrical conductivity, incubation, nutrient-poor, organic waste, vermicompost.

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Organic carbon dynamics under different land use systems of Assam

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ABSTRACT

Land use is one of the important factors that influence soil organic carbon (SOC) balances between storages and losses of OC from soils. Soil and climate have long-term effects on SOC, while land use has a strong and direct impact. The present research was conducted to assess the land use impacts on SOC stock, organic carbon fraction, aggregate stability and carbon stabilization within soil aggregates. Soil samples were collected from the five different land use systems and mainly focussed on two districts i.e. Jorhat and Golaghat district of upper Brahmaputra valley of Assam. The trend of total organic carbon stock up to 45 cm as affected by different land use systems are Forest system > Sugarcane ≃ Inorganic tea ≃ Organic tea > Rice-fallow system. Soil labile carbon per cent in different land use system followed the order Forest > Organic tea > Rice-fallow > Sugarcane > Inorganic tea system. In case of recalcitrance carbon pool (%), the sugarcane land use system recorded highest in lower depth of soil which varied from 34 (0-15 cm) to 67% (30-45 cm) which may be due to high clay content in lower depth so binding of clay with organic matter in presence of iron and aluminium oxide. Aggregate stability (measured as mean weight diameter) was significantly lower in rice-fallow system as compared to other land use systems. Forest and organic tea systems had significantly higher macro and micro-aggregate associated carbon content. This study also advised that upper Brahmaputra valley of Assam region have very good carbon accumulation potential in different land use systems, if it is managed in best possible way.

Key words: Carbon pool, Land use, Macro aggregate, Micro aggregate, Soil organic carbon.

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Exploring the role of microbial autotrophic and heterotrophic contributions in soil carbon dynamics in semi-arid to sub-humid central India

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ABSTRACT

Ongoing global climate change represents one of the biggest scientific and political challenges of the 21st century. In this respect, assimilation of atmospheric CO_2 into soil is of utmost importance. Terrestrial carbon (C) cycle depends upon the balance between the autotrophic C fixation and soil respiration which ultimately controls the net effect of climate change on ecosystem carbon budgets. We are well aware of photosynthesis; however there are considerable knowledge gaps regarding potential of microbial autotrophic carbon assimilation in soil C cycle. With this backdrop a study was conducted to decipher the role of microbial autotrophic and heterotrophic contribution in soil C dynamics. For this, soils from grassland, horticulture, agroforestry and natural forest system were studied. Undisturbed soil core was collected in triplicate from two depths i.e. the 0-15 cm and 15-30 cm soil layers. Microbial autotrophy was studied by analyzing soil RuBisCO enzyme and *cbbL* gene abundance. Soil C cycling enzymes, microbial biomass and soil respiration were studied as representative of microbial heterotrophic counterparts. Result revealed that agroforestry systems have the highest microbial autotrophic C fixation potential (35.8 ug CO_2-C g-1 soil day-1) followed by horticulture, grassland, and natural forests. *cbbL* gene abundance followed the similar trend. Specific phenol oxidase enzyme activity indicated that the horticulture and grassland system has significantly more carbon sequestration potential as compared to agroforestry and forest soil. Likewise, significantly lower specific activity of β-Glucosidase and β-Galactosidase in horticulture and grassland systems also indicated higher carbon sequestration potential than agroforestry and natural forest system. Thus, specific enzyme activities of C cycling enzymes have appeared as crucial ecological indicator for soil carbon sequestration across the land use system. Furthermore, microbial stoichiometric ratio of MBC:MBN has also found to be the primary indicator of nutrient cycling in different ecosystem ultimately regulating soil C cycle.

Key words: *cbbL* gene; C cycling enzymes; Microbial autotrophy; N cycling enzymes; RuBisCO activity.

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A meta-analysis of heavy metals pollution in European soils under a strong anthropogenic pressure

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ABSTRACT

In the last decades, the continuous industrialization and expansion of European cities is implying a strong anthropogenic pressure that is affecting the heavy metals concentration in soils. The heavy metals contamination in European soils has been deeply investigated through a wide range of field studies. Therefore, an intensive and cohesive study on these publications may help to illustrate the status of soil heavy metals pollution at a larger scale. The aim of this paper is to provide a comprehensive assessment about heavy metals pollution in European soils based on a meta-analysis of reviewed data. A literature selection of papers published between the years 2000 and 2022 is extracted from the Web of Science and Scopus databases, using an advanced search. After extraction, the data is filtered and categorized, selecting field studies on topsoils in urban areas or heavily affected by human activity. The approach of this work is giving a measure of heavy metal prevalence on European topsoils based on available studies, exploring the spatial distribution and showing the temporal variation of the data. The meta-analysis is carried out using Microsoft Excel and the statistical software R.

Key words: Contamination, Heavy Metals, Meta-Analysis, Soils.

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Wind damages monitoring on vine yard to select the right location in Gobustan District

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ABSTRACT

Wind damage impact on the plants is actual question in cultivation for the windy places, long term monitoring is to be carried out before plantations' location determination. Hazardous wind risk for vine yards in Gobustan's agrarian sector was investigated in the paper. Long term monitoring and measurements were realized on the base of remote sensing radar techniques according to Several windsats. The results have been analyzed to Wigner-Ville distribution (WVD), wind speed calculators of Danish Wind Industry Association. Wind roses and were established by using Wind Rose online maker. All wind measurements were realized by using radar techniques of remote sensing method at 2 meters above the earth. In the process of studying several wind sats' results including Azer sky satellite have been utilized. Synchronical wind directions' action was observed in the aerospace sources to reveal the real risks for plantation areas. Geographical distribution of the vine yards in the district have been determined. Average daily, monthly, yearly wind direction and wind speed potentials were determined after the analyses of the wind data. Wind speed data due to10-50 % interval windiest areas have been calculated to the proper methods. Total area wind potential's monogram was developed on the months along the year taking into consideration time and season. Meanly 50% windiest areas average wind speed consists of 4.16 m/sec, maximum wind speed index is observed in December about 1.33 and minimum one in May and August about 0.82. Increasing happens beginning from May, generally in vegetation season wind index is higher. These both directions possess maximum occurrences. The north and the northern west part wind directions are characterized to the west part of the district. Wind potential's impact on the vine yards and geographical suitable part for plantation have been defined for Gobustan district.

Key words: Wind Damage, Monitoring, Wind Speed, Wind Direction

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Use of product containing free nitrogen-fixing bacteria (biofertilizer) as a supplement in nitrogen fertilization of crops

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ABSTRACT

The impacts of chemical fertilizers do not start after application but are initiated from the production stage. Application of them leads to the loss of soil fertility and, consequently, soil degradation. Fortunately, plant growth-promoting bacteria (PGPB) can hinder intensive usage in agricultural practice. They are well-known as plant growth-promoting rhizobacteria (PGPR). Aerobic, free-living, and atmospheric N_2-fixing PGPB have the potential for plant development and nutrient utilization performance, and they can be found in the soil and water. PGPR is commercially available as a biofertilizer, providing promising results due to the scientific research conducted on both introduced soil and cultivated plants. Demand for food and global agricultural crop criteria has been drastically increasing in the last decades. Using bacteria with nitrogen, phosphorus, and potassium (NPK) to increase harvest is possible in a sustainable way. In the present study, the focus is on the reported effect of biofertilizers containing N-fixing bacteria on the physical-chemical properties of the soil, growth, and yield of the highly consumed crops. Modes of action include soil pH, positive plant root development and morphology, assisting in the creation of bio pores, consequently improving water infiltration, increasing cation exchange capacity (CEC), soil organic matter, and the availability of other nutrients. The combination of listed actions can be achieved with a reduced (70% of recommended) amount of chemical NPK fertilizer to meet the world food criteria.

Key words: Biofertilizer, Biological Nitrogen Fixation (BNF), Crops, Plant-Growth-Promoting-Bacteria (PGPB), *Priestia megaterium*, Rhizosphere

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Oil polluted soils: Review

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ABSTRACT

Soil all over the world is threaten by different types of environmental pollution, one of them is oil pollution that usually occurs is sites that have been exposed or found close to area that have been subjected to oil extraction by mankind. Depending on the level of contamination soils can no longer be used to their full potential, therefore the need for soil reclamation arises, which usually involve huge expenditures and time before we could reach partial and total recovery of the soil. The change in soil both physical and chemical properties is the reason why soils become unproductive. In this review, we shall explore crude oil contaminated soil in the world, examine oil components that cause soil to become unproductive especially for agricultural purposes and finally discuss the existing soil remediation methods that have been used.

Key words: Pollution, Oil, Reclamation, Soil

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Potential of organic amendments on reclaiming the soil properties affected under alkaline and/or sodic condition

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ABSTRACT

Sodic and/or Alkaline soils is generally associated with poor soil structure and soil properties representing the major land degradation process in the world especially in arid and semi-arid regions. In order to address this problem, proper and clear understanding on the effects of sodicity or alkalinity in the soil is necessary and effective, affordable and sustainable reclamation approach should be chosen. In this context, the aim of the review was to study the alkalinity and/or sodicity effects on soil properties and explore the potential of wide range of organic amendments to reclaim the sodic soil and maintain the soil quality and sustainable production. Presence of dispersive cation Na+ and the several degradation processes (slaking, swelling and dispersion) involved in sodic soil possess the huge impact on soil physical (undesirable structures, crusting, hard setting, high bulk density, low infiltration rate, hydraulic conductivity, permeability, plant available water holding capacity, weak structural stability) and chemical (pH, SAR, ECe and ESP) properties. Input of various organic sources (compost, farmyard manure, green manure, municipal solid waste, biochar) can be used to recover soils contaminated with salts and sodium. Organic amendments facilitate the leaching of sodium and other salts and better aggregation thereby leading to better structural stability and overall soil properties with no risk to soil environment. Thus, this organic way of remediation has proved to be environmentally friendly, sustainable, effective as well as practical. Therefore, the potential benefits provided by the organic amendments will open up a new direction of research in reclamation process.

Key words: High pH, Soil conditioner, Soil properties, Soil structure

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Comparison of phenotypic and cytogenetic characteristics analysis of *Hibiscus syriacus* and *Hibiscus moscheutos*

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ABSTRACT

Hibiscus is prized for its winter hardiness and abundant bloom in multiple colour and shape. Modern plant breeding requires to know phenotypic features and information on cytogenetic traits prior to start breeding program. The purpose of this study is to know phenotypic features and cytogenetic characteristics of parental *Hibiscus spp*. With a crimson colour, *H. moscheutos carousel* 'Jolly Heart' had the highest flower diameter among our study materials (16.70 cm), whereas *H. syriacus* 'Yuam,' a pale white variety, had the shortest blossom size (9.60 cm). H. moscheutos (Luna white' and 'Pink Swirl') leaves were lanceolate and leave of *H. moscheutos carousel* 'Jolly Heart' was elliptical. *H. syriacus* 'Sukim', *H. syriacus* 'Wasung' and *H. moscheutos carousel* 'Pink Passion' had palmate leaves. While both 'Yuam,' and 'Freedom' had lanceolate shaped leaves. H. *moscheutos carousel* 'Jolly Heart', *H. moscheutos carousel* 'Pink Passion', and 'Luna Pink Swirl' had prolonged leaves length of 11.20 cm, 12.53 cm and 13.12 cm respectively while stunted leaf lengths were noticed in *H. syriacus* 'Sukim', 'Freedom', 'Wasung' and 'Yuam' and the lengths were 4.10 cm, 4.30 cm, 5.35 cm and 11.12 cm lengths accordingly. Chromosomes number of H. moscheutos 'Luna White' and 'Pink swirl', 'Jolly Heart' and 'Pink Passion' were 38 while *H. syriacus* 'Sukim', 'Freedom', 'Wasung' and 'Yuam' had 84, 84, 82, and 86 sequentially. 2C-DNA contents of *H. syriacus* 'Sukim', 'Freedom', 'Wasung' and 'Yuam' were 4.27 pg, 4.08 pg, 4.18 pg and 4.17 pg respectively whereas *H. moscheutos* 'Luna white, 'Pink Swirl', 'Pink Passion' and 'Jolly Heart' had 2.06, 2.04, 2.05, 2.06 pg correspondingly. These findings will help with the in-depth cytogenetic investigation of *Hibiscus*, which will assist with plant breeding in this genus.

Key words: Hibiscus, Breeding, Cytogenetic, H. syriacus, H. moscheutos

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Effect of compost surface application without incorporation on soil temperature, air temperature above the soil surface and water content

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ABSTRACT

Composting is one the most preferred options to process organic waste to obtain a final stable product that can be used as a source of organic matter to the soil. Important characteristics determining the compost quality include its stability and maturity. According to some studies, the application of stable and matured compost to the surface was as effective in improvement of soil properties as compost incorporated into the soil. Thus surface application of compost could provide significant benefits for either perennial plants where incorporation is impossible, either for annual crops while reducing the application costs. Objective of this preliminary study is to evaluate continuous monitoring of soil water content (SWC) and temperature at parcels with surface-applied compost and compare the observation with control parcels without compost treatment. Monitoring was carried out at 3 localities with different soil and climatic conditions, different compost dose and crops (maize, oat and wheat). The TMS-4 sensor (Tomst Inc.) monitors SWC in surface layer (14 cm), soil temperature (8 cm deep; T1), and air temperature above the soil surface (+1 cm; T2 and +15 cm; T3). 4 sensors were used at each locality (2 compost, 2 control) during vegetation season with recording every 15 min. Findings were different for each locality and especially water content seems to be more affected by the site variability rather than compost application. Highest average and maximum daily temperatures were observed with the T2 sensor. Lowest average and daily minimum temperatures were observed with the T3 sensor at all localities. Air temperatures have higher diurnal differences than soil temperature. Density of the canopy affected the observation as well, the differences between compost parcels and control are higher as long as the compost is exposed to the sunshine (higher daily maxima and thus higher diurnal differences in air temperatures).

Key words: Compost, Microclimate, Soil Temperature, Soil Water Content, Time Domain Transmissometry, TMS-4

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Review of the phytoremediation potential of *Sedum plumbizincicola* for the remediation of contaminated soils

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ABSTRACT

Natural and anthropogenic activities including industrial/agricultural wastes disposal, mining, smelting ores, sewage application to agricultural soils and other waste-generating activities that produce toxic pollutants have become a serious environmental concern in the recent decade. The amount of polluted soils has been increasing in tandem with the rising global population and the spread of urban areas and this have affected agricultural productivity globally. While several methods has been found and adopted for the remediation of contaminated soils, phytoremediation is perceived to be significantly cost-effective and environmentally safe. Although its major setback is the fact that the process is slow. Scientists across the world are working to tirelessly to discover plant species that would make Phytoremediation a must-go-to for remediation processes. Quite a large number of hyperaccumulator plants already exists but the quest to get a more suitable plant with high adsorption capability still makes the search going. The *Sedum plumbizincicola* was recognized in the year 2005 in a Zn-Pb region near a city called Zitong in the western province of Zhejiang, China and has since been used by scientists to clean up the soil. According to a study by Violina (2020), this plant thrives on soils with high levels of heavy metals (2540.8% Zn, 2429.3% Pb, and 51.5 mg/kg Cd). This paper gives an overview of the existence of this plant and its potential for the cleanup of contaminated soils by a critical review of existing literatures.

Key words: Phytoremediation, Sedum Plumbizincicola, Heavy Metals, Polluted Soils, Soil Cleanup, Sustainable Environment

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Composting process of organic materials

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ABSTRACT

Composting is the biological conversion of organic wastes from an amorphous dark brown to a black colloidal humus-like substance under optimum conditions of temperature, humidity and ventilation. Although there are 3 different main composting methods, the windrow method is commonly used in many composting facilities. At the beginning of composting process, the most followed parameters are C/N ratio, moisture content, bulk density, porosity, and oxygen level of the compost pile. Temperature, pH, N and OC content of compost material are main monitored parameters during the composting process. During the composting, the temperature of the pile must rise around 55 °C at the thermophilic stage. To reduce harmful microorganisms in compost material, the compost pile should stay in thermophilic stage at least 3 or 5 days. During the maturation phase of the compost, the pH value is expected to approach neutral and stabilize. And finally, although the final C/N ratio will depend heavily on the initial material used, generally a mature compost should have a C/N ratio of 10 to 15 and mature the pile temperature should be equal to outside temperature. As a conclusion, a well composted material should have a high humification degree and not harm the plants when applied.

Key words: Organic Waste, Compost, Composting Process, Soil Fertility

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Detection of soil-borne viral and protozoal pathogens by simultaneous extraction of total nucleic acids from sugar beet roots

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ABSTRACT

Rhizomania is a widespread soil-borne viral plant disease of major importance in sugar beet (*Beta vulgaris* L.). It causes reductions in beet yield and sugar content. Beet necrotic yellow vein virus (BNYVV), the causal agent of rhizomania, is transmitted by the soil-inhabiting protozoa *Polymyxa betae*. This vector also transmits other sugar beet viruses such as Beet virus Q (BVQ), Beet soil-borne virus (BSBV) and Beet soil-borne mosaic virus (BSBMV). In this study, BNYVV, BVQ and their vector were propagated as bait plant technique using BNYVV-susceptible sugar beet cultivar (cv. Ansa). Then, total nucleic acids were isolated from the lateral root of the bait plants by using cellulose fibers. One-step reverse transcription-polymerase chain reaction (RT-PCR) was applied to identify BNYVV, BVQ and their vector *P. betae*. As a result of the study, expected sizes of 997 bp, 291 bp and 250 bp fragments were obtained for BNYVV, BVQ and *P. betae,* respectively. This method is recommended for the simultaneous detection of soil-borne viruses and their vector in sugar beet plant.

Key words: Sugar beet, BNYVV, BVQ, P. betae, dsRNA isolation, RT-PCR

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Possibility of using vermicompost to improve oil plants productivity

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ABSTRACT

The world now is facing a shortage almost in all kind of plant yields. Research has shown that plant yields influenced by several factors (E.g. Soil fertility, high temperatures, and water deficit); a decline in soil fertility is the primary cause of yield decline, and that the presence of one or more of these factors increases the negative impact on plant yield. This review aims to determine the effect of vermicompost application to soil on oil production in plants. Based on a review for many literatures related to the effect of vermicompost on plants, multiple pot and field experiments to different plants were held. Multiple Measurements were done for the plants (E.g. oil quality, oil yield, seed yield, flower yield, etc.) and determine the respond for multiple vermicompost doses. Analysis of the experiments demonstrated that vermicompost can increase the production of oil content, soil fertility, fresh and dry flower yield and seed yield. Eventually improve plant growth and quality. On this basis, it is recommended that farmers use vermicompost as a key factor in enhancing and maintain their soil fertility and oil productivity. Further research is needed to identify other materials that could strengthen the effectiveness of this organic amendment.

Key words: Essential Oil, Organic Fertilizer, Vermicompost, Yield

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Investigations on soil-borne viruses and their vectors in sugar beet production areas of Ankara and Konya provinces

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ABSTRACT

Sugar beet (Beta vulgaris L.) is widely grown in Turkey as a raw material for the sugar industry. The plant can be affected soil-borne viruses including Beet necrotic yellow vein virus (BNYVV) and Beet black scorch virus (BBSV). A total of 52 soil samples were collected from different sugar beet fields in Ankara and Konya provinces during 2020 growing season. Incidences of BNYVV and BBSV and their vectors Polymyxa betae and Olpidium spp. were determined by bait plant test using ELISA and root staining techniques. The study showed that BNYVV was very common (78.8%) in the sampled sugar beet fields. Also, all of the root samples investigated were found to be infested with its vector P. betae. On the other hand, the vector of the BBSV, Olpidium spp. were present (57.7%) in the surveyed region. However, no BBSV infection was detected in any of these samples. This study indicated that BNYVV, the agent of rhizomania disease, and its vector are highly widespread in sugar beet production areas in Ankara and Konya provinces.

Key words: BNYVV, BBSV, P. betae, Olpidium spp., ELISA.

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Determination and mapping of pH indicators in Kurmukchay basin soils

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ABSTRACT

The research area is located in the north-east of Azerbaijan. The length of the river is 55 km. The river basin covers 56,200 hectares. The main part of the basin is covered by mountains, partly mountains and plains. Snow in spring, and rainwater in summer and autumn cause flooding in the river. Spring floods last 100-120 days a year. Samples were taken from specific soils of the area during the corresponding period. Based on the collected soil samples, soil pH analysis was carried out. The pH indicator is used to determine the degree of acidity in the soil. Measuring soil pH plays a very important role as it affects the relative availability of soil nutrients. If the pH indicator is not within the specified limit, the crop will grow poorly and this will increase the potential for soil erosion. Nutrients in soil exist in complex, insoluble complexes and simple dissolved forms. But for the development of plants, it is important to break down complex compounds into simpler ones. Soil pH is defined as the negative logarithm of hydrogen ion concentration. The pH scale varies from 0 to 14, and pH 7.0 is the neutral point. As the amount of hydrogen ions in the soil increases, the pH of the soil decreases, becoming more acidic. At pH from 7 to 0, the soil becomes increasingly acidic, and at pH from 7 to 14, the soil becomes increasingly alkaline. If the PH increases from 6.5 to 8.0, the absorption of iron, zinc and manganese decreases, while the amount of molybdenum and phosphorus increases. Soil with a very high pH is enriched with carbon dioxide, which absorbs other free ions and harms plant growth. The results of the analysis were then plotted on a pH map using the Arcgis program.

Key words: River, Analysis, Ecology, pH, Map.

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Potential of using fly ash as amendment for soil characteristics

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ABSTRACT

Fly ash acquired from electric and steam generating plants (power stations) causes removal challenges and environmental concerns. Disposal concerns can be solved by employing these waste materials as a raw source to improve soil characteristics, which is a process carried out to achieve improved geotechnical properties and engineering response of a soil at a site to achieve the needed Stability due to the enhancement of the soil's geotechnical properties. Water content, strength, plasticity, and density are the most often adjusted properties, which can be beneficial for plant. Extensive studies have focused on the impact of fly ash on soil characteristics. Therefore, this review discussed some of these studies, drawing a critical review to find out the effect of fly ash application on soil characteristics. Generally, it can be said that fly ash improved the soil stability, water-holding capacity, bulk density, and raise the low pH in soil. On the other hand, fly ash is beneficial at moderate levels, but higher levels have a significant depressing effect.

Key words: Fly Ash, Soil Amendment, Soil Characteristics, Soil Physical Properties

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Effects of conditioner application on dispersion ratio in clayey soil

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ABSTRACT

The objective of the present investigation is to find out the effect of incorporating of various inorganic and organic amendments Sources such as lime (L), zeolit (Z), polyacrylamide (PAM) and biosolid (BS) on the dispersion ratio. A bulk surface (0–20 cm depth) soil sample was taken from Samsun, in northern part of Turkey. Some soil properties were determined as follows; fine in texture, modarete in organic matter content, low in pH and free of alkaline problem. The soil samples were treated with the inorganic and organic materials at four different levels including the control treatments in a randomized factorial block design. The soil samples were incubated for ten weeks. After the incubation period, corn was grown in all pots. The results can be summarized as organic and inorganic matter treatments decreased dispersion ratio and soil erodibility. Effectiveness of the treatments varied depending on the types and levels of organic and inorganic materials.

Key words: Fly Ash, Soil Amendment, Soil Characteristics, Soil Physical Properties

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Effects of polymer applications on soil stability

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ABSTRACT

This study was conducted under greenhouse conditions in order to determine the effects of polyvinyl alcohol (PVA), polyacrylamide (PAM) and humic acid (HA) applications on the soil stability (instability index). Surface soil samples with three different textures (clay, loam and sandy loam) were used in the study. In the greenhouse, PVA, PAM and HA were applied to soil samples at doses of 500, 100 and 500 ppm, respectively, and incubated in four different periods (0, 15, 30 and 45 days). During the incubation, irrigation was performed when 50% of the available moisture in the soil samples was decreases. As a result of the analysis and evaluation made on the soil samples after the incubation, it was determined that PVA, PAM and HA applications increased resistance to stability all three soil groups and that the conditioners were more effective in the soil in sandy loam texture category. It was observed that the conditioners were ranked as PVA>PAM>HA in terms of the said effectiveness. It was observed that PVA's first period applications were more effective on instability index value.

Key words: Polymer, soil texture, instability index, soil erodibility.

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Effect of different salt contents in irrigation water on some growth parameters of sorghum plant

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ABSTRACT

Sorghum is a well-adapted plant to semi-arid and arid conditions due to its tolerance to abiotic stress factors such as; drought and salinity. In this study, effects of two different salt contents (NaCl and $CaCl_2$+$MgCl_2$) of irrigation water on some growth parameters of sorghum plant were investigated under a greenhouse condition. Sorghum seeds were sown in the pots including 3 kg sandy clay loam soil in each one. During the experiment, the pots were weighed 2 days interval and irrigated around field capacity with water including three different salt contents which were NaCl (W_{Na}:10 dS/m), $CaCl_2$+$MgCl_2$ (W_{CaMg}:10 dS/m) and rain water (W_R:0.045 dS/m) as a control treatment. At the end of the 45 days, the plants were harvested. The highest plant biomass was obtained in the control treatment pots irrigated with W_R. When the plants were irrigated with W_{Na} and W_{CaMg}, the biomass values decreased as 26% and 13% over the control, respectively. The highest main stem diameter was obtained in W_{CaMg} irrigation and it was 15% higher than the control. However, the main stem diameter decreased 6% with W_{Na} irrigation compared to the control. While the highest plant height was found in the control treatment (W_R), the plant heights in W_{Na} and W_{CaMg} treatments decreased by 23% and 8% compared to the control, respectively. As a result, increasing salt concentration and content (W_{Na}, W_{CaMg}) in irrigation water reduces plant growth parameters. The worst plant growth was obtained in W_{Na} treatment compared to the control (W_R).

Key words: Salt stress, irrigation water quality, sorghum, plant growth.

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Effects of pyrolysis temperature and time on biochar procedures

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ABSTRACT

Biochars are generally obtained when biomass is heated around 300-1000 ^{o}C under very less or no oxygen conditions. Recently biochars are used commonly as a multifunctional material related to carbon sequestration, reduction of N_2O and CH_4, contaminant immobilization, pollutant filtration and soil fertilization. These multifunctional capacities of biochars depend on their chemical and physical properties gained during the pyrolysis process under different conditions. Biochars consist of stable and persistent carbonaceous compounds. At the higher pyrolysis temperatures, usually pH, ash content, total C content, aromatic compounds, specific surface area increase while biochar yield, cation exchange capacity, nitrogen and sulphur compounds decrease. Pyrolysis reaction time is also a factor that changes the properties of biochar, but it is often dominated by pyrolysis temperature. Pyrolysis time may more affect the carbonization degree and yield of biochar especially at low temperatures. As the pyrolysis time increases, a more carbonaceous biochar is obtained. As a result, production process conditions influence the properties of biochars and their production for specific purposes.

Key words: Biochar, Pyrolysis Temperature, Residence Time, Stability

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Land degradation and melioration measures

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ABSTRACT

As a result of human economic activities and the influence of natural factors, the gradual deterioration of soil properties, reduction of the amount of humus, disruption of the soil structure, and decrease in fertility lead to soil degradation, which is one of the most important problems of our century. Land degradation can be divided into degradation of productivity and soil pollution. In the loss of productivity, there is a significant decrease in the amount of requirements necessary to ensure the development of living organisms in the soil, and pollution is determined by the increase of harmful or toxic substances in the soil. All over the world, soils are degraded mainly due to salinization, desertification and erosion. Degradation can also be classified as physical, biological, chemical and wind degradation. Physical degradation consists of the reduction of the content of organic matter due to the cutting of vegetation and the excessive decay of useless products. Biological degradation refers to the increase in the mineralization of humus present in the surface layer of the earth. Chemical degradation is a phenomenon in which the water component transports plant nutrients into the deeper layers of the soil, a process that leads to poor productivity and significantly lowers soil pH values. Wind degradation is a process that occurs when wind intrusion causes soil particles to be swept, eroded, and dragged away. When talking about the damage caused to the ecological environment during erosion, it is necessary to take into account the damage caused to the agro-ecological environment, transport system and roads, hydro facilities (reservoirs, water collecting channel and collector drainage network), fisheries and other ecological environment due to soil erosion. The most favorable agrotechnical measure against erosion is planting the enrichment of the cover, the replacement of annual plants with perennial plants and the establishment of protective forest strips on arable lands. Land reclamation is one of the most important measures in the fight against erosion. The choice of irrigation methods is also very important. In areas subject to erosion, the irrigation technique, water consumption, length of the irrigated furrow or strip, and duration of irrigation should be selected in such a way that the erosion process (soil washing) during irrigation is minimized or completely prevented. For this reason, the slope of the surface, the type of soil, its mechanical composition and water absorption capacity should be taken into account when preparing irrigation techniques against erosion. Along with phytomeliorative and agrotechnical measures, hydrotechnical facilities should also be used in the organization of farms in areas where erosion occurs. If comprehensive measures are taken in the area from the water separator to the river bed in the river basins, the water regime of the rivers will be regulated, and erosion and flood flows will be prevented. Hydrotechnical measures against erosion are carried out on the slope, bed and delivery cones of rivers. On the river slopes, the soil cover has been severely washed away, and the bedrock has come to the surface. Since it is impossible to strengthen such areas with afforestation, special stone or concrete dams and fences are used.

Key words: Biochar, Pyrolysis Temperature, Residence Time, Stability

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Topsoils nutrient dynamics of compound farms in the upper and lower slopes of University of Nigeria, Nsukka

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ABSTRACT

Information on fertility status of compound farms are invaluable for proper management of soils to enhance crop productivity especially in farmlands with different slope gradients. This research aims to assess topsoil's nutrient dynamics of compound farms on upper slopes (CFUS) and lower slopes (CFLS) of the University of Nigeria, Nsukka (UNN). Since the inception of UNN in 1960, there hasn't been much known about how fertile the soils are in CFUS and CFLS, hence this study. A handheld GPS receiver was used to delineate the campus area into CFUS (458 to 447 m above mean sea level (AMSL)) and CFLS (415 to 423 m AMSL). Twenty compound farms were randomly sampled at 0-20 cm soil depths, ten each from CFUS of Ikejiani and Ezenwaeze areas and CFLS of Mbanefo area. Standard methods were used to analyze the soil samples at the UNN Soil Science Undergraduate Laboratory. Higher values of organic matter, CEC, pH, and exchangeable calcium recoded at CFUS showed that soil fertility status of CFUS was generally higher than CFLS. The CFUS had significantly higher clay and silt contents (p 0.05) than the CFLS, while the lower slope had a higher sand fraction. The results did not follow the typical trends of soil nutrients being transported from upper to lower slope, probably due to anthropogenic activities such as buildings and road constructions between the upper and lower slopes of the campus. Therefore, this result will help compound farmers in both CFLS and CFUS achieve higher crop productivity by adopting efficient management techniques to complement the soils' fertility using both organic and inorganic fertilizers.

Key words: Compound Farms, Fertility Status, Topsoil, Slopes, Nutrient Dynamics

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Water stress efficacy on soil borne diseases

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ABSTRACT

The global drought, which has been tracked for almost two decades, has shown continuous fluctuation in soil moisture and a severe drought affecting 70% of the land globally. To date, it has been observed that drought has adverse effects on agricultural and economical structures in many countries such as; the USA, France, Russia, Türkiye, Afghanistan, Iran, Mongolia, China, Brazil, Thailand, and also in many continents; Australia and Africa. Türkiye is among the countries that will experience drought problems in the most of its agricultural lands and there are significant differences between regions in this issue. Also, significantly reducing soil water availability in drought condition could suppress soil microbial biomass and activities. Moreover, the structures of microbial communities can change under drought conditions. Drought-tolerant groups with higher water acquisition capacities and lower nutrient requirements, such as fungi and Gram+ bacteria, can continue their activities. It is known that *Fusarium culmorum* and *F. pseudograminearum*, which cause significant crown rot in cereal plants, and *Bipolaris sorokiniana,* which is the root rot agent, develop better in drought-stressed areas and cause severe diseases in plants in Türkiye. Many studies showed that there is a strong negative correlation between plant water relations and root rot severity in many cultivated plants. On the other hand, soil is a very complex environment. Therefore, it is not easy to discover and predict microbial community structure and activity in soil. The type of soil, especially its organic matter content and vegetation type, is a very important factor in determining the changes that occur in the structure and activity of soil microorganisms, and subsequently in enzyme activities, carbon and nitrogen cycles. Comprehensive analyzes of microbial genome sequences, particularly those that are drought resistant, for genes encoding drought stress-related compounds appear to be a promising tool of how microorganisms cope with such harsh conditions.

Key words: Bacteria, Drought, Pathogens, Root Rot Fungi, Soil Microorganisms.

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Hazelnut cultivation Black Sea region in Turkey: Future challenges and sustainable solutions

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ABSTRACT

It is predicted that in many parts of the world agriculture will face various challenges due to the effects of climate change. In addition to that, conventional agricultural practices such as tillage and use of mineral fertilizers and pesticides often have detrimental effects on the environment and result in loss of soil fertility which further exacerbate the loss of agricultural effectiveness. Organic agriculture encompasses a set of practices that help make food production more sustainable and agricultural systems more resilient and resistant. Most of the world's hazelnut production is concentrated in Turkey's Black coast region. In this article we present the current status of hazelnut cultivation in this region and the challenges that are predicted to arise due to the changing climate. We will describe the effects that conventional agricultural practices have on the environment, particularly on soil properties, processes and microbial communities and compare these to the effects of organic production practices. Considering the established approach to hazelnut cultivation in the region and local conditions we will present some appropriate practices that could be adapted in order to make the hazelnut production more sustainable.

Key words: Black Sea Region, climate change, hazelnut, organic agriculture, soil fertility.

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Oribatid mites from mushrooms growing in natural forest soils in Kastamonu Province, Turkey

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ABSTRACT

Oribatid mites, one of the richest groups of mites, live in a wide range of habitats that include forests, tundra, deserts, caves, freshwater and seas. They are major contributors to organic matter and nutrient cycling by degrading plant materials that contribute to soil formation and plant growth, and also disperse fungal spores. Mushrooms are macrofungi with a high nutritional value that have been consumed for thousands of years. Kastamonu Province, located in northern Turkey, is rich in native, temperate climate forests and the diversity of its mushrooms, and is a center for the export of wild, edible mushrooms. There are saprophagous, fungivorous and predatory mites associated with them. In this study, oribatid mites found on wild, edible mushrooms were determined in 2021 and 2022. The mushrooms were collected from the soils of natural forests in summer and autumn, and the mites were extracted by using Berlese funnels. The collected mites were cleared in lactophenol and slides were then prepared by using Hoyer's medium for identification purposes. *Adoristes (A.) ovatus poppei*, *Eremaeus hepaticus cordiformis*, *Hypogeoppia* sp. and *Sphaerochthonius splendidus* were the most abundant species. Nymphs were also abundant. The mushroom, *Boletus* sp., had the highest number of different oribatid species associated with it.

Key words: Acari, Biodiversity, Macrofungi, Oribatida, Soil.

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Effects of biotic and abiotic stress factors on evapotranspiration rate of pepper plant

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ABSTRACT

It is known that water stress and viral infections cause important declines in crop yield. In this study, effects of Tomato spotted wilt virus (TSWV) infection and two irrigation levels on total evapotranspiration rate (ET) of pepper plant were investigated. The pepper seedlings were planted into pots containing perlit:peat mixture of 1:4 ratio in a randomized plot design with three replicates. Two different irrigation levels, which are 70% (FW: full irrigation) and 30% (DW: deficient irrigation) of maximum water holding capacity, were applied to plants by weighing the pots in two days interval during the experiment under a controlled growth room conditions. Plants were inoculated with TSWV at 4-6 leaf stage, and tested by double antibody sandwich enzyme-linked immunosorbent assay (DAS-ELISA) to detect and confirm the presence of virus at four weeks after inoculation. The ELISA absorbance values (A405 nm) of infected plants (VI) were at least two fold higher than uninoculated healthy control plants (H) in both irrigation levels. The total evapotranspiration rates were significantly affected by the TSWV infection and irrigation levels. After 8 weeks, the ET rate determined in full irrigated healthy plants (H-FW) was significantly higher than the ET rates of other treatments, which were ordered as follows: H-FW (120 mm) > VI-FW (112 mm) > H-DW (58 mm) > VI-DW (55 mm). As a result, the ET rates of plants decreased due to TSWV infection in both irrigation levels. There was a significant difference in ET rates between healthy and inoculated plants at full irrigation level, whereas there was not a significant difference between them at deficient irrigation level.

Key words: ELISA, Drought, Irrigation Level, TSWV.

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Physical and chemical properties of the Black Sea region hazelnut growing soils

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ABSTRACT

Hazelnut plant is generally grown in sloping areas in the Black Sea Region of Türkiye, 60 km inland from the coast and up to 750 m altitude, where the annual average temperature is 13-16ºC, the precipitation is above 700 mm, and the relative moisture does not fall below 60% in summer. In the areas where hazelnuts are grown in the Black Sea region, the physical and chemical properties of the soil deteriorate as a result of the effect of precipitation and incorrect agricultural practices. In addition, the high slope of the lands of the region causes the soils to be exposed to erosion. In this study, the characteristics of the soils used for hazelnut cultivation were determined. The lowest coefficient of variation was determined in pH (16.10%) and the highest coefficient of variation was determined in lime content (262.65%) among the soil properties of hazelnut growing areas. While saturation and pH value showed a coefficient of variation below 25%, other productivity parameters had a coefficient of variation above 25%, and the properties examined between the sampled areas showed high variability. The saturation (%) values of the soils were compared in terms of provinces, the lowest coefficient of variation was found in Artvin lands (8.59%), and the highest coefficient of variation was found in Ordu (27.34%). The pH values of the soils were compared in terms of provinces, the lowest coefficient of variation was found in Artvin soils (3.70%), and the highest coefficient of variation was found in Sakarya soils (15.51%). The lime values of the soils were compared in terms of provinces, the lowest coefficient of variation was found in Artvin soils (0%), and the highest coefficient of variation was found in Giresun soils (677,14%).

Key words: Black Sea Region, Hazelnut Growing Soils, pH, Soil Properties.

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The changes in growth criteria of Lettuce (*Lactuca sativa*) with salicylic acid application under salt stress

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ABSTRACT

In this study, it was aimed to determine the effects of salicylic acid applications on plant growth criteria of lettuce (*Lactuca sativa*) under salt stress conditions. The experiment was conducted according to factorial experimental design with three replications at the controlled chamber room of Soil Science and Plant Nutrition Department of Agricultural Faculty in Yüzüncü Yil University, Türkiye. The total number of 36 pots was used in the experiment and lettuce (Lactuca sativa) seedlings were planted in pots including 3 kg soil in each one. Four doses of salicylic acid (SA_0:0, SA_1:1 mM, SA_2:2 mM and SA_3:4 mM) and three doses of NaCl ($NaCl_1$:0, $NaCl_2$:30 and $NaCl_3$:60 mM) were applied to growth media. The experiment was ended after 8 weeks of planting. Plant growth parameters were determined in the harvested plant samples. Generally increasing NaCl doses negatively affected plant growth criteria significantly ($P < 0.01$) while the application of SA positively affected plant growth under NaCl salt condition. The lowest plant height (7.500cm), plant fresh weight (13.933g), plant dry weight (2.167g), leaf number (10.333), plant diameter (4.800 cm), root length (6.433 cm), root weight (0.617g), root diameter (4.133 cm) were determined in the highest dose of NaCl without SA application. It has been concluded that 2 mM salicylic acid application is the optimum dose for alleviate of NaCl damages in plant growth. As a result it was determined that the plant growth parameters increased by increasing the application doses of salicylic acid.

Key words: NaCl Stress, Salicylic Acid, Lettuce, Growth Parameters.

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Evaluation of potato varieties of domestic and foreign breeding for organic production in the conditions of the south-east of Kazakhstan

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ABSTRACT

Within the framework of the target scientific program "Development of technologies for organic farming for the cultivation of agricultural crops, taking into account the specifics of regions, digitalization and export" under the project "Organic production of potatoes and hundred root crops (carrots, beets) based on the use of adaptive-ecological varieties and biologization of agricultural technology of crops in the conditions of south-east Kazakhstan" in soil and climatic conditions of south-east Kazakhstan, domestic and foreign potato varieties were studied. 44 potato varieties were evaluated for resistance to environmental stress factors, harmful diseases and productivity. The goal is to select the best potato varieties for cultivation in the organic vegetable growing system.

Key words: Potatoes, Organic Production, Variety, Evaluation, Yield, Disease Resistance, Nitrates.

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The use of leonardite in agriculture

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ABSTRACT

Chemical fertilizers and pesticides used in agricultural activities disrupt the balance of nature and cause negative effects on public health. Since the continuously use of nitrogen and phosphorus trade fertilizers pollutes the nature, it is a reality that the use of organic fertilizers should be emphasized in order to minimize the use of commercial fertilizers. From this point of view, there is a need for completely natural organic resources that didn't harmful effect the populations, enable the sustainable use of soils and contribute to the reduction of environmental pollution. One of these substances is leonardite raw material, which could improve the physical, chemical and biological properties of the soil. Leonardite is essentially a soil conditioner and its active ingredient is humic and fulvic acids. By the leonardite applications, we can increase the organic matter level of the soil to a certain extent. In addition, while sufficient amount of organic matter (around 10%) has positive effects, more of it (28% and above) causes harmful effects. In order to avoid some negative effects on yield or yield characteristics in crop production, on the one hand, leonardite material should be applied in agriculture as a soil conditioner in sufficient quantities, on the other hand, care should be taken to avoid its unsifficiend or excessive applications. It regulates the soil structure perfectly and while improving it, and not harm the environment and also removes the pollution in the soil. For this reason, it should be mixed with the soil at varying rates depending on the soil, plant and type and characteristics of the leonardite. Also, it is subjected to chemical treatment with potassium hydroxide in machines called reactors and crude liquid humic acid is obtained. They enable the soil to warm up quickly, increase its water holding capacity, increase the number of microorganisms it contains, and uptake the plant nutrient elements in the soil in a available form.

Key words: Leonardite, humic acid, application, soil, plant.

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Importance of silicon in agriculture

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ABSTRACT

Sustainable agriculture emerges as a system that protects the environment and natural agricultural resources, has lower production costs and higher net returns. As the basic principles of sustainable agriculture in the world, minimum amount of agricultural chemicals should be used in order to protect the environment and increase productivity. The use of different chemicals to increase crop productivity may have adverse effects on ecosystems. Due to the rapid increase in human population, the demand for nutrition needs continues increase in food production. However, biotic and abiotic stresses caused by pests and climate change significantly reduce crop productivity in agriculture. Silicon can act as an anti-stress agent and play a protective role against abiotic and biotic environmental stresses. Silicon can provide economic and ecological benefits in plant growing. Silicon is also an advantage for sustainable agriculture, as it is the second most abundant element in the world. Extractable forms of Si in soil include amorphous, active and water-soluble silicon element. Plants generally can uptake Si as the forms of orthosilicic (H_4SiO_4) or silicic acid ($Si(OH)_4$) through their roots. The availability of Si by the plant depends on the humidity, temperature, pH and the accompanying ions in the adsorption-desorption process of silicon in the soil. Especially in recent years, soil and foliar Si treatments have been made against Si deficiency in plants. In this review, the importance and applications of silicon for agriculture are emphasized.

Key words: Silicon, stress, nutrition, plant, crop production.

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