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ABSTRACT BOOK

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Abstract book

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Annotation. The Proceedings of the Congress which be organized with the theme and declare by the UN General Assembly "The International Year of the Soil". The Congress provided 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 congress will focus on multidisciplinary approach to soil science, with special interest on basic research, latest and technological developments for soil use and management. This scientific book emphasizes basic concepts of soil. The book also provides multiple opportunities for interaction among scientists from public and private institutions that will help accelerate the transfer of knowledge about soil science into action for the benefit of society and the environment.

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Content

Effect of spraying fenugreek seed extract (*Rigonella foenum–graecum L.*) and salicylic acid on growth and flowering parameters of snapdragon plant (*Antirrhinum majus L.*)

Jamal Ahmed Abbass*, Mushtaq Talib Al-Zurfy, Sadeq Mohommd Ali

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An experiment was conducted at the nursery of Agriculture Faculty, Kufa university during growing season 2013 – 2014 to study the effect of spraying Fenugreek seed extract and Salicylic acid on some vegetative and flowering parameters of Snapdragon plant . Experiment was adopted in Randomized Complete Block Design (R.C.B.D) with three replicates in two factors First three concentration of Fenugreek extract (i.e. 0 , 3 and 6) $ml.L^{-1}$ Second three concentration of Salicylic acid (i.e. 0 , 25 and 50) $mg.L^{-1}$ and their interaction , using Least Significant Difference (L.S.D) test to compare the means.

Results showed that spraying with Fenugreek seed extract at concentration 6 $ml.L^{-1}$ or Salicylic acid at concentration 50 $mg.L^{-1}$ increased significantly growth parameters (plant height , number of leaves , shoot dry weight , total content of chlorophyll and total soluble carbohydrates in leaves , longest height of roots , root dry weight , height of inflorescence , numbers of florets per inflorescences, dry weight of florets, in addition to reduced the days until opening the first flower bud compared with control treatment which gave the least vales.

Resulted showed that spraying Fenugreek seed extract at concentration 6 $ml.L^{-1}$ and Salicylic acid at concentration 25 $mg.L^{-1}$ increased significantly number of leaves , shoot dry weight, number of florets per inflorescence, dry weight of florets in addition to reduced the days until opening the first flower bud compared with control treatment which gave the least vales.

Key word: fenugreek seed extract (*Rigonella foenum–graecum* L.), salicylic acid, snapdragon plant (*Antirrhinum majus* L.)

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The pore space of Baer mound soil landscapes (Astrakhan region)

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Specific geomorphological formation, Baer mounds represent a system of parallel ridges and troughs. Until now, the origin and evolution of the mounds debatable in many ways not clear place in landscapes mounds Baer soil processes. Investigation of the structure of the pore space can complement understanding of the genesis and properties of soils in the region.

Purpose - to study the structure of the pore space of soil Baire hillocks. Tasks: 1. Determination of total porosity by X-ray microtomography 2. Simulation of three-dimensional structure of the pore space fragments.

Place of sampling - Ikryaninsky District of the Astrakhan Region. Soil samples for the study were selected microtomographical three sections with different depths: 1) The top of the hill Baer, 2) Saline, 3) Rice checks. All soil samples were tightly packed with preservation of structure and soil moisture on the day of sampling.

The tomographic study was carried out in the Soil Institute on microtomography SkyScan 1172. Resolution shooting 16mkm/pixel. Soil samples tomography at the same shooting settings, reconstruction and binarization.

In a study prepared flat tomographic slices of soil, based on the processing of which yields three-dimensional images of the pore space and some morphometric parameters - total porosity, pore size and shape.

It was found that the pore space of the soil is extremely heterogeneous. Soil porosity ranges from 10 % (of the mountains. A saline.) To 1,7% (Bsa, top of hill). Soil rice check was the least porous, salt marsh - the most. The salt marshes marked the largest number of forms different genesis and size. Saline soils to a depth of 45cm in 2-3 times more porous than the soils of hill rice Baer and Rice check. (6-7%).

Key words: X-ray microtomography, Baer mound, Astrakhan Region, pore space

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Effects of different planting term on mineral content of endive (*Cichorium Endivia* L.)

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This study was undertaken at Agricultural Research and Extension Center of Ataturk University between 2013 and 2014 in Erzurum conditions in Turkey. The objective of this study was to determine the effect of different planting term (I: 25 May, II: 10 Jun, III: 1 August, IV: August) on mineral content of Amigos, Eros, Davos endive (*Cichorium endivia* L.) cultivars. According to results of the study, the effects of different planting term on endive were different based on cultivars. It was determined that the highest TSS and vitamin C were obtained from Eros cultivar, content of TSS and vitamin C increased in III. and II. planting term respectively. While amount of N in root was about 2%, in leaf it has been increase up to 2 times. Generally, root mineral content was high in II. and III. planting term and varied according to cultivars. The highest mineral content of leaf was obtained from I. and III. plantings.

Key words: endive, planting term, mineral content

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A study on the compatibility of the data obtained in the removal of zinc pollution in soil through phytoremediation with certain experimental models

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There are several studies on the availability of phytoremediation for the removal of heavy metal pollution in soils. In Turkey, however, there are a limited number of studies on the topic. The aim of the present study is to investigate the compatibility of different experimental mathematical models with the results obtained from greenhouse experiments conducted to study the availability of cultigens in the removal of zinc soil pollution. With this aim, zinc was applied to different cultigens at different doses and the amounts of zinc that remained in plant shoot, plant root and experiment soil were determined as the result of the experiment. In the modelling studies conducted by using these data, it was concluded that the optimum available model was the Binomial model.

Key words: heavy metal, mathematical models, pollution, zinc

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Microbial biomass in a clay loam soil with addition of *Philoscia muscorum* (Isopoda; Philosciidae) and wheat straw

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The objective of this study was to determine effect of Philoscia muscorum (Isopoda; Philosciidae) on microbial biomass in wheat straw added clay loam soil. The microbial biomasss due to addition of increasing number of Philoscia muscorum into the soil was measured over a short term (four-week) period under laboratory conditions. Incubated microcosms under standard conditions were inoculated with a natural assemblage of Philosciidae species. At the end of the experiment, the soil with a high number of Philoscia muscorum content showed higher microbial biomass than the soil with a low number of Philoscia muscorum content. Philoscia muscorum stimulated soil microbial biomass and altered the response of this biomass with addition of wheat straw into the soil microcosms.

Key words : soil, isopod, microbial biomass

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The clay mineralogy features at clayey plains in the areas with land subsidence and cracking in Iran

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One of the major problems in great clayey plains of Iran where have developed under urbanization, agricultural activity and technology is land subsidence due to the reduction of ground water table. The purpose of this research is to find the relation between clay minerals in clay particles of soils and intensity of the problem in some clayey plains of Iran. For this study the fields were selected from west with arid (Abarkuh) and semiarid (Shahrekurd) climates, also from north (Mashhad) with arid to semiarid climates and from centre (Yazd) with arid land or desert soils with significant problem of land subsidence. Routine and X Ray Diffractometer analyses were done on the clay fractions of the soils. The XRD analyses show that clay minerals in different geographical parts of Iran are not the same. In west of Iran between Zaqgros mountain the clay mineral with interstratified random mixture of smectite and mica can lead to sever effect in land subsidence. But this effect in arid lands as Abarkuh is higher than semi arid lands as Shahrekurd. Also Mashhad diffractograms show that a clay component with high quantity illite and medium quantities of smectite, chlorite and kaolinite cannot have intensification effect in land subsidence and cracking. As a new feature of clay mineralogy that was observed in Central Iran(Yazd) , on old alluvial is resolving alumino-silicates and in result to forms cracks and new appearance of nodules from secondary carbonates and silica.

Key words: diffractogram**,** arid to semiarid climates**,** interstratified smectite and mica

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Acidity forms of selected soils of the northern part of Yamal region

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Active and potential soil acidity forms of selected soils from the Northern part of Western Siberia has been investigated on example of more than 120 samples of soils, collected during complex scientific expedition "Yamal-Arctic"–2013, which has routes in Ob' river, Kara and Barents sea and field plots in Yamal and Gydan peninsula as well as Beliy island. Data obtained shows that soils with acid and slightly acid values of active acidity of the fine earth dominate in Yamal region. On the base of potential soil acidity data it can be summarized that samples with strongly acid values of potential acidity prevails. Data obtained shows that the greatest difference between maximal and minimal values of pH (delta pH) is found in soils with well-developed organic horizons.

Investigation of titrated forms of soil acidity shows the differences between organic and mineral layers. Values of exchangeable acidity and its hydrolytic form in organic horizons are usually greater than in mineral horizons. In general, the values of hydrolytic acidity are greater than values of exchangeable acidity. The most acid reaction of soils is observed mostly in the lowlands, where the soils have a Histic horizons. In the soils with a buried humus horizons vertical distribution of the acidity values is more complicated. Samples from the buried humus horizons usually have a more neutral reaction than samples from underlying and overlying horizons.

Key words: soil acidity, polar soils, polar environment

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Interconnection of quantitative indicators of humus and complexes of invertebrates in natural parcels of mountainous-forest brown soils of Azerbaijan

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A particular importance carries research of quantitative indicators of humus in forest regions. Research works have been carried out in mountainous-forest brown soils in two parcels - under oak trees and herbaceous vegetation. The character of involvement of died phytomass in process of humus formation in both parcels is closely connected with complexes of invertebrates.

In the oak parcel the quantity of humus in 0-10 and 10-20 cm upper layers forms 5.02-4.75% whereas in lower layers decreases to 2%. In the parcel of herbaceous vegetation the quantity of humus is considerably higher and varies on layers between 8.29-5.35-4.91%.

In the soil of the oak parcel fulvic acids (14.24-17.40%) exceed humic acids (5.49-13.24%) in terms of quantity. In the parcel of herbaceous vegetation the quantity of humic acids gradually increases up to 13.72-19.18% whereas fulvic acids keep dominating (17.42-23.54%). Therefore, the humus formation process is of fulvic type ($C_{h.a}$ /$C_{f.a}$ is equal to 0.32-0.81).

Changing of humus quantity adequately reflects group structure of invertebrates. In the oak parcel dominate insects, mollusks, slaters (phytophags, phyto-saprophags) serving for formation of coarse forms of humus. In the parcel of herbaceous vegetation dominate humificators (saprophags), i.e. lumbricids forming more soft forms of humus.

Key words: humus, parcel, biocenose, phytomass

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Structure of the natural parcel vegetation in mountain-forest brown soils

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A main source of the soil organic substrate in the forest biogeocenozes is vegetation. Phytocenoz productivity has a definite influence on direction and intensity of the soilforming process. As a rule, this effect is determined, first of all by the plant cover structure, forming by phytomass, degree of its decomposition and humification, formation of the organic-mineral combinations.

An analysis of the collecting herbarial material in the vegetation showed that the grassy parcel phytostructure consist of kinds belonging to compositae, cereals, crucial (cruciferae), ringent, euphorbia. Besides, among these groups cereals were dominant. In the oak parcel the grassy undergrowth was lowgrowing with the limited groups and kind content of the plants, where the cereals are only found.

Definition of the natural phytocenozes productivity indicated that in the grassy parcel the raw and dry phytomass forms 628 g/m2 and 173,2 g/m2, moreover is 150 g/m2 of grassy fall. Underground grassy biomass of the oak parcel somewhat differs from the previous. The total raw and dry phytomass is accordingly 480 g/m2 and 149,4 g/m2, 236,4 g/m2 falls per fall, i.e. nearly 1,6 times more than in the previous parcel (evidently at expense of the oak tree dead parts).

It is established by the experiments that 81 % of the oak green leaves and 68 % of the grass surface parts decompose for a month. Moreover 4,1 and 2,29 kkal of the plant residues energy is released. The rough parts of these plants are decomposed significanly less 44,3 and 43,5 %, as a result a tittle quantity 3,10-1,96 kkal of energy accumulating in plant substance is distinquished. It follows from conducting analysis that the plant partcipation character in soilformation differs depending on phytocenoz type, its kind content, phytomass and intensity of the biological rotation. Therefore under investigation of the plant cenozes role (at present parcel) in soilformation it is necessary to pay attention to the peculiarity of phytomass residue decomposition and humification by the soil biots activity, intencity of involving in biological rotation, energy accumulating in the plant substances.

Key words: parcel, phytomass, energy

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Effects of date palm biochar on hydraulic properties of calcareous sandy soil: Influence of temperature, particle size and application depth

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A laboratory column experiments were conducted to investigate the effects of date palm waste (biochar) pyrolyzed at different temperatures (300, 500 and 700°C) with different particle sizes and application depths on hydro-physical properties of sandy loam soil including: soil water penetrability, infiltration rate, intermittent evaporation, water retention and saturated hydraulic conductivity. Biochar produced from date palm wastes was applied at 15 g kg^{-1} (21.9 t ha^{-1}) in different sizes ((< 0.5 mm (S_1), 0.5-1mm (S_2) and 1-2 mm (S_3)) as biochar-soil mixture layer 2-cm thick at 0 cm depth (D_0), and 5 cm depth (D_5) . The results indicated that applying date palm biochar decreased the waterfront and saturated hydraulic conductivity of sandy loam soil. The cumulative evaporation was the highest and amounted to 44.00 mm in the non-treated soil, but it recorded the lowest amount of 32.25-35.46 mm in the date palm biochar-treated soil with < 0.5 mm in size. The biochar addition caused significant (P<0.05) increases in the amount of conserved and retained water compared to control soil. The highest amount of water conserved in soil was found for S_1 biochar at D_5. In addition, the cumulative water infiltration through the soil was significantly reduced by S_1 and S_2 biochars at D_0. The values of saturated hydraulic conductivity for the biochar treatments were significantly (P<0.05) lower than those for the control, with the lowest values for S_1 at D_0 and D_5. These results strongly suggest positive improvement for some hydro-properties of coarse-textured soils following date palm biochar addition, especially finer particles (< 1 mm) of biochar.

Key words: date palm biochar, hydro-physical properties, intermittent evaporation, water retention, hydraulic conductivity, cumulative infiltration.

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Chemical composition of soil organic matter in a reclaimed oxisol of Brazil: A chemical approach for evaluating changes in soil quality

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The removal of native vegetation and topsoil changes the quality and content of soil organic matter (SOM). A research site was established to examine the influence of land use and a soil reclamation practice on the quantity and chemical quality of SOM. The experimental site involved replicated treatments established in an Oxisol under native vegetation and an adjacent Oxisol site whose top 8.6 m had been removed to build a hydrodam nearby. A portion of the eroded soil was planted to native grass and tree species that also received a single addition of 60 t ha^{-1} of sewage sludge. This study used Pyrolysis Field Ionization Mass Spectrometry (Py-FIMS) to characterize the SOM chemical composition in samples taken from the top 5 cm of a native, degraded and reclaimed Oxisol. We identified 217 organic compounds in each soil condition. The abundance of all chemical classes of SOM in the eroded soil was always lower than in the native and reclaimed samples. The native soil samples had the highest abundance of lignin dimers, n-alkylbenzenes, flavonoids, n-diols, N-heterocyclics, nitriles, alkyl radicals, and sterols plus steroids. Conversely, the reclaimed soil samples showed the greatest abundance of carbohydrates and amino acids. The abundance of phenols + lignin monomers, lipids, alkyl radicals, N-heterocyclics, and esters of suberin was the same in the native versus the reclaimed soil samples. The chemical analysis of SOM by Py-FIMS was more efficient to indicate changes in soil quality than it total quantity.

Key words: degraded soil, mass spectrometry, native tree species, sewage sludge

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Carbon dioxide emission and respiration activity of microbial community of chernozems typical under anthropogenic transformation of terrestrial ecosystems**

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The soil CO_2 emission is provided by soil microorganisms and plant roots. The CO_2 emission and its microbial respiration (MR) portion were measured in different ecosystems (steppe, forest, bare fallow and city) of chernozems typical (Kursk region, Russia). The soil microbial biomass carbon (C_{mic}), basal respiration (BR) and fungi-to-bacteria ratio (F/B) were assessed in soil samples, specific microbial respiration (qCO_2) was calculated. The soil CO2 emission was varied (3.29-23.22 g CO_2 m^{-2} d^{-1}). The C_{mic} content was decreased along ecosystems gradient (1710, 1580, 372, 284 μg C g^{-1} for steppe, forest, bare fallow and city, respectively). The BR rate was high in steppe and forest, and it was low in bare fallow and city. The qCO_2 value in urban soil was by 2-4 times higher other studied ecosystems. The soil MR values (4.78-11.28 g CO_2 m^{-2} d^{-1}) were in average 48, 91 and 77% of total CO_2 emission in steppe, forest and city, respectively. The correlation between the total soil CO_2 emission and microbiological parameters was found (r=0.53 and 0.64 for C_{mic} and BR, respectively). The regression relationship between the MR and BR was shown (R^2=0.67). The F/B ratios in soil of city and steppe were almost the same (3.4 and 3.8, respectively), however the C_{mic} / C_{org} и C_{fungi} / C_{org} in urban soil were by 2.6 and 2.4 times less than steppe. Thus, along gradient of transformed ecosystems the "deterioration" of soil microbial community functioning was found. BR is able to characterize the MR in natural condition.

Key words: soil, greenhouse gas, land-use management, microbial biomass, microbial respiration, fungi-to-bacteria ratio

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The technologies of reclamation of coal mines dumps in the forest-steppe zone of Siberia

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The main areas of reclamation at coal mines are: agricultural, forestry, environmental protection and sanitation, and hydroeconomic approaches. Different areas of reclamation focus form different types of landscape in the recovered areas, which leads to the formation of specific soil cover and different soil-ecological statement of reclaimed land. The traditional reclamation technology of agricultural approach consists of several process steps and requires prior removal, warehousing and storage of topsoil in the clamps. Later saved topsoil slept on the planned dumps surface. This creates artificial soil – tehnozem. The dumping depth varies from 0.2 to 1.0 m. Soil-ecological statement of such sites is rated as good to excellent, allowing them to actively use. At the forestry approach the planting of *Pinus selvestris* and *Hippophae* is conducted. The planting should be done on the planned dumps surface and slopes up to 18°. For 15-20 years the forest plantations, which actively operate, safety and environmental functions, were obtained. The soil cover is mainly represented by organo-accumulative and cespitose embriozems. Soil-ecological statement is estimated like good.

Environmental and sanitary approaches in Siberia used in areas where reclamation is currently impractical or costly. Often, these sites remain under natural or self-overgrowing or them are seeded perennial grasses, to reduce the activity of erosion processes. The development of the processes of recovery of soils in these areas slows to a crawl. The soil cover is mainly represented by initial and organo-accumulative embriozems. Soil-ecological state of these areas is satisfactory. Hydroeconomic approach applies to the remaining open pits. When reclamation by this method the quarry work planning are conducted at an early stage, and the process equipment is cleaned and screened outputs coal seams. Flooding quarries produced mainly by groundwater. This is gradually recovering natural level. Depending on the water quality the using reservoir can be carried out in various areas: fisheries, recreation and recreation. Therefore the quite a wide range of reclamation technologies to effectively restore disturbed areas in accordance with its intended purpose is developed and applied in practice for the conditions of forest-steppe of Siberia.

Key words: soil, embryozem, disturbed land, reclamation, monitoring, soil-ecological condition

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Metagenomic research of chernozems under different types of lands

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The study of the microbiome was carried out by means of DNA and RNA extraction from the soil and 16SpRNA gene sequencing at the GS Junior sequencer (Roche). The analysis of the microbiomes taxonomic structure revealed a number. Representatives of 28 microorganisms phylae were found, of which 7 phylae dominated: Proteobacteria, Actinobacteria, Firmicutes, Verrucomicrobia, Acidobacteria, Gemmatimonadetes, Chloroflexi. The phylae ratio is different at different depths. In the parent rock, the percentage of phylae differs from the average values for all samples. Comparing the microbiome structures at a depth of 100 and 200 cm in the soil of the idle field soil revealed their complete identity. In the whole, the obtained data about microbial communities, 158 families were identified. Most representative of them were two phylae groups. The first group includes Proteobacteria and Actinobacteria phylae, the second group covers all the other. The relationship between the type of land and the taxonomic structure of soil microbial communities is rather obvious only for three families: Gaiellales (Actinobacteria), Rhodoplanes (Proteobacteria), Chthoniobacteraceae (Verrucomicrobia). The maximum variety of microorganisms described using the Shannon index, is observed in the 5–10 cm layer of the arable soil (8.5), and the minimum one, in the same layer of the idle land soil (7.8).

Key words: phylae, analysis of the microbiomes taxonomic structure, chernozems

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Reconstruction of paleogeographic conditions of soils formation in the territory of the upper paleolithic site of the Kostenki-I archeological monument

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Based on a comprehensive study of soil and sediment complexes (SSC) Kostenki-I (K-1), a reconstruction of paleolandscapes and soil forming types was carried out, concurrently in the ravine and its watershed.

The soil formation process in the ravine and within the watershed area was not synchronous. Whereas in the watershed area, during the humid climate period, the soil forming process was developing, in the ravine, with a high base level of erosion, sedimentation went on in a water medium. During aridity periods, at low temperature, periglacial steppe landscape were simultaneously formed in the watersheds and ravines. During the period from 45 to 20 thous. years ago, 2 epochs and 3 soil forming rhythms succeeded each other in the ravine. For the last 20 thous. years, only one interglacial soil forming epoch has been identified in SSC K-1, represented by the modern soil. There is no evidence of pleniglacial epoch and Holocenic rhythms in the excavation.

In all probability, in the upland positions of the watershed catchment basin of the ravine, the soil formation process has been uninterrupted for the last 45–50 thous. years. In the period of 40(45)–20 thous. years, soil transformations occurred 4 times

Key words: paleolandscapes, soil forming types, reconstruction of soil formation's conditions, archeological monument

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The soil aggregate stability influenced by hazelnut husk compost application: main effects of soil texture and sampling period

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Our aim was to assesschanges in aggregate stability (WAS) of soils by different doses (0, 1.25, 2.5, 5.0, 7.5 and 10 ton da^{-1}) of hazelnut husk compost (HHC) application in different sampling time (spring, summer, fall and winter)and in two hazelnut orchard with different textures such as sandy loam (SL) and clay loam (CL). In the end of the each sampling period, soil aggregate stabilities were determined according to wet sieving method. Aggregate stability was not affected by HHC application while it was effected by soil texture and sampling time statistically. Our results showed that there were significant differences in different soil texture and sampling time. The best HHCapplication choice was 5 ton da^{-1} to increase the organic matter content by 2% level.

Key words: hazelnut, compost, soil, aggregate stability

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Development of standard Russian and Kazakhstan scenarios of mathematical models of pesticide behaviour in soils

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Twelve standard scenarios of mathematical model PEARL were developed to estimate pesticide concentrations in soils and groundwater of main Russian and Kazakhstan rural regions. Data on weather, soils and crops were gathered from different sources for parameterization of these scenarios. Model PEARL and standard scenarios were used for prediction leaching potential of four test-substances and for assessment of Russia and Kazakhstan vulnerability regions to pesticide pollution of soils and groundwater.

Key words: pesticides; groundwater; soil; risk-assessment; PEARL

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The effects of organic preparations on mineral substance of raisins in organic grape growing

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311.595 hectares of organic grapes are grown, which constitutes 4.6 percent of the world's grape growing area in 2013.

Turkey is a major producer country of grapes growing in the world. Viticulture is one of the major branches of agriculture with respect to production area and its large share of income in Turkish national economy. Since 1985, Turkey producing and exporting organic raisins, is a world leader in the production of raisins.

8418 hectares grape are grown organically which constitutes 1.8 % of the total grape production area of Turkey in 2013.

The research was established in 15 years old Sultana vineyard under irrigable soil conditions in Alaşehir-Yeşilyurt Viticulture Research Station during organic production phase from 2006 to 2007. The objective of this study was to determine the influence of an applied organic preparations on mineral substance analyses of the raisins.

It was carried out according to randomized block design trials with three replicates consisting of 12 vines per parcel. Mineral substance analyses of the raisins obtained from the applications were performed using the ICP-AES technique.

It was found that there was an increase in average phosphorus (P), potassium (K), magnesium (Mg), calcium (Ca), sodium (Na), iron (Fe) and manganese (Mn) and a decrease in average zinc (Zn) contents applied organic preparations as compared to not applied organic preparations and a difference of 5% was determined between applications. There was no statistical significance in copper (Cu) contents between the applications.

Key words: sultani çekirdeksiz, organic preparations, mineral substance, organic raisins

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Morfological and diagnostic characteristics of genetic horizons of grey-brown soils located in the sphere of influence of cement and superphosphate plant

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The research was conducted on the genetic horizons of gray-brown soils contaminated with cement and superphosphate plant waste (for example, Karadag and Sumgait arrays).

Morphological description of genetic horizons of gray-brown soils of natural and cultivated cenoses performed comparatively on the following layers: 0-5; 5-12; 12-20; 20-30; 30-50; 50-100 cm.

The virgin soil contaminated with cement dust are characterized not only to change the color scheme of individual horizons, but also in compacted structure, small richness in humus.

A similar trend is observed in the gray-brown soil contaminated waste superphosphate plant. However, this marked the formation of a weak turf and humus-accumulation layer, there is activation of the biological activity.

Cultivation of the soil contributed to the change in the morphological horizons associated with the formation of the profile of the cultivated rich in humus, and an increase in their biogenesis.

Key words: genetic horizons, contaminated and cultivated soil

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The preparation of the classification of Azerbaijan soils according to the world reference base for soil resources

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A main aim of scientific research consist of the new soil classification fulfillment according to the World Reference Base for Soil Resources (WRB) which is necessary for soil researches preparation in a level of the world standards in Azerbaijan. As we live at a globalization period the international cooperation enlargement has been changed to a day's requirement. Using of the international scientific approach and methods is a necessary term for the cooperation. From this point of view one of the most important problems is transition into the WRB system in the soil classification and nomenclature for an integration of soil science to the international world. The Azerbaijan soil scientists performed definite researches in this direction. But these investigations were fulfilled according to WRB version of 1998, corresponding to the International Soil Science Society official recommendation and this version possessed the most informative character in performed correlation because of playing reference base role. A new version of the WRB was published during XVIII World Congress of USA in 2006 and 120 soil scientists' remarks and suggestions from 30 countries of the world were taken into account in improvement of this version. An application of the 2006 year version was late in Azerbaijan. The problem urgency is that it is necessary to use from the new WRB classification system for performing of the researches in an international level in the field of soil science. Inessentiality of such system in Azerbaijan makes obstacles in a way of the international scientific cooperation and integration.

Key words: diagnostics, nomenclature, soil classification, soil types

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Effect of macro (NPK) and micro (B, MN) elements on crops of the beet-sugar root-crops growing under bogharic conditions in the little Caucasus from the Azerbaijan Republic

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Growing of the technical cultures, including beet-sugar, being one of their main sources not only of the sugar production, but also serving as an excellent forage for cattle is one of the actual problems, appearing before the agricultural specialists. The successful solution of the problem under this culture growing is impossible without use of fertilizers, which rise crop and improve a product quality. It is established that the mountainous leaching chernozem soils in the little Caucasus of the Azerbaijan Republic are not enoughly ensured with the assimilating mobile nutrient. Therefore it is necessary to apply mineral fertilizers under growing of the beet-sugar. The researchers showed that the testing doses and fertilizer correlation positively affect growth and development of the beet sugar plant, improvement of the soil nutrious regime, increase of the surface mass crop increase and root-crops, its quality, accumulation of the beet sugar nutrient in the yield. It is established that an optimal dose of fertilizers, promoting of the root-crop production increase till 65 % is N90P120K90+B6,0 that is also recommended for production.

Key words: beet-sugar, mountainous leaching chernozems, mineral fertilizer, macro fertilizer, optimal norms

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Influence of mineral fertilizers on the potato crops, quality and guarding

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The main directions of the economical and social development in the Azerbaijan Republic are measures on the populations requirement satisfactory improvement in fruit-vegetable production, generally and a potato in particular. Among the agrotechnical methods, provided a high and steady productivity of the potato, an application of the mineral fertilizers take an exceptional important place. An application of the mineral fertilizers, besides increase of productivity, a quality of the potato is also improved. The soils of the experimental area are insufficiently ensured with the mobile and easily assimilated forms of the nutrient. Therefore it is necessary to apply mineral fertilizers under potato growing. An application of mineral fertilizers provided considerably addition to the potato crop. From the tested norms of NPK on average for 3 years the highest potato yield – 115,0 c/h was obtained at application of N120P120K120 in soil. The crop addition of the unfertilized version formed 51,6 c/h or 81,4%. The qualitative indices of the potato tubers are essentially developed: increase the dry matter content, raw protein, starch exit, nitrate content in turber didn't increase MPC. The best indices are noted under a version with the application N120P120K120. Mineral fertilizers don't exert an essential effect on potato tuber safety.

Key words*:* a potato, mineral fertilizers, crop, starch, nitrate

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Manganese fertilization of vineyards on sandy soils of Chechen republic**

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The aim of the research is to determine the content of manganese in soils of Tersky sands and to identify the physiological reaction to manganese fertilizer of Platovsky grapes. The main task of the research is to determine the effect of root feeding time and doses to productivity of vineyards. Studies were carried out on fruiting vines Terek-Kumskiy sands of vine producing farm "Burun" of Shelkovskoy District of the Chechen Republic. The methods of agrobiological counts (the number of buds, shoots, buds on the bushes, accounting harvest berries from the bush and 1 hectare, and the average mass of clusters) were performed on establishing the vineyards on industrial scale. The new data has been obtained on manganese influence of grapes plantations productivity on sandy soils of the Chechen Republic as a result of the research. Manganese feeding is effective agricultural technique promoting the growth, development, increase of frost resistance and productivity of grapes plants. Manganese fertilizing of soils by 4 kg active ingredient per 1 ha against the background of nitrogen 90 kg/ha, phosphorus 90 kg/ha and potassium 90 kg/ha into a phase of grape sap flow promotes acceleration of damaged vineyards restoration by frosts, improves development of reproductive organs, allows to increase productivity. Application of this agricultural technique promotes increase in the content of sugar in grapes berries at essential decrease in acidity of juice.

Key words: grapes, soil, mineral nutrition, manganese, productivity

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Effects of hazelnut husk applications on some soil properties in a hazelnut orchard

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In this study, effects of hazelnut husk obtained after production on some physical and biological properties of a hazelnut orchard soil was determined. In the experiment, each hazelnut ocak planted at intervals of 4.0 m x 4.5 m formed a plot and hazelnut husk was applied to per ocak at 0 (control), 25, 50, 75 kg doses according to randomized blocks experimental design with three replications. Soil samples were taken in the first, second and third year following the application after hazelnut harvest and organic matter, carbon dioxide production, microbial biomass carbon, bulk density, aggregate stability and penetration resistance were determined in these. The hazelnut application increased organic matter amount of clay loam textured soil as average 29.84 % compared to control, depending on the application dose. Dependently this increase, average decreases as 21.53 % and 16.36 % were determined in penetration resistance and bulk density values respectively, compared to control. Although an increase as 2.32 % was provided in aggregate stability values, a statistical variance wasn't observed between subjects but differences between years were seen. Lower aggregate stability values were obtained in the third year compared to the first and second year after application. Similarly, average increases as 124.52 % and 40.09 % occurred in the values of carbon dioxide production and microbial biomass carbon respectively, compared to control.

Key words: hazelnut husk, organic matter, soil properties

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Role of the arbuscular myccorhizal fungus *Glomus* spp. on water nutrition of date palm (*Phoenix dactylifera L.*) in Algerian arid regions

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Tolerance of mycorrhized clover (*Phoenix dactylifera* L.) to drought depends on the arbuscular mycorrhizal fungi associated to the host plant. Seven arbuscular mycorrhizal fungi isolates were collected from seven algerian date palm grove's soils and were investigated for their ability to improve the plant tolerance to water deficit stress. Applying a constraint of 30% field capacity reduces severely the mycorrhizal rate in the root cortex of most of the tested isolates. Fungi collected from saoura (South-West of Algeria) date palm grove were less affected by the drought than the other strains, such as *Glomus* isolated from saoura soil. This fungus allowed the plants to maintain its water content, water potential and its leave transpiration at high levels compared to the non inoculated plants. The values of stomata resistance and the saturation deficit in water remained lower for mycorrhized plants than non-mycorrhized. Ones further more, the isolate of saoura and *Glomus* were the most virulent colonizing the host plants regard less of the level of water deficit in the soil. This is to our knowledge the first demonstration of a causal link between AM fungal growth and water repellency of soil aggregates. Our results also place AM fungal contributions to soil aggregation on a firm mechanistic footing by showing that hyphae are sufficient to produce effects, in the absence of other soil biota, which have always been included in previous studies.

Key words: mycorrhiza, date palm, water deficit, drought, arid region

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Contribution of invertebrate in organic matter of cryogenic forest soils of Central Siberia**

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The questions of participation of soil animals in the processes of accumulation and transformation of matter and energy in cryogenic soil are particular significance for understanding peculiarity of biogeochemical cycle in forest ecosystems of permafrost zone.

The direct invertebrate biomass contribution in soil organic matter of cryogenic forest soils of Central Siberia was investigated.

Cryosols turbic of forest tundra ecosystems, entic podzols of northern taiga, carbic podzols of middle taiga and greyic phaeozems albic of southern taiga were studied (WRB, 2006).

Formation of soil invertebrate biomass formation in forest ecosystems is determined by climatic and soil factors on this area: maximum of biomass is typical for soils of southern taiga forest. Role of invertebrate biomass in accumulation of main biogenic elements increases under improvement of soil-climatic conditions. Values of carbon and nitrogen accumulation by soil invertebrates much less then overall organic matter stock in forest soils Values of carbon and nitrogen accumulation by soil invertebrates much less then overall organic matter stock in forest soils (< 1 % from total C and N reserves in the same soils). Direct and indirect invertebrate contribution to transformation of soil organic matter increases from forest tundra to southern taiga.

Key words: macrofauna biomass, carbon, nitrogen, cryosols turbic, podzols rustic, podzols haplic

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Heavy metals in the soils of the city of Rostov-on-Don

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Seventeen soil profiles were established in different parts of the Rostov agglomeration. The following objects were studied: (1) Calcareous ordinary chernozem under steppe vegetation (fallow) and under trees (forest belt): soils of natural structure insignificantly affected by urbanization processes; (2) Urbostratozems: soils of natural structure overlain by loose anthropogenic deposits. (3) Screened urbostratozems: soils of natural structure overlain by asphalt. The ecranozems retain scalped chernozems at some depth under the asphalt layer.

It has been shown that the concentrations of most elements in the parent rock of Rostov-on-Don exceed the background values, and those of some elements (Zn, Cu, Co, Pb, Ni, V, Cr) exceed the MPC levels. This is one of the reasons for the increased contents of these elements in the soil profile. Another reason is the input from anthropogenic sources, as is proved by the accumulation of such elements as chromium, nickel, zinc, lead in the surface horizons. The level of contamination is estimated as permissible throughout the profile.

Key words: contamination, urbanization, trace elements in soils

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Effects of dust detergent residues on biological properties of the farming soils

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Laundry detergent plays a very large role in daily life. Commercial laundry detergent, however, contains many irritating, and potentially toxic ingredients.

The objective of this study is to determine the effects of six different commercial laundry detergent residues on soil biochemical properties e.g. bacteria, fungi population and basal respiration in soils. The soil samples were taken from 0-30 cm depth and examined microbial population and soil biochemical properties (bacteria, fungi population and basal respiration). Biochemical properties of the soil were measured for six months period by using pots in greenhouses conditions. Soil biochemical properties in polluted soils with detergent residues and compared with non-polluted soils.

The results showed that there was significant correlation between polluted soils with detergent residues and microbial population. Similarly, basal respirations (CO_2 respiration) of the soils were showed significant correlation with polluted soils with detergent residues.

Based on the results of this investigation, it was determined that commercial laundry detergent residues had a negative impact by depending on detergent concentration and ingredients of the detergent on microbial population and basal respiration in polluted soils with detergent residues.

Key words: basal respiration, microbial population, laundry detergent residues

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Soils of the middle-boreal subzone (middle reaches of the Stony Tunguska)[**]

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The forest ecosystems of middle-boreal subzone are formed on the permafrost deposits. These deposits are not continuous they form patches. The aim of this paper is to determine the influence of permafrost on the formation of soils.

Larix stands that grow on the permafrost deposits. The typical type of soils is Podzols Gleic. The gley materials in mineral or organic soil horizons show evidence of cryoturbation (frost churning). These soils are always moistened, therefore the quantity of biomass and organic matter in these landscapes is smaller than in the others. The ground vegetation consists of lichens and mosses.

The next point is Pinus sibirica stands were located on the non-permafrost deposits. The typical type of soils is Podzols Cambic. One color is characteristic of all horizons and they also contain a lot of organic matter. These soils are warm and there are ground vegetation of grasses, bushes and shrubs.

Pinus silvestris stands were located also on the non-permafrost deposits. The Podzols Ferric is a typical one, they are of a characteristic buffy color. This depends on the presence of iron cutans in mineral horizons.

Key words: Forest ecosystems, permafrost, Podzols, properties

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Contribution to the inventory of mosses bryophytes of national parc of El-kala (North-eastern Algeria)

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The plant kingdom is a polyphyletic assemblage of photosynthetic organisms, This group is composed of two lines, one alga, and the second of land plants, which include Bryophytes or Bryophyta, ferns, gymnosperms and angiosperms, Bryophytes are small plants; mainly, terrestrial, but looking wet sites; especially, in boreal and alpine areas, and they are an important part of rocks, and tree trunks. Bryophytes include liverworts, hornworts and mosses.

The North-eastern Algeria is known by its humid and sub-humid bioclimatic floors housing a dense vegetation and diversify whose Mosses occupy an important place but they remain little known, At the end of the study, which was conducted in the National Park El-Kalain northern Algeria, and after a number of successive walk on land, the inventory of mosses brings up the existence of 62 species of which the latter exists only in an only station throughout Algeria.

View the steppe of Mosses, their great abundance in wet and rainy environments and their identification difficulties, our research has been made during the period of optimal growth of the species. Harvest hardly presents particular difficulty, terricolous species and muscicoles are easily removed from their substrate eventually using a penknife, while some species cling to the substrate, it is then necessary to detach fragments of the substrate with an adequate instrument.

Sphagnum denticulatum the plants are green, yellow-brown to dull coppery red, sometimes with a violet tint. The branches of external capitulates are swollen and smooth in outline, leaves with flat edges, which cladding and tighten those above. At least some of the branches are curved in top view, with the leaves towards the point of the branch learned narrowly enough to each other, forming a pointed end object. The species *Sphagnum denticulatum* found in only one station in Algeria, it is Bergougaya'sAin in the National Park of El Kala.

Bryophytes often live in humid conditions, it is observed in these foams the phenomenon of revival: they can withstand prolonged desiccation, passing a slow state of life, when conditions are viable return, they do go back their metabolism.

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Velocity characteristics of cycle nitrogen. Transformation in cryogenic soils of Transbaikalia: hypothesis, experience and conception

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First presents results of long-term experiments on nitrogen transformation in cryogenic soils with application of stable nitrogen isotope (^{15}N) and modeling as renewed efforts to make a biokinetic conception of nitrogen status in rigid climates of the northern part of Central Asia, namely in Transbaikalia**.** It uses a theory to investigate velocity characteristics of nitrogen pool change in cryogenic soil environments. The goal of theoretical background of nitrogen pool velocity transformation is to reveal modern approach to assessment of inherent nature cycle. In nitrogen cycle kinetic parameters were evaluated as the main processes of nitrogen ^{15}N uptake and immobilization in terms of scaling with constant of growth velocity and microorganism performance being a key position in nitrogen transformation. The results show a new possibility to assess nitrogen cycle through calculated velocity constant and revealed dynamic pattern of the main processes. The ongoing assessment enables us to formulate a new original hypothesis for theoretical kinetic model. This mathematical extrapolation of results allows to build a basis for theoretical simulation of nitrogen cycle and a more dynamic pattern of nitrogen pool changes.

Key words: soil nitrogen, constant of velocity, kinetic conception

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Soil-water contact angle: Significance and research methods

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The work is dedicated to the measurement of the soil-water contact angle by a sessile drop method on the DSA-100 system and the choice of optimal method of preparing the soil for analysis. The object of study is the arable horizon (0-20 cm) of typical chernozem. It was carried out the comparison of three methods of sample preparation: in two of them, the sample is fixed on a double-sided adhesive tape, in the latter - on acetate lacquer. These variants differ in thickness of the applied layer of the soil and produce different results. The sample, prepared in different ways, gives angles from 20 to 45 degrees, and the last two methods give the most stable and objective results. It is recommended to use the data obtained by a particular method of sample preparation.

Key words: the surface of the soil's solid phase, soil-water contact angle, sessile drop method, typical chernozem

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The effect of mixed cultures of plant growth promoting bacteria and mineral fertilizers on tea (C*amellia sinensis* L.) growth, yield, nutrient uptake, and enzyme activities[**]

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Tea, a well-known important ancient beverage crop, is consumed as a drink and cultivated all over the world for its commercial value and beneficial effects. Enzymes play important role in the antioxidant system of plant, in the oxidation and formation of the tea compounds, in the biosynthesis of flavonoids and in tea manufacturing process. Plant associated N_2-fixing and P-solubilizing bacteria have been considered as one of the possible alternatives to inorganic fertilizer for promoting plant growth and yield. Therefore, this study was conducted in order to investigate the effects of mineral fertilizer and one commercial liquid bio-fertilizer, and eight in three and four new multi-traits rhizobacteria based bio-formulations on tea growth, nutrient uptake, chlorophyll contents and enzyme activities under acidic field soil conditions, in two years. The experiment was arranged as a completely randomized design with eleven treatments and three replicates (each having four tea bushes). The inoculation with multi-traits rhizobacteria enhanced different enzymes, such as, glutathione reductase, glutathione S-transferase, glucose-6-phosphate dehydrogenase, 6-phosphogluconate dehydrogenase, polyphenol oxidase, peroxidase, and 5-dehydroshikimate reductase, and alcohol dehydrogenase, in tea leaves. Bacterial combinations efficiency was variable and depended on the inoculants strain and parameters evaluated. Bio-fertilizers formulations stimulated overall plant growth, including shoot development, leaf area, fresh and dry leaf yields, macro- and micro-nutrient uptake, chlorophyll and anthocyanin contents, and activities of oxidative, catalytic, hydrolytic and anti-oxidative enzymes of tea plants. In this study indicate that a higher enzyme activities and yield potential can be expected from acidic soils with some new bio-fertilizers formulations.

Key words: mixed inoculations , bio-fertilizers, plant-growth-promoting bacteria, Tea (Camellia sinensis L.)

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Spatial patterns of soil organic carbon in a sandbank forest in a federal conservation unit in Cabedelo, Brazil

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Forests are important for maintaining the global climate balance and atmospheric carbon sequestration. This study aimed to quantify the organic carbon content and fertility attributes in soil surface layers in a sandbank forest fragment located in a federal conservation unit. Samples were collected in 0-20 and 20-40 cm layers in a sandy soil (Quartzipsamment in Soil Taxonomy) in Restinga of Cabedelo National Forest (Flona), State of Paraíba, Brazil. We evaluated the soil organic carbon (SOC), available phosphorus, exchangeable bases (Na, K, Ca and Mg), pH, H+Al, base saturation and soil cation exchange capacity (CEC), in the layers 0-20 and 20-40 cm from samples collected in 48 points arranged in a regular grid of 30 x 55 m. Descriptive analysis and correlation of attributes were conducted. The spatial analyzes were evaluated with geostatistical tools, with the generation of semivariograms, interpolation by ordinary kriging and generation of surface maps. SOC was significantly correlated with the pH to a depth of 20 cm and with H+Al and the CEC to a depth of 40 cm. The degree of spatial dependence (GDE) of COS is moderate in both evaluated layers. For them, the best fit was obtained with exponential semivariogram models, with a range of spatial dependence of 36.9 m (0-20 cm) and 29.1m (20-40 cm). For reliable sampling of COS levels in the sandbank forest fragment at Flona, it is suggested collecting samples distant by at least 40 meters apart.

Key words: Atlantic Forest, fertility, geostatistics, soil quality

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Spatial variability of Cd and Pb in arable land of the Alborz Dam downstream basin (Babolrood - Siahrood) Iran

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Soil pollution and heavy metal accumulation is one of the most important environmental problems to plants, animals and human health. Naturally, heavy metals exist in soil but industrial and agricultural processes and municipal activities cause heavy metals accumulation in soil and food chain pollution that cause plants to absorb heavy metals.

Because the lack of heavy metal distribution map, the objective of this research is to provide map of heavy metal of Cd and Pb distribution and evaluate pollution pattern in arable land of the Alborz Dam downstream basin in area of 95000 hectare. Total Cd and Pb content were extracted by 4M HNO3. Carbonate form of Cd and Pb were extracted by 0.05M Na2EDTA. Spatial distribution maps were drawn using the ordinary kriging method, in order to identify the most affected areas and the main pollution sources. ArcGIS 9.0 was applied in order to create the spatial database. The best interpolator were monitored with respect to some statistics such as mean error, mean square error and root mean square standardized.

Results showed that carbonate form of Cd and Pb were not acceded the maximum permitted standard level. Total content of Cd and Pb was normal, but in some areas is more than toxicity level. Soil contamination of Cd and Pb was mainly derived from anthropogenic activities such as agricultural practices, irrigation with polluted water. Evaluating kriging method showed that, ordinary kriging is the best way of estimating unsampled areas. In the maps, the most contaminated area was near Siahrood River in east, especially between Joibar and Kiakola and near Ghaemshahr.

Key words: geostatistics, zonation, heavy metals, Pb, Cd, kriging

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Humus soil profiles in the Northern Urals («Vishercky» natural reserve)

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The characteristic of the group composition of humus and optical properties of humic acids were measured in the soil profile of mountain-forest and sub-alpine high altitude vegetation zones on the slopes of Homgi-Nël in the Northern Urals. The types of profile distribution, accumulation and quality of soil organic matter under study depend on the conditions of soil formation under different types of vegetation.

The studied samples of humic acids had peaks of various degree of manifestation which indicate the presence of green humic acid, the distribution of which is found mainly in soils experiencing excessive moisture. We established the average direct correlation between the extinction coefficient (E465 and E665) and the content of readily degradable organic matter (0.59 and 0.61, respectively); also there is unstable weak inverse correlation with an area altitude. Wide ranges of color coefficient are characteristic of the soils (0.88-12.00) suggesting a less complex structure of humic acid molecules. Based on the study of humus condition indicator signs in soils on mountain Homgi-Nël on the west macroslope of Northern Urals we diagnosed buried horizons in the soil and different ages of the successive changing soils on the slope. Humus profiles remember environmental changes of both quantitatively level as well as the ratio of the main components of humus despite youth and immaturity of humic acids due to the nature of mountain soil formation.

Key words: natural reserve, mountain soils, organic matter, the profile, the optical density, process

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Agroecological evaluation of fertility of soils of forest-steppe of Krasnoyarsk region

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The report describes the results of SEI usage for assessment of fertility of arable lands of 4 agricultural enterprises located in the Krasnoyarsk forest-steppe. SEI was determined using Karmanov I.I. method on each object for all soils, soil combinations (SC) and land area as a whole. SEI values for different soils of examined farms range from 25 to 52 points, which characterizes a fairly wide range of fertility of these soils. Weighted average SEI values for farms are different and range from 38 to 46 points. It was found that the potential fertility of arable lands is largely limited by SCS components with negative agronomic characteristics. Was discovered the interdependency between SEI and soil contrast. In a series of the same type soil combinations of compared farms range of SEI values varies slightly (44-47). As a result, contrast is low (1.05-1.34). Soil combinations in other fields have more diverse component composition. They are characterized by a fairly large range of SEI values (27-47). SC contrast here has maximum value (1.58-1.62).

Usage of SEI provides a qualitative and quantitative evaluation of soil fertility and makes it possible to solve agronomic problems for the entire agricultural landscape and land use management.

Key words: soil-environmental index, the combination of soil, soil contrast

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Effects of vermicompost extract tomato seedling production

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Earthworm compost application on agricultural production is becoming more popular recently in accordance with increasing interest on organic farming. Vermicompost is the excrement of earthworms which consumed organic substrate such as animal manure, bedding materials and vegetable waste. The main difference between microbiologically composted substrat and its earthworm version is the enzymes and amino-acid that exudate by worm digesting system. The aim of this experiment was extraction of the so-called effective proportion of vermicompost and evaluate it effectiveness on seedling production. Three-hundred gram of vermicompost made up to one liter reverse-osmosis (RO) water and mixed thoroughly for 2 hours. Suspension decanted for 1 hour and filtered by 106 µ sieve, 770 ml of solution obtained. That solution was stored at 4 °C and 1 ml solution or RO water applied to seedlings at every-other two days after seeding in accordance to experimental design.

Results revealed that solution obtained from vermicompost was effective on the parameters observed. The highest plant shoot dry matter was found at three-time solution applied plants as 243 mg plant^{-1} whereas the highest root dry matter development and stem diameter was in one time applied pot as 63 mg plant^{-1} and 3.66 mm, respectively. Root nutrient contents determined higher in almost all parameters than shoot contents. Shoot cupper concentration was tend to be increased up to 4 times application; however, root Fe concentration reached its maximum value at 1 time and gradually reduced by repeated application. There was great fluctuation on nutrient composition of the plants; therefore, no statistical significance was observed.

Key words: vermicompsot, vermicompost tea, tomato, plant nutrition

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Spatial variability of soil CO_2 fluxes in a sandbank forest fragment in the Brazilian Atlantic Forest

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Studies in tropical regions indicate the potential of forests to be sinks of atmospheric carbon, if correctly managed to reduce deforestation and forest degradation. This study aimed to evaluate the spatial variability of soil CO_2 fluxes in a sandy soil (Quartzipsamment in Soil Taxonomy) in Restinga of Cabedelo National Forest, State of Paraiba, Brazil. We marked 48 points on a 30 m x 55 m regular grid, separated by 5 m (in line) and 10 m (between lines) apart. Soil CO_2 flux (FCO_2) was measured on each point in 27/12/2014, between 11:00 and 14:00, with an infrared gas analyser model LI 8100A (Licor, Lincoln, Nebraska, USA) and a 10 cm diameter dynamic camera (LI 8100-102), with temperature and soil moisture sensors. Samples were collected from depths of 0-20 to 20-40 cm for soil organic carbon (SOC) determination. Semivariograms models were generated, and point kriging interpolation was performed using 16 nearest neighbor data points. FCO_2 in the study area ranged between 2.61 and 8.12 μmol m^{-2} s^{-1}, averaging 4.20 μmol m^{-2} s^{-1}. The model that best fit the FCO_2 was the spherical, with a range of 44.7 m and R^2=0.756. The degree of spatial dependence was moderate. There was no significant correlation between FCO_2 and the temperature, soil moisture and neither COS in 0-20 and 20-40 cm layers. The highest FCO_2 value occurred in sites with large availability of organic material in the forest (tree trunks and fallen branches) or large amount of litter on the soil surface.

Key words: carbon dioxide, geostatistics, Restinga de Cabedelo National Forest, soil quality

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Spatial patterns of soil organic carbon in a sandbank forest in a federal conservation unit in Cabedelo, Brazil

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Forests are important for maintaining the global climate balance and atmospheric carbon sequestration. This study aimed to quantify the organic carbon content and fertility attributes in soil surface layers in a sandbank forest fragment located in a federal conservation unit. Samples were collected in 0-20 and 20-40 cm layers in a sandy soil (Quartzipsamment in Soil Taxonomy) in Restinga of Cabedelo National Forest (Flona), State of Paraíba, Brazil. We evaluated the soil organic carbon (SOC), available phosphorus, exchangeable bases (Na, K, Ca and Mg), pH, H+Al, base saturation and soil cation exchange capacity (CEC), in the layers 0-20 and 20-40 cm from samples collected in 48 points arranged in a regular grid of 30 x 55 m. Descriptive analysis and correlation of attributes were conducted. The spatial analyzes were evaluated with geostatistical tools, with the generation of semivariograms, interpolation by ordinary kriging and generation of surface maps. SOC was significantly correlated with the pH to a depth of 20 cm and with H+Al and the CEC to a depth of 40 cm. The degree of spatial dependence (GDE) of COS is moderate in both evaluated layers. For them, the best fit was obtained with exponential semivariogram models, with a range of spatial dependence of 36.9 m (0-20 cm) and 29.1m (20-40 cm). For reliable sampling of COS levels in the sandbank forest fragment at Flona, it is suggested collecting samples distant by at least 40 meters apart.

Key words: Atlantic Forest, fertility, Geostatistics, soil quality

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Improving use efficiency of applied phosphorus by zinc fertilization in *basmati* rice-wheat cropping system

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Rice-wheat rotation is the most important cropping system of the Indo-Gangetic plains. On-farm experiment was conducted to reveal the effect of Zn fertilization on yield, uptake of nutrient, utilization efficiency (UE) and grain output per unit of fertilizer use through agronomic efficiency (AE) of P and Zn in rice-wheat rotation. The experiment was conducted with rice (*cv*. Pusa Basmati 1) and wheat (*cv.* UP-2425) by imposing twelve treatments involving four different doses of P (0, 20, 40 and 60 kg P_2O_5 ha^{-1}) and three different doses of Zn (0, 2.5 and 5.0 kg Zn ha^{-1}) with three replications. The yield of basmati rice was not significantly influenced by P×Zn interactions however, for wheat, a conjoint dose of 60 kg P_2O_5 and 5 kg Zn ha^{-1} gave the highest grain yield (5.43 t ha^{-1}). Phosphorus utilization efficiency (PUE) of wheat was higher compared to basmati rice however, the reverse was true for zinc utilization efficiency (ZUE). Utilization efficiencies of the two nutrients diminished as their rate of fertilization increased, in both the crops. The AE of applied nutrients, in basmati rice varied from 31.4 to 49.7 kg grain kg^{-1} P and from 43.2 to 121 kg grain kg^{-1} Zn. In wheat, AE for P varied from 26.9 to 65.5 kg grain kg^{-1} and for Zn from 56.4 to 83 kg grain kg^{-1}. The utilization and agronomic efficiency of P were increased when P was added in doses lower than its recommended dose (60 kg P_2O_5 ha^{-1}) along with the recommended dose of Zn fertilizer (5 kg Zn ha^{-1}) in both the test crops. Therefore, addition of balanced dose of P and Zn fertilizers is required to harness optimum yield by saving fertilizers, the costly inputs in agriculture to reduce the cost of production.

Key words: agronomic efficiency, basmati rice-wheat rotation, Indo-Gangetic plain, P×Zn interaction, utilization efficiency

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The content of the organic carbon in grounds of the Caspian sea

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The concentration of organic carbon in soils of the Western part of the Northern Caspian Sea during the period 1994-2012 was changed from 0.01 to 2.82 %.

The content of the organic carbon in soils is in direct correlation dependence on the percentage of pelitic (d < 0.01 mm) and aleuric (d = 0.01-0,1 mm) sediment fractions. The correlation coefficient reached + 0,73 + 0,76, respectively. This dependence indicates that the highest intensity of accumulation of the organic material inherent fine-dispersed soils.

The researches revealed a positive dependence between the accumulation of the organic carbon in soils and indicators of the intensity of primary producing of the organic matter.

The closest link between the level of accumulation of the organic carbon in soils and satiation of the superficial water with oxygen was revealed (r = + 0,74). The maximum coefficient of the correlation (+ 0,78) in connection with organic carbon in soils – pH of the coating surface of water.

Most notable is the impact of chlorophyll "a" (the correlation coefficient reached + 0,79), presented in all photosynthetic organisms, and also carotenoids (the correlation coefficient reached + 0,84), whose contents are mediated through trophic relationships of benthic biocenosis.

Key words: organic carbon, grounds, the Northern Caspian, grain-size content, oxygen, phytopigments, active reaction of environment (pH)

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Comparison of composted tobacco waste and farmyard manure as organic amendments: Influence on the yield and nutrient content of lettuce

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In this study, composted tobacco waste (CTW) as an organic residue combined with composted farmyard manure (FM) at different ratios was applied to Typic Xerofluvent soil. Influence of these amendments on the yield and nutrient content of butter head lettuce (*Lactuca sativa* L. var. capitata) were investigated. The experiment was conducted at the Agriculture Faculty's Research Farm of Ege University in Menemen plain, Turkey. The treatments were (1) control, (2) 12.5 t ha^{-1} FM + 37.5 t ha^{-1} CTW, (3) 25 t ha^{-1} FM + 25 t ha^{-1} CTW, (4) 50 t ha^{-1} FM, (5) 50 t ha^{-1} CTW, and (6) 37.5 t ha^{-1} FM + 12.5 t ha^{-1} CTW. The maximum yield was obtained (62,7 t ha^{-1}) in the 100 % CTW application. Lettuce yield decreased in 2nd vegetation period due to negative effect of cold winter season. The highest total yield of lettuce in both vegetation periods (102.7 t ha^{-1}) was determined in 100% CTW application parcels. CTW and FM applications raised N, P, K Ca, Mg, Na, Fe, Zn and Mn contents of the lettuce. According to the results, CTW can be used in agricultural fields just like FM.

Key words: lettuce, manure, nutrients, tobacco waste, yield

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Pore space investigations by morphometric and X-ray microtomography methods

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The pore structure of cylindrical soil monoliths of different genetic soil horizons the clay loam sod-podzolic soils developed on the canopy covering loam at field moisture, at capillary saturation and air-dry conditions was studied on the X-ray microtomography SkyScan-1172 (Bruker, USA).The diameter of the monolith was 3 cm, height was about 4 cm. Scanning was performed with a beam energy of 100 keV and a resolution of 9 microns per pixel. The moistering-draining processes uniquely affect the pore space distributions at different horizons. In horizons AEL and BT1 with moistering the soil mass is "swimming", most rounded and low indented pores are disappeared. When soil dried rounded pores are not reversed, this increases the amount cracked rugged and elongated pores. In the horizon VT2 is more powerful "swimming" and after draining soil pore space does not restore the previous level, even at the expense of fracture. In the horizon BEL processes of swelling-shrinkage less noticeable, which is associated with less clay particle size in granulometric composition and abundance of rounded closed pores, which do not participate in the capillary saturation. The greatest decrease in porosity during shrinkage processes is manifested in horizons with a heavy grain size and high content of fine macropores (horizon BT2).

Key words: soil microstructural, x-ray microtomography, soil swelling and shrinkage

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The effects of applications of different fertigation times on yield and nutrient uptake of muskmelon (*Cucumis melo* l.) plant

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Fertigation is the application of liquid fertilizer through an irrigation system. A major benefit of fertigation is that it provides greater flexibility and control of applied nutrients than conventional broadcast applications. Also, increases efficient use of water and fertilizers, produces higher yields, improves quality of the production and protects environment. The aim of this study was to investigate the effects of different fertilization times (fertilizer with every irrigation, fertilizer with every second irrigation, fertilizer with every third irrigation) on yield and nutrient uptake of muskmelon plant. Based on soil test results, 160 kg ha^{-1} nitrogen (N), 100 kg ha^{-1} phosphorus (P) and 200 kg ha^{-1} potassium (K) were applied. The experiment was carried out under field conditions with three replications at University of Cumhuriyet, Vocational School of Sivas, Department of Crop and Animal Production. In the experiment two muskmelon species was used as Kırkağaç and Yuva and fertigation was compared with conventional irrigation system. Yield of muskmelon, N, P, K, Fe, Zn, Mn and Cu concentraiton of leaves were determined in the experiment. The results shown that, application of fertilizer every irrigation significantly increased plant yield. Also, the application of fertilizer in every irrigation increased P concentration of muskmelon plant compared with other treatments.

Key words: fertigation, muskmelon, nutrient uptake, yield

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Environmental risk assessment of Bt cotton cultivation on soil microbial diversity using community level physiological profiling

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Cotton is one of major cash crops grown in India, having significant value in textile industry. Change in climate, pest and predators are common reasons of loss in crop productivity. Boll worm causes major harm to cotton. As a remedy, transgenic variety of cotton plant was introduced, which significantly reduced the number of boll worms. The microbial community in the agricultural field have its own role towards crop improvement, by their symbiotic association with plants and they are said to be natural fertilizers. Present investigation aims at studying the effect of transgenic Bt cotton on the soil bacterial community. In this regard, community level physiological profiling (CLPP) as one of the important parameters to study the impact of transgenic cotton on soil bacterial community was carried out. Three districts of Northern Karnataka in India have been selected for study. Soil samples were collected at post-harvest stage from Bt and Non Bt cotton cultivating fields. The collected samples were serially diluted and 10^{-6} dilution was inoculated by one of the pure culture technique, spread plate method. The culture was then incubated for about one week to get bacterial colonies. After incubation, the number of colonies were counted and tabulated. Cultures were maintained in triplicate to study the significance of the results by way of statistical analysis. Two way ANOVA for analysing statistical parameters was performed with the help of SPSS software. The results obtained preferably shows, decreased number of bacterial colonies in Bt cotton cultivated soil sample than non-Bt cotton cultivated ones. Hence, we can conclude that there is an unfavourable impact found in transgenic Bt cotton cultivated soil with respect to soil bacterial community by the *trans* gene.

Key words: transgenic cotton, soil microbes, impact assessment, CLPP, trans gene, post-harvest

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The effect of foliar usage of selenium for spring barley

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In this study, the question of environmentally safety of sodium selenite foliar application in cereals was investigated. The main aim was to evaluate the effect of two concentrations of sodium selenite (0.01 and 0.05% Se) on yield and the quality of spring barley Raushan (*Hordeum vulgare* L.) on two soddy-podzolic soils differing in the level of the major elements of mineral nutrition (0.1 g/kg and 0.2 g/kg active substance of NPK). During three summer seasons green house pot and field experiments the uptake of selenite in different barley organs, concentration and removal of nutrients (N, P, K) was studied. The special role was payed to concentration of selenium in grain, because it is necessary to control the maximum permissible level (MPL) of this element in food production. The treatment of 0.01% Se increased the selenium concentration in grain up to 530 mg/kg, and 0.05% Se up to 730 mg/kg (field experiment). This amount does not exceed MPL for cereals (MPL – 800 mg/kg). The concentration of 0.05% Se caused increase of the grain biomass quantity and quality of yield (mass of 1000 grains and the content of protein nitrogen). This concentration could be recommended for the usage in agriculture with the aim to improve the grain quality and for plant products fortification with selenium.

Key words: sodium selenite, foliar treatment, *Hordeum vulgare* L., ecological safety, selenium, MPL, NPK uptake

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Impact of the anthropogenic deposits on properties of the urban soils

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The frequent occurring deposits on the soils surface or in their mass are communal wastes. These, generally, adversely alter the properties of the soil, but also provide a plurality of components, some of which can be used by micro and macro organisms. Unfortunately, among municipal waste, the significant part are glass and plastic, with a low susceptibility to degradation. Their presence was noted in 29.5% of the analysed topsoil samples. In most of the analysed cases the presence of the communal waste in urban soils distinguish herself in the form of increased salinity – 0.2-1.0 $mS \cdot cm^{-1}$. The result of the deposition of glass, plastic, pottery and other skeletal elements are also low soil bulk density - 0,48-0,74 $g \cdot cm^{-3}$ in the humus horizon and 1,40-1,58 $g \cdot cm^{-3}$ in the mineral horizons.

The construction wastes deposition effects in most far-reaching changes in soil properties. This is due to their high reactivity due to the presence of lime and large size of individual parts (increasing the content of the soil skeleton). Salinity is strongly dependent on the soil horizon – the topsoil is generally poorly saline (0.2-0.4 $mS \cdot cm^{-1}$), the horizons lower located in the soil profile much more (up to 2.5 $mS \cdot cm^{-1}$). Soils with a high content of rubble are alkaline (pH 7.32-8.22), and rare neutral (pH 6.64-7.28). Sorption complex of these soils is almost completely saturated with calcium ions (> 95%).

Overall, the topsoil in the area of Zielona Góra was contaminated with anthropogenic deposits in 51% of the analysed cases, while the soil horizons occurring lower in the profile in 61%. In the topsoil, the waste deposit seldom was higher than 3% of the soil by weight, while in the lower-lying horizons reached 100%.

Key words: anthropogenic additives, urban soils, anthropogenic soils

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Construction debris as the anthropogenic bedrock of Technosols

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The construction rubble is one of the most frequently occurring waste in the soils of urban, industrial, and communication areas. Classification effect of this is to highlight Technosols between the different anthropogenic soils (WRB 2007). The presence of rubble in soil results from both the faulty waste management as intentional use as drainage and levelling layers. Construction debris is also an inherent matter arising in the course of demolition and renovation works, associated with the depletion of previously used buildings and structures, planning changes within the city, and sometimes natural disasters and war operations.

During the investigation within the city of Zielona Gora (Poland), the different rubble materials were tested, the raw ones and long-term deposited in soils. There were established the basic properties of rubble and soil lying under rubble deposit or containing debris additives.

It was found a large variability of rubble properties, expressed in pH-H_2O 7.5-11.8, EC 0.63-4.49 $mS \cdot cm^{-1}$, $CaCO_3$ content 2.2-4.0%. This is mainly connected with the presence of mortar and plaster fragments, as well as fine parts of the cement and lime construction elements. It was obtained the image of a small load of heavy metals in the rubble in the potential bioavailable form: $Cd_{0,1M\ HCl}$ 0.12-0.18 $mg \cdot kg^{-1}$, $Cu_{0,1M\ HCl}$ 1.0-56.7 $mg \cdot kg^{-1}$, $Ni_{0,1M\ HCl}$ 1.3-17.8 $mg \cdot kg^{-1}$, $Pb_{0,1M\ HCl}$ 1.7-21.5 $mg \cdot kg^{-1}$, $Zn_{0,1M\ HCl}$ 2.4-125 $mg \cdot kg^{-1}$. This is an important element of reflection on the environmental importance of rubble admixtures to soil of the urban areas. The characteristic volatility of rubble reaction is connected not only with the properties of the construction material, but also the amount and type of construction adhesive present in the rubble. This is reflected in the results of the calcium carbonate content in the analysed Technosols (0.8-3.8%).

Key words: construction rubble, urban soils, Technosols

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Changes of certain properties of chernozems in Northern Kazakhstan under the influence of long-term tillage

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The article presents the results of long-term soil-geographical and stationary researches, factors of formation of chernozems and regularities of their geographical distribution in Northern Kazakhstan. The evaluation of the impact of long-term tillage on morphological, agro physical indicators of soil fertility has been conducted.

Key words: Chernozem, subzones, genetic horizons, soil physics, humus

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The influence of gleyzation on the chemical composition of the lysimetric water and the physicochemical properties of the parent rocks under stagnant-percolative and stagnant water regimes (model experiment)

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Three heavy-textured soil-forming rocks (river alluvium, loess-like clays, and lacustrine–alluvial carbonate deposits) were used to investigate influence of gleyzation on some lysimetric water chemical properties and changes of physicochemical characteristic of the soil-forming rocks under model experiment conditions. Gley formation developed under stagnant and stagnant-percolative water regimes over 2.5 years. 1% liquid sucrose was used to initiate gley formation progress. Under the stagnant–percolative water regime, the gleying caused acidification of the waters (by 3–4 pH units) and intense removal of iron; a drastic decrease of the base saturation and an increase in the hydrolytic (total) acidity of the soil-forming rocks; remarkable increase in content of mobile aluminum. The highest total removal of iron was found from the river alluvium followed by that from the loess-like clay and saline lacustrine alluvium. In the closing stage of experiment, the most pervasive changes were observed in carbonate-free parent rocks (river alluvium and loess-like clays). The experimental samples of carbonate-free parent rocks acquired distinct features of eluvial-illuvial differentiation. The remarkable changes of physicochemical characteristic of lacustrine–alluvial carbonate deposits progressed only in its top layer. In this case sulfate reduction process developed simultaneously with gleying. Under stagnant water regime the changes in physicochemical characteristics of the soil-forming rocks were less significant or absent.

Key words: acidification, anaerobiosis, drainage, gleying, iron removal

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Investigation of heat conductivity equation in soil using similarity theory

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Theoretical determination of heat transfer is related with heating area and heat properties (heat gradient, heat conductivity, heat diffusion) influencing heating area. In this research, solution of one dimensional heat conductivity equation was investigated and application of mathematical model to predict soil temperature was shown. The solution was supported with a numerical example using error, complementary error functions (erf and erfc) and Fourier number.

Key words: soil temperature, heat conductivity equation, similarity theory

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Trichoderma species determined in Turkey's Soils

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Microorganisms are the most important components of the soil. These microorganisms may be bacteria, actinomycetes, fungi, algae and protozoa. Fungal species belonging to the genus *Trichoderma* are predominant components of the soil mycota in various soils such as agriculture, forest, prairie, salt marsh and desert soils in all climatic zones. *Trichoderma* is a genus which includes species of free-living soil fungi, opportunistic, avirulent plant symbionts, asymptomatic endophytes, and parasites of other fungi. For a long time, *Trichoderma* species have been known as biological agents for the control of plant pathogenic fungi. Similar to soil pathogens, they successfully suppress leaf pathogens as well. Several modes of action have been proposed to play roles in biocontrol capabilities, including antibiosis by the production of antifungal metabolites, competition for space and nutrients, plant growth promotion, induction of the defense responses in plants and mycoparasitism. *Trichoderma* species quickly colonise the substrate of soils, especially after chemical or heat sterilisation treatments. This microorganism is now registered as a biofungicide in many countries. In this review, the *Trichoderma* species determined in Turkey's soils until now are summarized. According to the relevant literature, 16 *Trichoderma* species are reported in Turkey's soils.

Key words: microflora, soil, *Trichoderma*, Turkey

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Determination of microbial biomass C and organic C contents in different sizes of natural soil aggregates

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Carbon stabilization in soil is known to depend in part on its distribution in structural aggregates, and upon soil miroorganisms and their activity within the aggregates. However, the effect of different soil types on continued soil C storage within aggregates of different size classes is unknown. In this study, we applied a dry-sieving technique to separate bulk soil into eight fractions (< 0.250 mm microaggregate, 0.250-0.425 mm, 0.425-1.00 mm, 1.00-1.40 mm, 1.40-2.00 mm, 2.00-4.75 mm, 4.75-6.30 mm, > 6.30 mm), and measured microbial biomass C and total organic C analyses. Soils in the study area (Kuşkonagı Basin in Samsun, Turkey) were classified as *TypicHaploxerept, TypicCalcixerept, LithicXertorthent, VerticXerofluvent, TypicCalcixerert* and *ChromicHaploxerert.* It was determined that microbial biomass C and organic C contents of natural soil aggregates taken from the surface soils were 1.0-7.9 µg CO_2-C g-1.24 h dry soils and 0.2-1.9% respectively. Also, although macroaggregates contained organic C in more levels, ratio of microbial biomass C in the organic C was determined as decreased. Microbial biomass C at <0.250 µm diameters of microaggregates and 250-425 µm diameters of macroaggregates was generally found at higher levels.

Key words: microbial biomass, macroaggregate, microaggregate, organic carbon

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Agroecological practices that prevent degradation of the landscape and promote the restoration of tropical soils

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A common denominator that affects the various production areas is a dramatic loss of fertility and thus, the natural productive capacity of soils through a sustained process of erosion. In this sense, the agricultural crisis, understood as the crisis of peasant families, is directly related to a progressive deterioration of natural resources. The problem of impoverishment of tropical soils in Colombia is largely due to improper production practices, such as monoculture, chemical fertilizers, pesticides, intensive farming, transgenic seeds, among others. Agroecology is a science that allows the conversion of conventional production systems to more diversified and self-sufficient systems. The aim of the work focused on comparing soil samples from rural productions ranging in time with the application of agricultural practices. Preliminary results are observed as the organic productions where fertilizers, crop rotation and diversification, soil chemical parameters were significantly better apply and beneficial microbial diversity, reflecting a more structured and fertile soil. Processes for reclamation promote the incorporation of agroecological practices, it requires participatory methodologies and continuous support to the farming communities.

Key words: environment, peasant production, microbial diversity

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Phytoremediation of Pb and Cd contaminated soils by *Brassica napus* L.

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Phytoremediation is the direct use of green plants and based on cleanup of contamine soil sites with different contaminant. This study, the effects of ethylene diamine tetraacetic acid (EDTA) and canola on soil properties and metal accumulation were investigated in soils contaminated with Pb and Cd. Canola (Brassica napus L.) plant for cleaning polluted soil were used to determine the capacity of phytoremediation. Results showed that significantly decreased seed, shoot, root and total dry matter yield of application EDTA on contamine sites with Pb and Cd when compared to with control groups. Total yield decreased respectively ratios 30%, 43%, 51%; 27%, 24%, 47% for Pb and Cd. İn addition to translocation (TF) and bioconcentration (BCF) factors were determined. Maximum value of TF and PP for Pb and Cd application sites were found 12 mmol kg^{-1} EDTA treated soils when compared with control plants. Consequently, this study suggests that canola plant and EDTA applications agent can effectively be removal of this heavy metals from contaminated soils with Pb and Cd

Key words: cadmium, canola, EDTA, lead, phytoremediation

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Estimation of soil buffering to heavy metals in the impact zone of Pervouralsky-Revdinsky industrial hub, Sverdlovsk region, Russia

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The historical development in the Urals of siderurgy and non-ferrous metallurgy factories with old technologies leads to significant environment pollution with gas and dust emissions.

As result, the formation of local technogenic geochemical anomalies around metallurgical factories, which are characterized by high heavy metals (HM) content in soils, and adverse sanitary and environmental situation. The study area is confined to the impact zones of two major factories of Pervouralsky-Revdinsky industrial hub-SUMZ and «Chrompik». The content of major heavy metals (Cu, Zn, Pb, Cr, Cd, As, Ni), physico-chemical characteristics were determined in surface soil samples. Ecological risk was assessed using Zc index and soil buffering to heavy metals. The buffer capacity of soil in this study based on HM inactivating effect of humus, physical clay, sesquioxides, pH. The greater HM contents were in soils around the SUMZ plant, within 1.5 kilometers, the pollutants degree was assessed as extremely threatening, index Zc ranged from 263 to 545. Main pollutants were copper, chromium, lead, arsenic. Soil pollution around the «Chrompick» was lower (extremely threatening contaminated soils are found only within 0.5 kilometers zone). The contamination level characterized as moderately threatening, index Zc ranged from 23 to 30. Main pollutant is chromium. Studied soils were belonged to the group with high buffering. The proportion separate defining factors of this buffering varied and decreased in the following sequence: particle size distribution (30-60%), pH (5-50%), sesquioxides (15-25%), humus (10-20%).

Key words: buffering of soil, degraded soils, heavy metals, pollution assessment

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Changes in physical properties of chernozem under the influence of steppe woodlands

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Influence of forest vegetation on the properties of typical chernozem in the steppe zone is carried out comprehensively. Under the canopy of trees formed a special hydrothermal conditions, because of which there are significant and mainly positive transformation. We observed elimination overcrowded sites and a reduction of general density of horizons, improved soil structure and water-stability of aggregates.

Key words: soil physics, chernozems, forest shelterbelts, complicated soil cover, water resistance, the coefficient of permeability (CP)

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Effect of different amendments on the behavior of the culture of faba beans in a saline soil in Algeria

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In North Africa, the culture of the faba bean is a dietary source of primary importance. In Algeria, it is grown on the coastal plains and subtidal areas. With a cultivated area of about 37668 ha and a production of approximately 42386 tonnes per year, it ranks first among legumes. But this culture is facing many constraints that affect both the performance. These constraints are related to changes in the environment of the plant, the development of disease and salinity (soil and irrigation water). The region of Hmadna in Algeria is known for its saline soils, in our experiment we studied the behavior of a variety of faba bean in highly saline soils amended with 3 different types of amendments, the first treatment includes gypsum mixture, and humic acid manure, 2nd treatment contains gypsum and manure, and the 3rd treatment contains mineral fertilizer NPK. The results showed highly significant differences in yield among amendments with 510.3 grs / m², 406.64 gr / m² and 284.4 gr / m² for treatment 1, 2 and 3 respectively.

Key words: Algeria, faba bean, Hmadna, salinity, yield

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Genetic-ecological features of the soils of Turkestan ridge and their biological activity

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Soils of studied territory that under the influence of erosion differ on activity of development of various physiological groups of microorganisms. In these soils the soil forming process proceeds, mainly, in an aerobic condition, thus leading place belongs to ammonifiers, actinomycetes and mushrooms. In ceonosis the nitrifiers, butyric acid bacterium and cellulose-decomposing microorganisms have poorly presented. The nitrate fixing and denitrifier bacteria have an intermediate position.

Specificity of soil-ecological conditions of studied territory, presence of well expressed vertically-zone changing of the soil cover have caused different microbiological activity of soils. Number of the studied groups of microorganisms naturally increases in a genetic number of soils from typical grey soils to dark, mountain-brown carbonate and reaches a maximum in mountain-brown typical and mountain-brown weak lixiviated soils.

On value of soils biological activity of northwest spurs of the Turkestan ridge can arrange them in the following decreasing order: mountain-brown weak lixiviated soils > mountain-brown typical soils > mountain-brown carbonate soils > dark grey soil > typical grey soil. On the change of soil biological activity, it is possible to judge on a change of their fertility level.

Key words: genesis, vertical zone, exposition, biological activity

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Rationale for environmental assessment of the quality and rationing of eroded soils based on the profiles of soil properties

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The environmental assessment of soils prone to erosion includes generalization of individual assessments of 1) the intensity of water erosion of soil, 2) the intensity of wind erosion, and 3) the actual extent of the soil profile loss or gain due to erosion. All of them are generalized according to the rules of probability summation. The ecological state of the soil that lost the upper layer *x* can be assessed with the function of the form $p = g \exp(-A / (R(x))$, provided that A and *g* coefficients and the R(*x*) function are known in advance. The R(*x*) relates the amount of soil loss to the thickness of the lost layer. The latter was determined based on the comparative study of profiles of both the eroded and the non eroded soils. The maximum value of the correlation momentum between the centered function profile data for the non eroded soil and the experimental profile data was used as the similarity criterion of the of compared profiles of the reference and the eroded soils.

The function $R(x) = a\, x^{-b} \exp(-k/x)$ was deduced in which: *a* - is the scale factor, *b* - the coefficient of the R(*x*) decay rate, *k* - is the coefficient of the R(*x*) growth rate. This formula was proved to be adequate to the experimental vertical profiles of soil properties for some virgin and arable chernozems, gray forest soils, chestnut soils and meadow steppe and forest soils of the Russian Plane.

Key words: soil erosion, soil assessment

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Land degradation in the Novosibirsk region of Russia

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Land degradation leads to the loss of land productivity, thus to lower yields and to the decrease in the value of ecosystem services. Our study examines land degradation in the Novosibirsk region. Novosibirsk region is located in the south-east of the West Siberian Plain in the steppe, forest-steppe and taiga zones. The vegetation consists of forests, swamps and meadows. The most widespread are dark gray forest soils (Greyic Phaeozems) formed in carbonate loess-like loam. Moderately eroded soils occupy the major part of the total area of the degraded soils as shown at the map of soil degradation. The proportion of agricultural lands is 48%; however the Novosibirsk region accounts for a quarter of the total area of agricultural land in Western Siberia. General economic situation in Novosibirsk region is worse than in the surrounding areas. The objectives of this study were to identify and assess the type and extent of land degradation of the Novosibirsk region by analyzing soil maps, images, involving agrochemical indicators and economic models. We also planned to calculate the economic impact of land degradation in the region. The preliminary results showed that the land degradation had a serious impact on soil productivity and economics of agriculture.

Key words: food security, LADA, ecosystem management, ecosystem services

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Physical properties of soil – the most important part of agrophysics

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Agrophysics - the science that studies the system "soil-plant-atmosphere". In this system, the soil is the most important link, and physical soil properties determine the characteristics and functioning of this biosphere system.Many soil properties change under the conditions imposed by intensive farming, notably under the impact of mechanical compaction. The creation of a compacted soil layer at the plough sole affects the soil water regime and soil aeration. This is accompanied by changes in the soil biota and, often, in the character of transformation of soil organic matter. Soil physical properties are very conservative, many of them changing only slightly over time, but they vary significantly in space - a difficult problem for soil physical investigations in long-term field experiments. The fundamental physical properties of sod-podzolic soil (albeluvisol) under a long-term field experiment have not changed significantly under the influence of a century of liming and chemical and organic fertilization. However, significant changes of *approximation parameters* of penetration resistance depending on soil moisture content indicate that the application of manure increased inter-particle contacts within the studied moisture range. These approximation parameters indicate a significant increase in inter-particle forces with a decrease in moisture content in the control and lime treatments compared with the others ones that resulted from the sand fractions increasing in granulometric composition of control treatment soils and aggregation of particles due to the influence of lime (lime treatment).

Key words*:* soil physical properties, long-term field experiment, penetration resistance.

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Influence of the contribution of organic matter on aggregate stability and soil fertility through conservation agriculture in the plain of Annaba

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This work aims to study the effect of the contribution of organic matter on soil under a conventional system and other soil is not amended under direct seeding system to highlight the role played by the addition of organic matter in preserving the soil structure. We considered two stations, one is led to the conventional system with the addition of organic matter (station A), and the other direct seeding without addition of organic matter (station B). Nine samples from station A and eight samples station B. The test of structural stability of Le Bissonnais has been used in this study. The results show that the organic matter content is very high in samples from station A relatively to station B. The structur of the two stations is moderately stable to very stable. The results also show that the rate of organic matter is not the only condition for the stability; there are other factors such as (tillage, climate hazard ....) which can also influence this physical property of the soil.

Key words: structural stability, organic matter, conservation agriculture, Annaba

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Effect of organic matter on TDR calibration and measurements of soil moisture content

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In this study, effects of organic matter content on time domain reflectometer (TDR) calibration and errors in volumetric water content measurements were investigated. In a field study, 0, 3, 6 and 9 % of compost applications into 0-20 cm depth of sandy clay loam soil increased soil organic matter content (SOM) from 1.09% to 6.29% and decreased bulk density (BD) from 1.02 g/cm^3 to 0.589 g/cm^3. While the volumetric water contents (θ) in the field measured gravimetrically changed between 18.30% and 36.50%, TDR measurements (θ_{TDR}) changed between 38.00% and 72.00%. SOM content gave significant negative correlations with BD (-0.703**), θ (-0.748**) and θ_{TDR} (-0.580**) values. TDR measurements (θ_{TDR}) had significant positive correlations with BD (0.617**) and (0.596**) relative saturation (RS) values. According to the path analyses, the direct effects of soil properties on TDR readings were ordered as follows; BD (61.78%) > SOM (42.20%) > θ (23.34%) > gravimetric soil moisture content (W) (8.34%). The highest indirect effect values of SOM, θ and W on TDR readings were determined via BD. To calibrate the TDR measurements (θ_{TDR}), second order pedotransfer (multiple regression) equation was obtained using θ and BD values. θ values measured gravimetrically showed a higher correlation with estimated volumetric water contents (θ_E) using the pedotransfer function (0.842**) than θ_{TDR} (0.598**) values. Root mean square error (RMSE) (0.244) and relative error (88.06%) between θ and θ_{TDR} were higher than RMSE (0.023) and relative error (8.81%) between θ and θ_E. values. θ_E estimated using TDR measurements in the second order pedotransfer equations decreased errors in soil moisture measurements including different organic matter contents and gave the more realistic results with θ values.

Key words: TDR, pedotransfer equations, calibration, organic matter, volumetric water content

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Composting potential of paper mill waste with town waste

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In this study, composting potential of paper mill waste (PMW) with town waste (TW) was investigated, some physical and chemical properties of the end compost product were determined. Crude materials having less than 4 mm size were mixed with a rate of 2:1 (PMW:TW) and composted at the 60% moisture level of total water holding capacity for 65 days under greenhouse conditions. PMW having a higher C:N (85.84) ratio was composted with TW having lower C:N ratio (22.16). To decrease the C:N ratio of PMW, 1.8% of urea having 46% N was also mixed with the composting materials. The filtration of fresh forest soil and manure was added into the compos to initiate and increase the microbial digestion of raw materials. In the end compost product, C:N ratio reduced to 34.73 with decreasing OC to23.6% and increasing N to 0.68%. While the contents of ash, P, K, Fe, Cu and Zn in the end compost product increased according to that in PMW, the contents of organic matter, Ca, Mg, Na and Mn in the end compost product decreased. Also, pH and EC values of the compost product in the 1:10 (w:v) ratio increased. Water holding capacity in the compost product increased from 225% of initial value to 311.0%.

Key words: Paper mill waste, town waste, composting, physical and chemical properties

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The effect of ophiolitic bedrock on chemical composition of soils: A case study in east mediterranean region in Turkey

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The chemical features of soil derived from different ophiolitic rocks in Kahramanmaras, Turkey, invastigated and compared litologicallly and geochemically each other. The study area covers the Göksun - Berit ophiolite and metaophiolite, and unmetamorphosed ophiolitic rocks from the northern to the southern part of Kahramanmaraş, respectively. The Göksun-Berit ophiolite is characterized by an intact ophiolitic sequence, in ascending order, ultramafic-mafic cumulates, isotropic gabbros, sheeted dike complex, plagiogranite and island-arcvolcanics and the metaophiolite is represented by amphibolite, meta gabbro and amphiboles chist, whereas the unmetamorphosed part is characterized by dunite, harzburgite, wherlite and serpentinite. Although the ophiolitic rocks are litologically hetergemous, the soils have simalar morphologhies. However their chemical characteristic of soils differ considerably, with a pH range and exchangeble base status. In view of morphological similarities, chemical critaria are needed to separate the pedogenically different groups of ophiolitic soils. Exchangble Mg/CEC is the best simple critarion.

Key words: bedrock chemistry, Kahramanmaraş, ophiolite, soil

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Soil Quality of Lands converted to Pistachio and Vineyard Plantations in Mediterranean Region

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Lands with native vegetation in karstic areas of Mediterranean Region have been converted to agricultural uses, particularly for the last 50 to 60 years. The purpose of this study was to investigate the effects of land use change on soil quality. Some of physical and chemical characteristics of 147 surface (0-15 cm) soil samples collected from lands with native vegetation and adjacent lands converted to agricultural uses were determined. Soil characteristics which are sensitive to management practice change such as soil organic carbon (SOC), aggregate stability, pH, available phosphorus and potassium were accepted as indicators of soil quality. Soil quality was determined using the framework and the scoring curves developed under the Soil Management Assessment Framework, SMAF. The data were separated based on land use types, and the quality indicators and quality scores were discussed according on these factors. The lowest score among soil quality indicators is 0.78 for potassium concentration and the highest score is 0.97 for aggregate stability. Soil quality of soils in study area ranges from 59.4% to- 99.5%. Soils function approximately 90 % of their full capabilities. The highest quality score is 91.2 % in the lands under native vegetation and field crop production and the lowest quality score is in vineyards and pistachio orchards. The results revealed that management practices along with soil tillage in sloping pistachio and vineyard lands have significantly resulted in reduction of functioning capacity of soils.

Key words: mediterranean region, conversion of native vegetation, soil quality, SMAF

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Evaluation of Van Genuchten model parameters for two land-use types

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The knowledge of land-use effect on soil water properties is important for efficient soil and water management. In this work, the use of the van Genuchten equation to estimate soil water content (ϑ_h) was assessed. The comparison of the parameters of this equation (water release parameters (α and n) and residual water content (ϑ_r)) obtained in cultivated and rangelands was also evaluated. In this study, α, n, and ϑ_r values were not significantly different between the two land-use types. Model simulations using the van Genuchten model strongly corresponded with laboratory measurements. The fit of the van Genuchten model to water retention data resulted in a low sum of squared errors and high coefficient determination values.

Key words: land-use, soil hydraulic properties, Van Genuchten equation

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To display soil texture triangle and soil particle size distribution using MATLAB

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Soil texture is one of the most important soil characteristics in crop production and soil and water management. The textural class of a soil is determined by the proportion of the three primary soil particles including sand, silt and clay. Soil water movement, soil water retention capacity, soil erodibility and aeration are influenced by soil texture. A soil texture triangle is usually used to determine the soil texture class. Despite reading the texture triangle is simple, to automate the soil texture reading is justified especially when a large number of soil samples exists for soil particle size analyses. This paper is presented to introduce a program in MATLAB that can look up a soil texture. In this paper, a computer program has presented to automate the task of looking up the soil texture classes. The programming was done using MATLAB^{TM} (The MathWorks Inc., USA). First step to solve the problem is to design a function which receives apex coordinates of an n-angular convex and determines whether a point with (x,y) coordinates is located inside the polygon or outside. Each apex position of this polygon is clearly identified. Definitely, given an arbitrary point coordinates will determine whether the point is placed inside the polygon or not. Therefore, if we have the considered soil's coordinates, we can determine soil type using the algorithm expressed in first step.

Key words: MATLAB, soil texture triangle, programming

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A review of solute transport models and hydrodynamic dispersivity

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The knowledge of solute transport process in the porous media has an important role for addressing chemical pollution, loss of nutrients, groundwater contaminating rate and drainage water quality. There are several mathematical models applied to predict solute transport in soil. Among these models, convection dispersive equation (CDE) has been widely used to estimate solute transport. The solute transport models, convective - dispersive Equation (CDE) and convective lognormal transfer (CLT) are fitted to experimental breakthrough curves (BTC's) and solute transport parameters are estimated. The CLT model (Jury and Scotter, 1994) can be employed for different solute concentrations and boundary and initial conditions. The soil physical properties as well the condition of experiment critically affect the appropriate model that can characterize the BTCs. In CLT model, it is assumed that the travel time variance of solute transport increases as quadratic with distance, whereas in CDE models, this increase is linearly. Therefore, the change rates of travel time variance of solute transport with distance determines that if the flow type is CDE or SC (Jury and Roth, 1990). The solute transport studies have shown that CDE model is well adapted for the solute transport in small scale laboratory columns and in contrast, the transport in lysimeter scale (Vanderborght et al., 1997) and the field scale (Jury and Flühler, 1992) is better modeled with the CLT model, especially where the distances from the soil surface becomes larger (Jury et al., 1982).

Key words: solute transport, breakthrough curve (BTC), convection dispersion model (CDE), convective lognormal transfer (CLT)

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Effects of deforestation on some indicators of soil quality in east of Khuzestan Province, Iran

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Deforestation and the conversion of natural forests (NF) into croplands create a lot of environmental issues such as greenhouse gas emissions and lowering soil quality. In order to investigate the effects of deforestation on some indicators of soil quality, soil sampling was conducted in NF and those which converted to arable lands (F to A) in Baloutboland area, Khuzestan Province. Soil samples with eight replicates were taken in two depths (0- 15 and 15-30 cm) in December 2014 and total organic carbon (TOC), basal respiration rate (BSR), microbial biomass carbon (MBC) and microbial quotient (MQ) were determined in the samples. The results showed that the TOC, MBC and BSR contents of the soils had the highest values (25.6 g kg^{-1}, 933.25, and 422.6 mg kg^{-1}, respectively) in 0-15 cm layer in NF land use. Besides, conversion of NF to arable lands decreased the TOC, MBC, and BSR values in both depths. However, MQ values decreased only in the upper layers (0-15 cm) of the croplands. The results of this study suggest that MBC parameter with about 62.7% decrease (when NF was compared with F to A) could be considered as the most sensitive indicator of soil quality in Baloutboland area, Khuzestan Province.

Key words: baloutboland, deforestation, sensitive, Zagros forests

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The effect of the salinity and sodicity levels of the soils on the some soil microbiological parameters

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This study was carried out to determine of effect of the salinity and sodicity levels of the soil caused by irrigation water on the some soil microbiological parameters (soil respiration (SR), microbial biomass C (MBC) and dehydrogenase enzyme activity (DHA)) at the agricultural soils of Suluova, Amasya city which has been carried out intensive agricultural activites solely using the same irrigation dam as a source of irrigation water. For this purpose, 130 thousand km^2 irrigable land of this area splitted into 4 km^2 grid squares and totally 45 soil and water samples, representing the status of the land, collected from each grid. The soil texture of almost the whole samples classified as clayey. As pH values were alkaline (8,07 – 8,86), EC values were non saline (0,001 – 0,005), %$CaCO_3$ values were very calcareous (8 – 50%) and %Na, SAR values were minute amount determined as according to the results of the soil analyses. According to the analysis results, this study shows that the salinity and sodicity levels and other soil properties of the soil samples are not relate to the some soil microbiological parameters such as SR, MBC and DHA (R^2 <1). Because the general soil characteristics and salinity and sodium values are very similar despite the large surface area of the workspace did not lead to important differences among the microbiological properties of the soils. However, soil properties of this area is determined and the lowest microbiological values were determined in the soil 4 that the lowest of soil properties.

Key words: salinity, sodicity, soil respiration, microbial biomass C, dehydrogenase activity

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Influence of new technology of development of saline soils (NTDS-2) on soil microflora in rice fields

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The use of "NTDS-2" is designed primarily for heavily saline soils. Many researchers have done research on the impact of water-soluble salts on living organisms, including microflora. It has been found that not high content of salts in soil within 0.1-0.3% (on dry residue), stimulates the development of micro-organisms, high - 0.3-1.0% - had significant stress, and high - more than 1%, suppressed their livability.In this regard, the aim of research is to explore the effect of "NTDS-2 on microflora of soil in rice fields.The object of research are soils in Akdala irrigation area in Balkhash district of Almaty region.We have determined that planting rice using the "New Technology of development of saline soils (NTDS-2)" stimulates plant growth and has a positive impact on biological intensity of takyr type soils with various degrees of salinity. In planting rice by using "NTDS-2" the respiration of takyr soils increases. Emission of CO_2 as the end product of microbial metabolism is closely linked to the plant development and in soils without rice it is in less amount. The initial takyr soils, from ammonificators prevail microorganisms growing on KAA medium, and in the period of flooding using "NTDS- 2" - on MPA medium.In flooding soils for rice growing using "NTDS-2", high number of aerobic and anaerobic nitrogen-fixers has been observed and nitrogen-fixing activeness increased.Tested takyr soils in the initial state have a low quantity of denitrifying bacteria. Flooding of soils in growing rice using "NTDS 2" stimulates their development.Photosynthetic bacteria have been outlined from heavy and medium saline takyr soils. In growing rice using "NTDS 2" they develop during the flooding period in soils with different salinity rate.Initial takyr soils have low quantity of sulfatredusing microorganisms. In sowing rice using "NTDS-2" their number increased, particularly in slightly saline, but did not reach the values that destroy germs.

Key words: rice soils, microflora, salinity

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Impact of microorganisms from garbage soil on degradation of polyethylene

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Polyethylene (PE) has wide range of applications. They are creating environmental problems due to their recalcitrant nature. Its degradation can be achieved by using microorganisms from soil. In present study attempt is made to analyse degradation of PE by composting and submerged cultivation method. Soil samples from waste dumping sites of Bawda (S1) and Jayanti (S2) from Kolhapur city were collected for screening of PE degrading micro-organisms. PE sheets were inoculated in fermentation broth containing 1g of soil from each site and were incubated on a rotary shaker at room temperature, 110 rpm for 45 days. It was observed that the optical density increases continuously with increase in time of incubation. This confirms the growth of soil micro-organisms capable to grow in presence of polyethylene. Also the feasibility of a fungus, *Aspergillus niger* for active degradation of PE was also examined by composting method for one year. S2 showed weight and thickness loss of PE by 2.32% & 0.68% respectively. I.R. Spectroscopy has confirmed the weakening and breaking of existing bonds and also the formation of new functional group C=O.

Key words: soil, polyethylene, degradation, *Aspergillus niger*

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Bıologıcal characterıstıcs of kıwıfruıt orchard soıls ın Ordu, Turkey

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In this study, biological characteristics and their relationships with soil physico-chemical properties and nutrient contents were investigated in kiwifruit orchards which were in Ordu, Turkey. The 24 soil samples were collected from kiwifruit orchards. As a result, soil physico-chemical properties and nutrient contents showed significant correlation with soil biological characteristics such as dehydrogenase activity, CO_2-production, and microbial biomass.

Key words: kiwifruit orchard soils, soil enzyme activity, microbial biomass, soil respiration

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Spatial structure of metagenome of soil microbiomes**

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The most spectacular discoveries of the last decade was the finding of high density of genetic diversity of soil microbiome, which makes the soil a real living matter. The advent of sequencing technology allowed to study not only the diversity of microorganisms in the community, but also the genetic composition of the extracellular DNA, which makes up a significant part of the total DNA and has important ecological value. Polydispersity, various mineralogical structure of textural fractions and the existence of humic substances create conditions for the long storage of extracellular microbial DNA in soil. So, similarly to a pool of enzymes, a peculiar pool of DNA capable to transform of bacterial cells is created.

The simultaneous presence of many ecological niches, which differ greatly from each other in conditions, makes the soil a complex object for microbiological analysis. High-throughput metagenomic tools allow studying these microstructural differences in microbial community and enhancing the ideas, developed by classical microbiology and associated with the active participation of microbiota in the soil-forming process. In particular, data on communication of specific features of a soil microbiome with "vertical stratification" of a soil profile and with aggregate structure in different land use conditions are obtained.

The metagenomic approach to studying of soil microbiomes is a qualitatively new tool which allows not only to consider all variety of structural components of a soil biome, but also gives prerequisites to understanding of functioning of this system.

Key words: high-throughput pyrosequencing, 16 S rRNA, soil microbial community

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Comporative analysis of the microbiological soils in the drysteppe zone

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The comparative analysis of the soils microbiological indices in the dry steppe zone revealed some quantitative and qualitative differences between them.It was established that a total quantity of microorganisms in the grey-brown soils natural cenoz forms 5214 thousend/q of soil. The soils which increase in the cultivated soil of the cereals agrocenoz till 6823 th/q of soil. In a grouping content the microbiots of the grey-brown soils bacteria form 64,3 % actinomycets-35,6 % microscopic fungus-0,10 %. On cereals agrocenoze a share of the saprophyte bacteria rises till 67,1 % under a relative decrease of actinomycets and bacillus. The soil controls of virgin cenoz in the meadow-serozem soils are saturated with bacteria-65,6 %, actinomycets-32,5 % and microscopic fungus-1,9 %. On the Lucerne agrocenoz at the expense of organic residues rich in protein substances in a grouping content bacteria prevail over-72,3 %, a number of actinomycest significantly reduces-26,2 %, and the fungus quantity remains approximately on a previous level-1,5 %. In the soil of sorghum agrocenoz the non-sporeforming bacteria prevail over-75,7 %, but a quantity of actinomycets and fungus forms accordingly 24,0 % and 0,3 %. These indices on Lucerne agrocenoz rize till 77,3 %; 22,1 % and 0,6 %.

Key words: bacteria, actinomycetes, microscopical fungus

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Contribution studies of soil carbone dynamics , El- Kala Wetland, north east of Algeria "Ain Khiar Peatland"

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Ain Khiar Peatland is a part of El Kala Wetland, with an estimated area of 170 ha. The haracterization of alder organic sedimenst of through morphological description in eastern peatland revealed the existence of a large peat accumulation characterized by a high fiber rate and water. For defining an alternation of organic and inorganic backgrounds.

The evaluation of organic matter and organic carbon rates of alder confirms the results of the morphological description with very high levels (> 50%) of these rates in organic horizons and low rates (<10%) for mineral horizons.

By the presence alder as an interface between north dune and south plain clay, Ain Khiar operates in a framework that allows the maintenance of a good supply of water that saturates the ground and prevents any mineralisation activity of organic matter.

These peatlands are rare, fragile and the last refuges for rare or threatened species, hence the importance of their knowledge for better protect them. And in view of its wealth the alder Ain Khiar is protected by the Ramsar Convention.

Key words*:* Alder Ain Khiar, El Kala wetland, organic matter, organic carbon

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The innovative technology of remediation of soils contaminated with oil in the Republic of Kazakhstan

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Information on the developed zeolite-microbiological technology which is based on new strain cultures to stimulate the activity of hydrocarbon-oxidizing microflora has been presented.

In conditions of technogenic soil pollution with oil, the major factor in biological destruction of hydrocarbons in soil- are microbiological processes which are associated with the cycle of nitrogen transformation - nitrogen fixation and denitrification. The most effective form of nitrogen is nitrate, which provides a double way of using nitrogen by hydrocarbon oxidizing microorganisms, the least effective is ammonium which contributes to the mass development of microscopic fungi in soil and improve soil phytotoxicity.

High efficiency of organic nitrogen forms during bioremediation is due to slow process of ammonification in terms of oil pollution and dosed release of ammonium, excluding mass reproduction of fungi and suppress of processes of nitrogen fixation.

Specific feature of the developed zeolite-microbiological technology is based on the cultures of new strains enhancing the activity of hydrocarbon-oxidizing microflora by immobilization and creation of a new class of biomineral fertilizers- is that stimulation of activity of strains of microflora of preparation "BakoilKZ" is provided by the modified aluminosilicate minerals of 5 ranges. Doses of bioremediant depend on capacity, status of oil-contaminated layer and hydrocarbon concentration.

Micro-organisms that consume oil hydrocarbons, are the typical representative of soil and water biocenoses and their role in the process of purification of oil-contaminated ecosystems is crucial. Currently over 100 genera of bacteria, yeast and filamentous fungi capable to degrade oil hydrocarbons have been described.

Key words: soil fertility, humus, modified zeolite, macro- and micro nutrition elements, humic and microbial preparations

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Land agroecological assessment in the forest-steppe zone of Novosibirsk region

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Land agroecological assessment and grouping is the most important part of the adaptation of agriculture to landscape conditions of the area. The regional characteristics of agro-ecological conditions of agricultural lands are not fully known at this time. They are important to the modern strategy of adaptive-landscape agriculture. It is necessary to take into account the parameters of agroecological assessment in the design of farming systems. Using GIS-technology is the modern method of land agroecological assessment and differentiation of agrolandscapes. The objective of research was to study the character of distribution of agroecological heterogeneity and to carry out the agroecological grouping of agrolandscapes in the forest-steppe of Novosibirsk Ob'. Novosibirsk Ob' is elevated plain on the left coast of the Novosibirsk reservoir. The studies were carried out in the 2005-2012 years in landscape system, which is a combination of placor plot of the fourth Ob river terrace and its slope to the third terrace. This natural system is considered as local geosystem according to landscape typology, suggested by M.A. Glazovskaya. The plot total area is the 136.65 hectares. The total length of catena is the 1400 m. The distance between the observed sites is the 200-250 m. The mikropadings of different shapes are the microrelief on all elements mesorelief. Elements of mesorelief were identified on the basis of landscape analysis. They are watershed part with mikropadings and the southern slope of complex forms. The watershed part of the studied area can be divided into central and northern parts by the character of the microrelief. The central part of the watershed has absolute heights 149 -151 meters above sea level and is characterized by a weak surface slope (0.3°) to the east. Its area is 48.30 hectares. The character of surface is smooth, shallow mikropadings (not over the 1 meter) occur rarely. The northern area of watershed has a slope of less 0.5°. The site area is the 21.59 hectares. Linear forms occupy 9% of the northern area and closed circuit forms – 11%. The number of mikropadings and their sizes are essentially increased. The mikropadings are linear and closed circuit forms. The southern slope of the studied area has a complicated collecting form. Its area is the 66.76 hectares. The total length of the slope is the 550 m. The investigated areas have differences of the structure of soil cover and temperature-moisture regimes. The final product is a map of agro-ecological types of land according to the conception of adaptive-landscape agriculture. GIS technology is used as an integrating tool to create a map of agro-ecological types of land. It provides the assessment and visualization of the natural situation with coordinates of land plots. The existing topographic map with scale of 1:5000 with isolines of relief and boundaries experimental field was digitized into electronic. It gives information about the exact area of the land of field. . Layers maps have been created hereinafter: the soil, the vegetation, the soil productive moisture, the soil temperature, the weediness and other. The table structure of attribute database, which contained a list of indicators-characteristics of layer objects, was made before the creation of the layer. All electronic map layers have one coordinate system. The agrolandscape complex map with data is formed by superimposing thematic electronic maps layers. The agro-ecological assessment of lands has allowed distinguish the following groups of lands within the Ob plateau on flat spaces: erosion (southern slopes), plakor (central area) and the mikropading plakor (northern area).

Key words: land agroecological assessment, element of relief, the forest-steppe zone of Novosibirsk region

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An evaluation of quantity-intensity relationship of potassium on some low land rice growing soils

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Potassium (K) supplying capacity of some low land rice growing soils was investigated by employing the quantity-intensity (Q/I) approach. The values of potential buffering capacity (PBC^K), labile (K_L), Specific K(K_O), specific K sites (K_X), equilibrium activity ratio (AR^K) and free energy change (-ΔG) were estimated from the quantity-intensity curve. Non-specific K values changes with clay mineralogy and organic matter content. Higher cation exchange capacity and organic carbon enhance labile K pool. Low equilibrium activity ratio indicates that bulk of K was preferentially held at edge position of the clay crystals. Higher potential buffering capacity (PBC^K) indicates excellent K-status. PBC^K is directly proportional to the free energy change of potassium. The changes of Q/I parameters is associated with the contents of clay, organic matter and clay mineralogy of the soil. Higher exchangeable cations in soil matrix enhance labile K, specific K and specific K sites.

Key words: quantity-intensity relationship, labile K, specific K, specific K sites, free energy change, equilibrium activity ratio

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Aromaticity and humification of dissolved organic matter (lysimetric experiment)

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Ultraviolet and fluorescence spectroscopy were used in order to assess the aromaticity (specific UV absorbance at 254 nm, $SUVA_{254}$) and humification (index HIX) of the dissolved organic matter in lysimetric water derived from the different sources. Lysimeters were represented by: oak leaves (I), perennial grasses (II), arable horizon of chernozem (III), oak leaves placed on the surface of arable horizon of chernozem (IV) and perennial grasses on the surface of arable horizon of chernozem (V). According to $SUVA_{254}$ the aromaticity of DOM eluted from plant residues (leaves and grasses) is 1,4-1,7 times greater than DOM from chernozem. DOM from oak leaves show maximum values of UV absorbance, apparently due to the high content of tannins. The aromaticity of DOM from the lysimeters IV and V were 20% less comparing with DOM eluted from pure plant residues (lysimeters I and II). The observed decreasing of $SUVA_{254}$ indicates the adsorption of mostly aromatic DOM compounds from decomposing leaves and grasses by the solid phases of chernozem. Index, HIX demonstrate that extent of the DOM humification depends on the season: in the forward spring (March) grasses has an advantage over soil and oak leaves, but at the late spring (May) the greatest humification exhibit oak leaves. On the whole HIX for soil sample (III) varies in the range 0,83-0,86, that is substantially less as plant residues (0,90-0,96). It hasn't observed any decreasing of HIX for DOM from lysimeters IV and V comparing with I and II, indicating that most humificated compounds of plants derived DOM do not sorbed by soil.

Key word*:* dissolved organic matter, DOM, aromaticity, humification, HIX, lysimetric waters

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Application of various systems of fertilizers on gray forest soils Vladimir opolja

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Gray forest soils Opole is one of the most fertile soil types Russia. But lately, arable soils are subject to degradation - falling humus content, there are erosion, the formation of sole shoe. To increase the yield of crops on these soils good results are obtained by using mineral and organic fertilizers. But the use of large doses of mineral fertilizers is able to change the properties of these soils due to acidification of the reaction medium. Neutralization of soil ameliorants through any period of time after the last acidification does not lead to the initial operation of the soil, because you can not restore the original crystal-base minerals. Most of the studies carried out on sod-podzolisth soils and black earth (chernozem). The behavior of the minerals in the soil under the influence of gray hay substances is studied only at Rovenskoy and the Bryansk Agricultural Station, experimental fields Ryazan State Agricultural Academy. It was found that increased amounts of mineral fertilizers has led to a decrease in mixed-content entities, both due to their destruction, and because of the activation process when fixing agrodatsionnyh potassium fertilizer. There is a mechanical disintegration of phyllosilicates larger than silt, factions and its updating these products. Clay fraction replenished more resistant to weathering minerals, but with a lot of inert components, such as quartz and mica dioctahedral. The mineralogical composition of gray forest soils of Vladimir plain field has not been investigated, found no effect of different farming systems, the most widely used of these lands, the maintenance of the battery plant. The aim of this study is to determine the effect of commonly used systems of agriculture on gray forest soils of Opole on the parameters of fertility, for the maintenance of such an important figure as the water-pregelatinized and aggregated silts.

Key words: humus, fertility, water-pregeltinized and aggregated silts

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Chitosan as a detoxicant for oil contaminated soils and its subsequent transformations

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The common and most effective method of soils detoxification is sorption. We first studied a possibility of applying natural biopolymer chitosan for soils detoxification. In the scientific literature there is evidence of its use only for treatment of surface and wastewaters.

Chitosan is a natural biopolymer degrading to its typical components under action of ferments. The sorbentis made of shellfish chitin. Economic efficiency of using chitosan is conditioned by the presence of a localfeedstock: wastes generated during cleaning turbines of Volzhsky Hydroelectric Power Station.

Almost complete sorption of oil products out of the light-chestnut clay soil with finely milled chitosan and out of the light-chestnut sandy soil with 0,1% chitosan solution was shown; in both cases it is equal to 99,96%. The effectiveness of 2 days oil sorption with finely milled chitosan is about twice as high in the clay soil as compared to the sandy soil. For more complete oil extraction is 2-4 days. For oil spill response in light-chestnut clay soils,it is better to use finely milled chitosan, and apply 0,1% chitosan solution for conducting sorption in sandy soils. To prevent oil spills and their subsequent migration in the soils during the construction of petrol stations, we propose to create a sorption barrier.

Key words: oilproducts, a natural sorbent, a sorption mechanism, a sorptionbarrier

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Application of zeolite in the sustainable land use

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Effects of various doses of zeolite powder (Sources: Mád, Hungary) was studied on some physical, chemical and microbiological properties of a sandy soil with humus the results are the average of four-year (2007-2010). Perennial ryegrass *(Lolium perenne L.)* was the test plant. The used zeolite powder had a positive impact on the water and nutrient content of soil, with improving the available nutrient content for plants.

Dynamics and activity of the microbial population was stimulated in the changed micro-environmental caused by the zeolite treatments. The physical and chemical properties of soil were affected by the high dose (20 t ha^{-1}), while the parameters of microbial activity were preferably changed by the small and medium (5 and10 t ha^{-1}) doses of zeolite treatments. Our results have shown that the zeolite can play an important role in the amelioration of the sandy soils with low colloid content.

Key words: zeolite, properties, soil, plants, microbial activity

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Study on the vertical changes of organic carbon in typical grassland chestnut soil in Xinjiang, China[**]

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Study on the variation regularity of total organic carbon, humic acid types and the mineral complex in different altitude and soil profile of typical grassland chestnut soil. Use improved V.V.Ponomareva and A.Plotnikova method that Potassium dichromate-External heating method in grouping determation. In typical grassland chestnut soil, the variation range of total organic carbon is 9.89 ~ 47.84g/kg, the variation range of humic acid is 12.9 ~ 44.27 g/kg, the variation range fulvic acid is 15.84-32.14g/kg,and humin is 23.59 ~ 71.21 g/kg. The main content of humus mineral complex is clay mineral complex, that humic acid tight bound is 5.36 ~ 16.33%, and the content of fulvic acid tight bound is lower, and it only accounts 1.06 ~ 3.84% of total complex. The mineral complex in both humic acid and fulvic acid along with the distribution regularity of soil profile is all gradually reduced along with the soil depth, that 32.07, 20.35, 18.44, 23.57, 20.04 and 29.75g/kg. The both total organic carbon content and different components content of humic acid of Xinjiang typical grassland chestnut soil on the altitude and soil profile difference all reach the significant levels, and the main type of humus on the high altitude and upper profile point is fulvic acid-humic acid type, A/HF>1 ,and the main type of humus on the lower altitude and lower profile point is humic acid-fulvic acid type, HA/HF<1.

Key words: chestnut soil; organic carbon; complex; vertical distribution; soil profile

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Ecological patterns of distribution of uranium and thorium in soils of South Ural

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The paper studies thorium and uranium content and distribution in soils and rocks of South Ural in natural and human-made conditions (forests, arable lands, grassland). The results prove wide spread and high changeability of element concentration depending on the effect of environmental and technogenic factors on the ecosystem. There is data of the content of radioactive elements, deposits of the studied elements in a half-meter layer of soils, interference regularities between uranium and thorium as well as radioactive elements.

Key words: radioactive elements, concentration, pollution, republic of Bashkortostan

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Wetting contact angle of clay minerals after salt interaction

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The particular physical characteristics of saline clay soils (high dehydration strength, lesser density and wettability) regarding their important theoretical value arouses the researchers' much interest. This paper is aimed at a simulation experiment of determining wetting contact angles (CAW) of clay minerals (kaolinite and smectite) prior to and after their treatment with Na and Mg salts.

Clay samples were treated with 0.5 M Na and Mg sulfate and sodium chloride solutions containing Na_2SO_4 and $MgSO_4$ in the ratio 1:20. Than the samples were filtered and air-dried. The contact angles were determined by the method of the dynamic sessile drop on the Kruss DSA 100 goniometer.

According to the data obtained, kaolinite treatment with soluble salts does not practically affect the wetting contact angle size. Treatment of smectite with $MgSO_4$ and (Na, Mg)SO_4 does not cause also substantial changes of CAW. However, its treatment with Na_2SO_4 and NaCl solutions (while Na_2SO_4 and $MgSO_4$ are present) results in a sharp rise of CAW – from 28o up to 72–75o. Apparently, it is exactly sodium salts that determine substantially lesser wettability of saline clay soils, and consequently, their resistance to erosional impact.

Key words: clays, salts, clay-salt microaggregates

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Clay-salt formations in baer mound soils (Caspian lowland, Russia)

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The morphological, chemical, granulometric and microaggregate properties were studied on a soils (Endosalic Calcisols Sodic and Haplic Solonetz Albic) of a Baer mound and the adjacent territory in the western part of steppe ilmens in the Astrakhan region. Qualitative assessment of microaggregate composition by the scanning electron microscopy (SEM) made it possible to diagnose formations of insoluble (dolomite, calcite), difficulty soluble (gypsum) and soluble (halite and mixed formations of chlorides and sulfates of sodium, magnesium, and calcium) salts. Dolomite, as a marker of marine genesis of soil-forming deposits, is present in the form of separate crystals along the entire profile of the study soils. In the saline horizon the calcitic tabularly packed clay-salt microagreggates were diagnosed, but in the subsalt horizon clay microaggregates are formed with participation of vitreous rounded assemblages with joint participation of sodium and magnesium sulfates.
Thus, salts in the soils of Baer mound landscapes form individual crystals, formations of joint crystallization, and clay-salt coatings, microagreggates, and quasicrystals. The type of clay-salt formations (coatings and microagreggates) is conditioned by the silt content in soil. Particle packing, the size and shape of microagreggates depend on the content and properties of salts participating in their formation. The preservation and stability of Baer mound soils are related to the formation of clay-salt microagreggates and coatings.

Key words: Baer mounds, soils, salts, clay-salt cutans and microaggregates

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Influence of engineered nanomaterials and humate on soil structure and mechanical properties

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Research in the field of environmental behavior of nanomatetials has been increasing over the past decade due to their unique physico-chemical properties and to an expected rise in their production in the future. The question of their fate and impact on soils has become a major concern since poorly understood interactions of nanomaterials with the soil particles. Impact of nanomaterials on the fate of other pollutants in soil remains controversial. There is almost no data on the effects of nanomaterials on soil structure and physico-chemical properties with different humus status. This experimental study aims to reveal the rheological properties of structural bonds between grey-humus soil particles in samples treatment by metal-containing nanomaterials – nanomagnetite (nano-Fe_3O_4, 500 mg/kg) with addition of humate potassium (Le-PhK, 100 mg/kg) and without it. The results of rheological studies using a MCR 302 modular research rheometer of soil samples are presented. It was found out that the soil with nanomagnetite (has more elastic properties (G '- 3.95 • 10^5 Pa) than the original (control) samples (G' - 1.48 • 10^5 Pa). Adding humate to the soil with nanomagnetite enhances the strength of the structure. The destruction of the structure (the point of equality models G '= G'') for the original soil deformation occurs at 13.7%, and with nano-Fe_3O_4 and humate is much less (1.88%). It can be concluded that the previously identified differences in toxic effects nanomagnetite in soils by adding humates associated not only with the expected change in the specific surface of the particles (our preliminary results), but also with the physico-chemical characteristics of the rheological interaction between soil particles and engineered nanoparticles in the presence of humate.

Key words: soil structure, rheology, nanomaterials, elastic modulus, viscosity modulus

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The soil water retention, swelling and rheological properties of typical chernozems[1]

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Agricultural use effects on basic physical properties of soils: water-holding capacity, organic matter content, particle size distribution, rheological behaver. This article presents the study of water retentione curve, swelling, organic matter content and some of the rheological characteristics of soil behavior under the load. The objects of research were the upper layers (0-10sm) of chernozem pachic(WRB,2006)(Kursk region, Russia) in different land use: agricultural arable, adjoining forest belt (the Petrinka area), bare fallow, oak forest, virgin steppe (Kursk Biosphere Reserve named by V.V. Alekhin). The upper parts of the water retention curves were determined by the desorption of water vapors over the saturated salt solutions, and lower parts - by centrifugation. The soil swelling was determined by device "PNG-10". The texture was determined by Fritsch Laser Diffraction Particle Sizer ANALYSETTE-22 (Germany). Soil organic matter contents were determined by combustion (AN-7529 analyzer). The rheological characteristics were obtained by amplitude sweep test on the MCR-302 rheometer (Anton Paar, Austria). It is shown that the resistance of soil structure to loadings, water absorbing and water-retaining abilities of soils are defined by the content of organic matter of soils.

Key words: soil structure, organic matter, soil water retention, swelling, integral zone z.

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Types and distribution of soil cover patterns with gilgai topography in Russia**

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Special investigation of soil cover patterns with gilgai topography is carried out in Russia in the last three years. The main aim of research is geographic distribution of soil cover patterns with gilgai topography in Russia, determination of soil properties and parameters of gilgai microrelief at different regions and systematization of types of these soil cover patterns. There are seven regions in European Russia where areas with gilgai topography occur. About 300 gilgai areas exist at the Volga-Akhtuba Floodplain. At four regions, several decades of areas with gilgai topography occupy bottoms of large closed depressions (limans). At two regions, only four gilgai areas occur at slightly concave elevated surfaces. Parent materials for these soil cover patterns are shrink-swell clays of different origin and age. In accordance with WRB-2014, soils are Vertisols, Vertic Solonetz and Vertic Stagnosols. Thirteen types of soil cover patterns with gilgai topography are identified by conjugation of soils at micro-low, micro-slope and micro-high in gilgai. Differentiation of soil cover patterns along gilgai microcatena is determined by three groups of lateral and vertical soil-forming processes.

Key words: vertisols, vertic solonetz, vertic stagnosols

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Agroecological basis for the production of compost from organic waste

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In article are considered agroecological basis for the production of compost from different organic wastes. for composts used current components: municipal solid waste (MSW), sludge fresh water, cattle manure and straw (winter wheat). Analysed chemical composition of organic-containing wastes. the possibility of preparation of composts of different proportions. them was prepared 3 types of compost. Studied composts prepared on the nutrient content of microelements and heavy metals.The use of these composts, increase the content of organic matter in the soil. Composting of this waste will increase the reserves of organic fertilizers and reduce the environmental hazard of accumulated waste.

Key words: agriculture, soil fertility, compost, municipal solid waste, silt, cattle manure, straw, chemical composition.

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Self assembly soil micro-aggregate in macro-aggregate as a feedback on degradation soil structure by tillage chernozems

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The capacity of soils micro-aggregates (particles < 250 um) for spontaneous formation of macro-aggregates (particles > 250 um) was studied for Chernozems of long-term field experiments. Three tillage experiments (long-term potatoes, corn and black fallow), one post-tillage (17-yar deposit after black fallow) and no-tillage soil (every year cutting steppe) from Kursk region were sampled. In tillage soils micro-aggregates (particles < 250 um) are able to form macro-aggregates spontaneous without any additional binding agents. No-tillage soils micro-aggregates are have not this capable. Wherein, post-tillage soil micro-aggregate can form macro-aggregates. Self assembly soil micro-aggregate in macro-aggregate can be seen as a feedback on degradation soil structure and carbon release following tillage. Because of tillage in soil appear particles < 250 um witch are fragments of tillage-destroyed macro-aggregate. These particles are able self-assembled into macro-aggregate. The more intense soil cultivate the more fragments of macro-aggregates come out the more micro-aggregates are able self-assembled into macro-aggregates.

Key words*:* chernozems, long-term field experiments, macro-aggregates, micro-aggregates, self assembly, soil structure

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Evaluaton of xrf and icp measurement results on determination of macro- and micro- nutrients of corn plant and its fields

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X-ray Fluorescence (XRF) spectroscopy is one of the important methods to determine elemental composition.Because of the plant nutrient amont in soil is how much more the X ray amount will be more and according to the occuring peak amount X ray amount will be high. The occuring peaks gives the elemental values as % or ppm, numerically. ICP-OES produces stimulated atom and ions. The wavelength speciality of each element's emission intensity will be different because of their electromagnetic radiation expanding. The numerical amount of plant nutrient in soil will be obtained by emission intensity and elemental concentration inside of the sample.

There is no need sample preparation technics for ICP as solving in acid and not causes any destruction. The core sampling obtained via drilling or homogened via becoming dust form samples can be analysed like directly soils in nature with portable XRF devices.

In this study it was aimed determination of statistical importance of obtained results of sensitiveness and differences between these two devices and in this study direct readings were made at the corn plant growth fields with XRF device and soil samples were taken from reading areas from Romania and were analysed with ICP-OES under laboratory conditions after necessary processes. In addition to this, the readings were made on corn plant directly at field conditons. The reading samples were analysed with ICP-OES under laboratory conditions. The ICP readings were accepted as reference and the coralation was pretended between EDXRF device and ICP-OES. In this correlation, re-slope and intercept values were determined by linear regression analysing for each element. The determined values for each plant were buffered on EDXRF device and ICP values were calculated with the help of obtained formulation. As a result of statistical calculations a correlation between r^2 values at the level of $p<0.05$ $p<0.0$.

Key words: XRF, ICP-OES, corn, soil, plant nutrient element

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The soil microbial activities influenced by hazelnut husk compost application

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The objective of this study was to determine the changes in microbial activities of soil by different doses (0, 1.25, 2.5, 5.0, 7.5 and 10 ton da^{-1}) of hazelnut husk compost (HHC) applications in two hazelnut orchards having different textures. After nine months of HHC application, analyses of total organic carbon (C_{org}), total N, C/N ratio and soil microbial activities such as soil microbial biomass carbon (C_{mic}), basal respiration (BSR) and Cmic/Corg were carried out on collected soil samples. In general, C_{mic}, BSR, C_{mic}/C_{org}, C/N ratio and the contents of C_{org} and N increased ($P<0,001$) and C_{mic}/C_{org} values decreased ($P<0,001$) with increasing HHC application in comparison with the control. According to the results of field experiments conducted different location and condition, when the focusing on the organic substance management and sustainability of the biological process in soil, it was clear from the evidence obtained the research that the ideal HHC application was 0.5 ton per hectare to increase the organic substance content by 2%.

Key words: hazelnut, compost, soil, microbial properties

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Accumulation of carbon in dead organic matter on the soil surface in the middle taiga of middle Siberia

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In the present work, a quantitative estimation of carbon sequestration in the basic blocks of ground dead organic matter prevailing forest type groups. Research conducted in the zone of discontinuous distribution of permafrost in the Baikit forest district mountain middle taiga forests. The analysis of the data showed that over-mature coniferous plantation contains carbon in the soil dead organic matter 1.6 times and in coarse woody debris (CWD) and 4.5 times more than in coniferous plantation of the same age. The total stock of carbon accumulated in dead organic matter over-mature conifer plantations on the soil surface is 34.8 tC ha^{-1} and coarse woody debris 11.3 tC ha^{-1}, at stumps accounts for about one third of the reserve CWD. In the larch carbon stock CWD equal to about 2.5 tC ha^{-1}, while 78% are the major branches of the larch.

Key words: litter, coarse woody debris, larch forests, conifer plantations

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Rheological properties of disturbed and undisturbed samples of soddy-podsolic soils

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The rheological properties of monolithic and pasty samples of soddy-podzolic soils were studied by amplitude sweep test by the MCR-302 rheometer (Anton Paar, Austria). Monolithic and bulk (pasty) samples are characterized by different rheological behavior: monolithic samples with higher strength of natural structural contacts under the strain behave as a fragile body, while the pasty samples with lower strength of structural contacts behave as a plastic body. There are the direct correlation LVE-range values with the clay fraction content and the specific surface values and the inverse correlation for initial storage modulus values and specific surface values, Crossover and the total carbon content for pasty samples.

Key words: soil physics, soil structure, storage and loss modulus, linear viscoelastic (LVE) range, crossover (yield point)

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Microbiological bioremediation of the forest nurseries soils

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At present, more and more interest caused by the introduction of microorganisms antagonists, as a means of the plant protection and soil bioremediation in the forest nurseries of Siberia. The nature experiments were conducted in the forest nursery of Pogorelsky field station (Institute of Forest SB RAS) conditions with the aim of studying the influence of microbes-antagonists on the biogenous of the nursery soil and growth and development of coniferous seedlings: Scots pine (*Pinus sylvestris* L.) and Siberian larch (*Larix sibirica* L.). The analysis of data obtained during the experiment showed that seed treatments of Scots pine by *Ps*. sp. and *T. harzianum* increased soil germination from 31 to 53%, and Siberian larch from 4 to 31%. Greatest safety of conifer seedlings by the end of the growing season (September) was recorded in treatment options seeds *Ps.* sp. and *T. harzianum*. Presowing treatment of coniferous seeds by microbes-antagonists contributed to the increase in the total number of microorganisms, affect the distribution of ecological-trophic groups of microorganisms (ETGM) in the soil under sown seeds, and increased the soil biogenous (microbial biomass and activity of the main hydrolytic enzymes and microorganisms).

Key words: introduction, microbes-antagonists, ecological-trophic groups of microorganisms, enzymatic activity, soil biogenous

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Contamination of soil and vegetation cover due to emissions of mining and metallurgical enterprises

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Pollution sources, zones of emission impact of Ridder zinc factory in EKR, area of pollutants spreading have been determined. Condition of soil and vegetation cover of the areas around the zinc factory. Researches have shown a negative impact on soil and vegetation. For example, large areas of soil adjacent to the zinc factory are subject to erosion processes. Erosion is displayed as flush from soil surface, and formation of deep furrows and gullies. The soil surface over a large area is devoid of vegetation. Analytical data made it possible to determine the concentration of heavy metals in soil both gross and mobile forms. The priority elements of pollution are zinc, lead, copper and cadmium. Concentration of heavy metals in soil exceeds the MPC of both gross and mobile forms. The accumulation and distribution of heavy metals in vegetative parts of trees and shrubs is different. The negative impact of plant emissions on vegetation cover is presented by sparse vegetation clumps, some preserved species of willow and dropped plants, and lack of vegetation over large areas. The vast majority of plants are depressed. The burns are formed on the leaves under the influence of toxic emissions, drying of branches and axial shoots of crops, weak vegetative and generative development is observed.

Key words: pollution, erosion processes, heavy metals, accumulation, migration

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Food security, sustainable soil management and Global Soil Partnership

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Food security includes three components: the ability of a country to produce or buy food, equal availability of food to the population, and the quality of foodstuffs (food safety). Food security is based on the rational use of natural resources, especially of land and soil. Land degradation is a growing threat to food security and ecosystem services in Europe and Central Asia. Driven by biophysical and socio-economic factors, aggravated by effects of climate change, it is one of the greatest challenges faced by all the countries of the region. The loss of soil productivity results in the depletion of the agricultural production and thus threatens food security. The Global Soil Partnership (GSP) initiative initiated by FAO prioritizes the introduction of sustainable soil management that requires intensification of applied research on soil conservation and reclamation, on the improvement of soil fertility. The researchers should establish the dialog with the decision-makers, private sector and non-governmental organizations, in order to stimulate them for the sustainable soil use. Also GSP recommended the establishment of soil monitoring system. The GSP principles are implementation through the regional partnerships; the Eurasian Soil Partnership has been established in 2103 and now started to implement its Plan of Action.

Key words: soil degradation, soil productivity, FAO, Eurasian Soil Partnership

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Effetcs of lime application on growth, Ca, Fe, Zn content of grafted and non-grafted tomato plants in acid soil

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This study was conducted in a greenhouse to determine the effetcs of lime application on growth and Ca, Fe and Zn content of grafted and nongrafted tomato plants in acid soil. Grafted and nongrafted seedlings of Torry tomato cultivar were used. The tomato cultivar Torry was grafted into two rootstocks of Arazi and Kudret. Torry was used nongrafted seedlings as a control plant. Soil lime requirement was treated in different rates such as 0, 20, 40, 60, 80, 100 and 200 % as calcium carbonate. Lime requirements were determined to increase soil water pH to 6.5 according to the SMP method. The total content of Ca, Fe and Zn, dry weights were determined in grafted and nongrafted tomato plants. Our results showed that plant leaf Ca concentrations increased with increasing the amount of lime application, but plant Fe and Zn concentration were decreased. Total Ca concentration of leaves was found the highest in grafted tomato plants compared to nongrafted plant. The significant increases ($P<0.01$) were observed in plant species, application levels and interaction on calcium, iron and zinc content of leaves.

Key words: liming, tomatoes, rootstocks, scion, nutrition

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Current state of water-physical properties in soils of Mirzachul oasis

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The main factor causing the features of water-physical properties of soil in Mirzachul oasis is their mechanical structure and the nature of soil-forming beddings which influences are revealed on sizes of maximal hygroscopic moisture, the moisture of stable fading, the least of (field) capillary moisture, water permeability, wetting capacity. In physical properties under consideration certain distinctions are found out which are caused by their genesis and regional peculiarities. The presence of a considerable quantity of finely-sandy fractions of 0.1-0.05 mm from 8-13 till 64% in the top meter thickness exceeds the content of fractions of medium and fine silt for these horizons. The presence of more large sandy fractions of 0.25 –0.1 and more of 0.25 mm and in some places of 5-10% is peculiar to these soils. Changes take place in morphological structure, in chemical and physical properties of the soils under the influence of irrigation during high culture of agriculture with the use of mineral and organic fertilizers in meadow and sierozemly-meadow soils in Mirzachul oasis.

Key words: mechanical, maximal hygroscopicity, moisture capacity, irrigation, sand

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Chainging greygrounds including mineral and organic fertilizers of structural component typical age irrigation

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In clauses is stated the results of perennial of field experiences incorporated on age irrigation typical serozem with the following variants: (cotton plant without fertilizers (control); cotton plant N_{250}+PK (on agro chemistry map) cotton plant N_{200}+P_{175}+K_{125}+20 t/h manure; cotton plant N_{200}+P_{175}+K_{125}+20 t/h lignin; cotton plant N_{200}+P_{175}+K_{125}+20 t/h departure) in which was studied influence of organic and mineral fertilizers on structural structures of soils.

The basic purpose - to reveal efficiency of various dozes and parities(ratio) of mineral fertilizers and joint application them with various kinds of organic, in conditions of monoculture cotton plant and crop rotation of cultures, and also will establish in what variants of experience will be created the best parameters on agricultural chemistry, agro physical and other properties soils for their growth and development of cotton plant.

On experience for vegetation of cotton plant three were carried out(spent)glaze, the norms glaze it(him) depending on a stage of development of plants changed from 750-900 up to 900-1100 m^3/h Humidity of ground before glazes in a layer 0-100sm on the average has made 63 and 68 % from field moisture capacity of ground.

At entering 20 t/h of organic substances the structural structure and water strong of units are improved. Especially together with various kinds organic the greater formation true water strong of micro units and decrease(reduction) of factor dispersion of ground (23,7-31,9 %) against the control (38,5-47,0 %) is marked. Of the top of ground horizon are more formed of valuable agronomical soil units, though the units of ground by the size of 3-5 mm arable and under arable of horizons in the spring have a little by raised(increased) mechanical durability, after crop cotton plant had durability about 627-689 g/sm^2 and 280-284 g/sm^2 for units by the size of 2-3 mm, till current vegetation's she(it) was increased. The same distinctions were fixed on water durability and separately of units of ground.

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Influence inoculation of different strains of the bacteria with the addition of wheat straw on the enzyme activity in the soil

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The biological activity of the soil reflects the ability of soil to carry out its functions and is crucial to ensuring stability. The enzymatic activity of soils is an objective measure of biological activity, reflecting the intensity and direction of biochemical processes occurring in the soil. Enzyme activity is proposed as a potential indicator of soil quality due to its connection with the soil biota, ease of identifying and responding to the rapid changes caused by anthropogenic and physical influences. The purpose of this study was to evaluate the effect of inoculation of different microbial strains on the enzymatic activity of the test soil. Research conducted under the program TUBITAK (Council for Scientific and Technological Research of Turkey). Soil samples have been collected from the upper layer in the range of 0-20 cm in the farmland plains Bafra Samsun. We used microbial strains A. magusensis, A. orientalis, Streptomyces sp, A. geliboluensis and A. Azurea. The studies were conducted in greenhouses Department of Soil Science and Plant Nutrition, Faculty of Agriculture, Ondokuz Mayıs University, between November 2012 and November 2013. According to the control soil dehydrogenase activity refers to the average degree of enrichment of the enzyme. Soil bacterial strains contributed to increase the activity of dehydrogenase 1.5 times. Soil with the introduction of a bacterial strain with wheat straw on the treatments showed the worst result. After the effect of straw on yield of crops and soil fertility is largely determined by time. As a result of dehydrogenase activity in treatments with straw showed 2,3 -6,5 μg TPF g-1 dry soil 24h, and without making straw, only bacterial strain 5,8-18,2 μg TPF g-1 dry soil 24h, when the control shown 12,6 μg TPF g-1 dry soil 24h. So as a result of changing the direction of the main processes of transformation of organic matter occurring in the soil - become the dominant reaction towards degradation of hydrocarbons carried out by means of redox enzymes. Which were in the minority in the treatments with the addition straw.

Key words*:* soil, microbial strains, wheat straw, greenhouse

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Permafrost degradation and aridization of Mongolia, part I: Khan Khentii Strictly Protected Area

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The Khan Khentii Strictly Protected Area represents large areas of mountain forest steppe with islands of primaeval taiga forest in the Khentii mountains, situated to the north of the capital Ulaanbaatar. Khentii forms the uplift of the devonian-carboniferous terrigenous rocks and whole study area represents an unique cold region where permafrost still occures. Our data indicate an increasing of the MAGTs of about 0.4–0.5°C in seasonally frozen ground and island permafrost zones, and about 0.2–0.3°C in the discontinuous permafrost zones. Within Khan Khentii Strictly Protected Area noticeable degradation of permafrost during the past 50 years was observed.

The actual thermal state of Khentii permafrost reflects recent aridization. The average rise of MAAT was approximately 0.02–0.05 °C/yr for the different regions of Mongolia with maximum extent in the study area. The southern limit of permafrost has retreated 20–30 km northward.

Permafrost globally degrades and permafrost borders has moved at least 70-200 km northward for last 50 years in the Central Asia. Thawing of permafrost considerably change environment. These changes highly influence local inhabitants as well as economic flows. There are two possible scenarios what might happen after permafrost degradation – these areas will get swampy of mountain steppe. In both cases people will not be able to live their traditional nomadic life.

Consequently, there is an important finding that the permafrost in the Mongolia was till the end of 20th century less sensitive to local warming and/or aridisation than in the case of mountain permafrost at the territory of Northern America and Europe. But the situation changes dramatically and escalates actually. It is highly probable that influence of aridization of mongolian teritory in connection with the melting of permafrost will increase during 21st century.

Key words*:* permafrost, degradation, aridization, human society, Mongolia

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Pools of organic matter in agrophaeozem and agrochernozem

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Soil organic matter (SOM) contains a significant part of carbon and nitrogen of agricultural ecosystem. Carbon pools with various stability were determined from SOM in agrophaeozem and agrochernozem. For this purpose, the isotopic approach (based on natural ^{13}C-abundance by C3-C4 transition) was combined with the biokinetic, densitometry and chemical fractionations. The most stable pool with minimal young carbon content was identified using chemical fractionation - thermal hydrolysis with 6N HCl. We considered nonhydrolyzable carbon as the most stable pool in the simulations of carbon cycle in terrestrial ecosystems. Size of this most stable pool in agrophaeozem and agrochernozem is 65% and 48% of organic carbon, respectively. The combination of biokinetic approach with acid hydrolysis allowed us to estimate the size of medium stable carbon pool with mean residence time from several years to several decades. This pool is usually identified by variation of ^{13}C by changing the enrichment during C3-C4 vegetation. In the agrophaeozem and agrochernozem pool size was 46% and 35% of organic carbon, respectively.

Key words: ^{13}C natural abundance, soil organic matter fractionation, soil carbon pools

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Oribatid mites (Acari: Oribatida) of zonal and mountain tundra soils of The Kola Peninsula**

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The comparison of faunas and abundances of mature soil-habitat oribatid mites for both mountain Khibinian tundra and zonal coastal Barents sea tundra (near Dalniye Zelentsy settlement) was made, based on original and literature data.

66 oribatid mites species were found in mountain Khibinian tundra. This diversity is inferior to that published for the alpine and arctic-alpine belts of mountains north-east (80 species) and north-west (133 species) of the Scandinavian Peninsula. 142 oribatid mites species were found in zonal tundra. Abundance of oribatid mites in soils of zonal tundra is high (53480 — 92800 specimens/m^2) and close to such of taiga forest, whereas abundance of oribatid mites in mountain tundra is much lower (10200 — 24240 specimens/m^2).

Jaccard similarity coefficient (K_J) is low (0,27) for faunas of oribatid mites in zonal coastal tundra and Khibinian mountain tundra. Oribatid mites fauna of zonal tundra is most similar (K_J=0,33) to that of north-west of the Scandinavian Peninsula. Mountain oribatid mites fauna is most similar to that of the Polar Urals (K_J=0,32).

In altitude profile of Woodyavrchorr mountain (505m above sea — 579 m — 756 m — 1008 m — 1019 m), proportion of adults of *Eobrachychthonius latior* (Berlese, 1910) and *Nothrus borussicus* Sellnick, 1929 is remarkably high in the uppermost tundra belt (29% and 11% correspondingly at 1019 m altitude). These species were absent or sporadic in belts lower 1008 m. This fact may have indicative significance.

Perhaps, low coastal Barents sea tundra is not usual biotope of tundra biome because of fauna peculiarity and high abundance of oribatid mites.

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Evaluation criteria of agrogen transformation in brown forest soils of tea plantations on the Russian Black Sea Coast

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The paper informs about the main principles and criteria, allowing to produce an integrated assessment of the status and extent of agrogene changes in brown forest acid soils in tea plantations with their long-term intensive use. Owing to the specifics of agrogene nature and types of possible degradation, among the diagnostic indicators that characterize structural and functional properties of soils and soil processes, we have recorded two groups: mobile (indicators of acid-base status and biological activity, the content of available forms of the basic macronutrients) and conservative (indicators of humus state, granulometric, elemental and mineralogical compositions, morphological structure). Indication of soil agrogenic transformation and its extent is based on a comparison with genetically determined state of this soil subtype from adjacent background areas (natural cenoses) and then (in the course of further monitoring) compared with baseline.

Key words: soil, agrogen changes, soil and environmental monitoring, mineral fertilizers, mobile and conservative criteria

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Relationship between soil water retention model parameters and structure stability

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Studying and modeling the effects of soil properties and management on soil structure, a basic property of soil health, is vital for the development of effective soil and water conservation practices. Contribution of soil intrinsic properties and extrinsic conditions on structure stability was inferred in quantitative terms from changes in the water retention curves at near saturation (low matric potential, 0-50 cm, macropores > 60 μm) that were obtained by the high energy moisture characteristic (HEMC) method. The S-shaped water retention curves were characterized by the modified van Genuchten model that provided: (i) the model parameters α and *n*, which represent the location of the inflection point and the steepness of the water retention curve, respectively; and (ii) the soil structure index, SI=VDP/MS, where VDP is the volume of drainable pores, and MS is the modal suction. Model parameters, claculated y soil-HEMC model, were related to soil properties and hence soil water retention properties were linked to measured field characteristics. Soil SI increased exponentially with increase in α and decrease in *n*, while the relationship between SI and α/n was linear. An improved description of the water retention and its link to pore- and apparent aggregate size distribution, by using the model parameters α and *n,* can assist in (i) the selection of management practices for obtaining the most suitable type of soil structure depending on the desired soil function, and (ii) apply model parameters in soil-crop models for predictng the effects of changes in soil structure on soil hydraulic properties, erosion potential and crop yield.

Key words: aggregate stability, structure stability, pore size, water retention, stability index

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Bioavailability of heavy metal compounds from the soils contaminated by the power station emissions

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The effects of natural (soil properties) and technogenic factors (atmospheric pollution by harmful industrial discharges, soil contamination) on accumulation of heavy metals in natural grasslands have been studied at monitoring sites located within the influence zone of Novocherkassk power station (Rostov region), one of the largest power stations in Russia. Plant sampling was taken to analyze the averaged samples of grass harvest at monitoring plots. Since 2000 the soil and plant sampling has being taken yearly in the period of the active plant growth and development. Contamination of grass plants by Ni, Cd, Zn and Pb occurs at sites located near this station along the line of wind rose. They are contaminated with Pb and Cd through vehicular emission as well. A relationship is shown between the amount of loosely bound compounds of heavy metals in soil and their accumulation in plants. The plants are polluted by heavy metals following the scheme Cd > Zn > Pb > Cu > Mn > Ni > Cr. The metal compounds adsorbed from the polluted atmosphere play an important role in accumulation of these metals by the terrestrial organs of the vegetation.

Key words*:* contamination, plant, soil, translocation

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Efficiency of rock phosphate compared to the tsp in the fertilization of Saharan soil

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Within the framework of the intensification of research on the direct use of rock phosphate in agriculture in order to be able to arrive at a better exploitation of this product as fertilizer, we fixed as objective in this work to study the effectiveness of rock phosphate (RP) in the phosphate fertilization of irrigated Saharan soil and the conditions of its use in Saharan agriculture in comparison with the TSP. For this purpose we adopted experiments in field and others in pots of vegetation with various amounts of RP and TSP, which are carried out with crop of barley or without plant and in presence or absence of the organic matter.

Results obtained through the studied parameters that bound to the soil or the plant such as: available phosphorus, total phosphorus, fractionation of phosphorus, content of the plant of P_2O_5, grain yield, and weight of 1000 grains, showed that: the TSP thanks to its high solubility has a fast action and gives the best results in short-term (tillering stage). While the action of RP is slow and modest at this stage, but it in the long term becomes very positive especially in the presence of the organic matter what returns very near the effects of two fertilizers. The organic matter improved the effect of the two phosphate fertilizers in particular the RP. Certain factors intervening such as the rhizosphere, the hydrous mode and the micro-organisms strongly supported the effectiveness of the RP by a remarkable effect on its solubility following a favorable moisture and released acid substances.

Key words: rock phosphate, TSP, available phosphorus, fractionation of phosphorus, grain yield

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Entropy chemical composition of mountain soils in the middle Ural

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The basis of diversity of organisms is the variability of soil properties, which is formed as a result of the evolution and dynamics of soil cover. The purpose of research – to identify a diversity of bulk composition of mountain soils in the Middle Urals using S. Maximum values S in the Middle Urals recorded in the accumulative-organic soils in the upper horizons and the whole profile 1,66-1,73. This indicates a weak differentiation of oxides in soils and the predominance of soil formation processes above weathering. In burozems, entropy values are somewhat lower due to the greater differentiation oxides. In soils, developing in more severe conditions, the entropy decreases 1.36-1.37. Variation of entropy to profile slightly. Only in elyuvozeme entropy < 1.0. With entropy found that differentiation of profile in structurally-metamorphic soils distribution due Fe, which is involved in burozemic pedogenesis. In the organic-accumulative soils greatly entropy associated with the distribution of Na_2O and secondary with the contents of sesqui oxides. We have homogeneity of horizons within the soil profile, which indicates the absence of processes podzolization. The rate of change of entropy within the profile to diagnose processes of humus accumulation, eluviation, illuviation, gley pedogenesis, burozemic pedogenesis.

Key words: Entropy, soils, processes, differentiation, information, indicates

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Contemporary changes of information characteristics of the humus content in southern chernozems in Western Siberia

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The analysis of transformation of the probabilistic-statistical distributions (PSD) of the humus content in southern chernozems at the studied territory, situated on the Priirtyshsky uval for the 30-year period revealed existence of the tendency to decrease in the humus content in the top layer and its increase in underlying layers of soil. Transformation of PSD of the humus content is followed by very essential reduction of statistical entropy up to 60% of initial value that speaks about essential change of a condition of chernozems in spite of the fact that taxonomically soils had not change. The analysis of information divergence showed that the revealed tendencies in sandy loam version of chernozems are expressed more strongly, than in the loamy soils. And the greatest transformation of PSD of the humus content for the studied period happened in a layer 30-50 cm due to increasing of the low boundary of the interval of variation. The revealed transformations of PSD are interpreted from the point of view of interaction of soilforming, and landscape and exogenous processes.

Key words*:* monitoring, climatic cycle, probabilistic distribution, entropy, divergence

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Amphiphilic components of humic substances and wettability of the soil solid phase surface

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Wettability is one of the most important soil features as it directly influences physical, mechanical, chemical, biological and fertility properties of soils. Surface contact angle of wetting and the hydrophobic-hydrophilic composition of humic substances were determined for densitometric fractions of horizons A1 and AB typical chernozem. It was found that a decrease in contact angle of wetting of densitometric fractions was accompanied by an increase of the relative content of hydrophilic components of humic substances and the reduction of hydrophobic compounds. Our results indicate the heterogeneity of surface wettability of the solid phase components of soils, caused by heterogeneous distribution of hydrophilic and hydrophobic soil organic matter.

Key word: wettability, contact angle, humic substances, densitometric fractions

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Aggregate composition and the contact angle of the solid phase of soil after incubation with peat gel

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Laboratory experiments demonstrated changes in the aggregate state and contact angle of wetting (CA) of solid phase surface (SPS) of dark gray forest soils treated with 5% solution of commercially available preparation "CAVITA BIOCOMPLEX" (Trade and Industry Company "Kavita", Russia). After 14 days of incubation (W 19-20%, 20-22 °C), the content of agronomically valuable aggregates in the original soil and peat gel-treated sample (dry sieving) did not differ. As compared with the control, soil incubation with peat gel resulted in the formation of waterproof aggregates with size of 7 - 0.25 mm, while reducing the content of water-resistant aggregates of less than 0.25mm. After soil incubation with peat gel, SPS contact angle increased by an average of 11.3° for dry aggregates, and by 10.0° for waterproof aggregates. We explain this effect by the localization of hydrophobic (CA 130º) peat gel particles at the outer surface of dry aggregates and sorption of peat gel DOM (CA 54.2°) at mineral particles SPS. These results indicate the potential effectiveness of peat gel as soil amendment. Further studies are needed to demonstrate temporal stability of the waterproof structure as well as the impact of peat gel on agrochemical and microbiological properties of the soil.

Key word*:* soil amendments, aggregate composition, water stable aggregate, peat gel, contact angle

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Collection of soil monoliths as the basis for monitoring of soil in European Russia

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Using a collection of soil monoliths and samples that have temporal and geographical reference, offers a unique opportunity to obtain background characteristics of soils in various region of Russia prior to the commencement of the period of an active technogenic impact on the environment and the global climate change. The collections of soil monoliths of the Dokuchaev Central Soil Science Museum of European Russia totals more than 600 items, the earliest of which have been sampled as far back as in 1915. It characterizes the diversity of the soil cover in all natural areas, some natural reserves, natural and agricultural systems. According to the WRB classification, soils are classified into Albeluvisols, Calcisols, Cambisols, Chernozems, Cryosols, Fluvisols, Gleysols, Histosols, Kastanozems, Leptosols, Luvisols, Phaeozems, Planosols, Podzols, Solonetz, Umbrisols, Vertisols. Comparative chronological and comparative geographical research methods of soil monoliths collections and their modern analogues allow for revealing the trends and the ranges of changes in the soil parameters per profile over the known time intervals, as well as for developing prospective evolutionary models of soils behavior under different scenarios of climate and anthropogenic load on the soils.

Key words: soil types, monitoring of soils and environmental, soils of European Russia

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Application of methods based on synchrotron radiation for assessment of speciation of copper and lead compounds in soil

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The application of the methods based on synchrotron radiation for soil samples is an effective approach for studying the interaction of metal ions with soil compounds and identifying the phases-carriers of metals in soil and their stable fixation. The study of structural organization in different soil samples saturated with Cu^{2+} and Pb^{2+} ions by using X-ray absorption spectroscopy (XANES) and extended X-ray absorption fine structure (EXAFS) allowed determining the mechanism of their interaction with soil phases and all the chemical bindings taken place in the course of this process. Copper is absorbed after being introduced as $Cu(NO_3)_2$, and copper ions are incorporated in the octahedral and tetrahedral sites of minerals and bonded with humic materials at the expense of covalent bond and the formation of coordination humate copper complexes. Lead ions incorporated in the phyllosilicate minerals structure favoring a decrease in the bond distances between Pb^{2+} ions and O atoms in equatorial and axial coordination positions in Pb-bearing octahedrons. Lead ions are sorbed as a bidentate inner-sphere complex at the edges of the octahedrally coordinated aluminum ions.

Key words: synchrotron radiation, XANES, copper, lead

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Indicators of soil ecological condition under pollution of lead

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A system of environmental indicators of soil based on the fractional and group composition of heavy metal compounds is proposed. It includes calculation of the heavy metals mobility in soils and their accumulation in plants and evaluates safety functions of the soil – plant system and the total index of soil contamination. An increase in the environmental hazard has been revealed at the contamination of chernozem with lead. The participation of both strongly and loosely fixed fractions of lead in the development of their mobility in the soils and the sustainability of the soils to their impact has been shown.

Key words: soil, lead, fractional and group composition, environmental indicators

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Soil Protection as an Important Problem of Protection of Azerbaijan Soil Genofond

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Soil resources in various soil-climatic zones of the world are considerably limited both on the area, and on quality. Additionally, ineffective exploitation of soil resources (i.e. inappropriate placing of cultivated plants, building of the industrial enterprises) leads to destruction and degradation of soils, loss of their fertility and their alienation. Therefore, the major problem of rational usage of soil resources is protection of Azerbaijan soils. For the purpose of protection of a unique genofond of the soils, the state laws on the protection of nature and soils. Complex nature protection, organizational, economic, agrotechnical, meliorative, hydraulic engineering, agro chemical actions are provided in these acts. In Azerbaijan works including research with which are connected not only studying of prominent features of soils developing in arid and humid ecological conditions, but also working out of measures on protection of these soils are conducted. The Soil Museum established within the Institute of Soil Science and Agro Chemistry (within the Laboratory of Soil Genesis, Geography and Cartography) has a great importance in this regard. The unique genofond of soil monoliths which includes, sample, relic, seldom met, disappearing and soils of invariable and mountain territories is collected in the Museum. Among these soils tehnogenic polluted soils are demonstrated as well. The important part of the Soils Museum's activity is research of historical annals of formation and development of a soil science in Azerbaijan. The fundamental material collected in the Soil Museum will lay down in a basis of the red book of Azerbaijan soils where protection of soils will be presented separately.

Key words*:* arid soils, degradation, tehnogenic-polluted soils, sample soils

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Soil productive potential assessment of river basins of different ranks

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Soil plays a special role in ground biocenosis as it integrates all the other components in a single functioning system. Ecosystem productive characteristics greatly depend on biocenosis. For the ecologic characteristic of river basins ecosystems we have previously suggested to apply soil productive potential index, which generalizes long term observation data concerning vegetation cover productivity, phytomass accumulation and the factors influencing productive processes activity.

The fulfilled research is based on the basin approach applying the determination method of soil productive potential according to surface and remote data, the assessment method of vegetation condition according to vegetation index NDVI dynamics.

Research objectives included river basins of various ranks situated in the European Russia.

Soil productive potential assessment of 12 major 1st rank rivers in the European part of Russia made it possible to state that the highest values are typical for the Dnieper, the Kuban and the Volga basins ecosystems, but for the latter this value is high basically due to the Oka river basin. Separate parameters analysis of the soil productive potential has revealed that the most substantial phytomass reserve is concentrated in the Neva and the Oka basins.

For the Oka river, taken as an example, the assessment of the spatial – temporal variability of soil productive potential according to NDVI depending on the soil climatic conditions has been carried out.

The dynamics analysis NDVI(MODIS) during the period from 2000 to 2014 in the Klyazma river basin permitted to determine the group of river basins characterized by the index stability and its high values.

Key words: vegetation index, river basins, vegetation cover productivity, soil fertility

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Effects of olive-mill wastewater spreading on the rhizosphere of *Olea europea* L.

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A field experiment was carried out to assess the effect of the spreading of olive-mill wastewater olive (OMW) on the chemical and the bioavailability of potassium in the rhizosphere of the olive tree. The OMW was spread without pre-treatments, on an olive orchard in a Mediterranean environment. The experiment was carried out on the same plots during three years from 2006 to 2008 in Kabylia (North Algeria) with four treatments 0, 50, 100 and 200 m3/ha of OMW. Soils and leaves were sampled in mars 2009. Chemical and potassium analyzes were conducted on three soil fractions: bulk soil, rhizospheric soil and rhizoplan. Foliar potassium is also measured. The results allowed us to identify two effects, a dose effect related to the addition of OMW and effect related to the activity of the root of the olive tree. Thus, a significant increase ($p \leq 0.05$) of the EC, CEC, potassium soluble in water (KS), potassium extractable by N ammonium acetate (KNH4 +) and potassium extractable by Nitric acid (KHNO3) is observed in the all soil fractions with increased addition of OMW. It is interesting to note that the root activity of olive trees decreased significantly ($p \leq 0.05$), pH and EC in the rhizosphere and rhizoplan for all levels of OMW. In addition, a significant increase ($p \leq 0.05$) of soil organic carbon and KS is measured in the vicinity of the root compared to bulk soil. Despite the absence of significant and positive interaction of OMW treatments with root activity of olive trees on the content KNH4 +, the results indicates an increase of KNH4 + in the rhizosphere amended with 200 m3/ha. Thus, KNH4 + reached 51.87mg/100g of soil in the rhizosphere of olive amended with 200 m3/ha of OMW, which is above the needs in bioavailable potassium of the olive tree. Consequently, potassium foliar levels show that olive leaves has adequate potassium nutritional status. Addition of OMW associated with the root activity has improved not only the quality of the bulk soil but also the bioavailability of potassium in the immediate vicinity of the root of the olive tree.

Key word: potassium, rhizosphere, olive tree, olive-mill wastewater

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Spatial variation microelements in soils Perm krai

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The studying microelements content in the soil is one of the important criteria for evaluating the fertility of soil. Microelements content in the soil depends on the type of soils, properties and many other factors. Anthropogenic loading in bigger or smaller intensity can change elements content in the soils. In Perm Krai sod-podzolic soils of heavy granulometric composition occupy 69.6 % of the area of an arable land, characterized sour reaction of the environment, the relative poverty in elements and organic substance, is poorly expressed by structure, the availability of the inert podzolic horizon. We have investigated the content and spatial distribution of boron and zinc in sod-podzolic heavy loamy soils. Mathematical processing of experimental results testified the direct dependencies on the content of boron and zinc in the soil of organic carbon content (r = 0.908-0.949) and electrical conductivity (r = 0.683-0.841). Studies have shown that the boron and zinc content in the fine sod-podzolic heavy loamy soil is very high (3.83-36.77 and 1.38-6.75 mg/kg respectively) and is subject to strong variation in the experimental area (CV = 44 and 65% respectively).

Key words: boron, zinc, sod-podzolic soil, variation, distribution, statistical indicators

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A new approach; release of ambient phosphorus by silicate minerals in maize crop

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A pot experiment was performed on normal sandy loam soil to elevate the effect of silicon on the release of phosphorus from different inorganic and organic sources. Following silicon, phosphorus and compost treatment were applied during the study T_1 = Control (0 P and silicon), T_2 = Rock Phosphate 0.27 % of soil weight, T_3 = T_2 + Sodium Silicate 0.5 % of soil weight, T_4 = T_2 + Amorphous silica 1% of soil weight, T_5 = compost 2 % of soil weight, T_6 = T_4 + compost 2 % of soil weight, T_7 = T_3 + compost 2 % of soil weight, , T_8 = SSP 0.3 % of soil weight + Amorphous silica 1% of soil weight, T_9 = SSP 0.3 % of soil weight + Sodium Silicate 0.5 % of soil weight and T_{10} = T_2 + compost 2 % of soil weight. Results revealed significant concentration of phosphorus in soil and in the maize plant, similarly the silicon concentration in the soil. The application of silicon by various methods had significant effect on maize crop and its nutrient quality. The application of silicon in combined with phosphorus sources and with compost boosted the plant height. Soil application of phosphorus along with different sources of silicon significantly enhanced grains yield, total bio mass of plant, concentration of silicon and phosphorus in soil and uptake of these nutrients in maize plant. From results it is concluded that the effect of Silicon on the growth of maize crop was clearly shown when P was applied in combination with Si and with compost as compared to control and other treatments.

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Internal soil moisture exchange and chemistry of interstitial and ground water

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Experimental studies have defined how infiltration and evaporation of groundwater in the sod-podzolic soil are related: for the medium-drought conditions of atmospheric moistening it is 0.3-0.6, while for the mean annual precipitation it is equal to 2.6-2.9. The loss of potassium, calcium, magnesium, zinc and manganese under the grass sward respectively amounted to 0.95, 89.0, 37.7, 1.42 and 1.40 kg / ha per year. With capillary seepage 0.19 kg / ha of potassium (20% of the losses caused by infiltration of precipitation), manganese (16.4% of the losses), calcium (15.0%), zinc (13.4%) and magnesium (9.0%) are brought back into the root layer of sod-podzolic soil. It has been detected that in case the groundwater is close to the surface, evaporation of water from the surface leads to disruption of the capillary network. In case the power of soil monolith increases, the volume of soil moisture infiltration and removal of nitrates under both kinds of grass (cereal and legume) decreases.

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The use of municipal sewage sludge to fertilize the soil - technological possibilities and legal regulations in Poland

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Management of the growing volume of sewage sludge is one of the most important environmental problems in Poland. The selection of the most optimal method of its treatment is the priority of each sewage treatment plant and is strictly related to legal conditions. Sewage sludge regularly tests positive for e.g. heavy metals, polycyclic aromatic hydrocarbons, pharmaceuticals, flame retardants, phthalates, dioxins, and pathogenic microorganisms. Of the "thousands" of contaminants that have been found in sewage sludge, the Poland government regulates exactly 9 of them (seven heavy metals, pathogenic bacteria: Salmonella, parasite eggs: Ascaris sp., Trichuris sp., Toxocara sp.) if you want to use sludge in agriculture or in recultivation. On the other hand, sewage sludge is known to be rich in nutrients (nitrogen and phosphorous), organic matter and trace elements that are beneficial for plant growth and better yield. Application of sludge has been observed to improve the physico-chemical and biological properties of soils.

The paper describes the technological possibilities and legal regulations of sewage sludge using to fertilize the soil in Poland. The analysis has been drawn up in connection with the new restrictive criteria related to the spreading of hazardous substances in the environment and to biological hazards. The final selection of the sludge management method has been made in terms of the technical, ecological and economic aspects.

Key words: sewage sludge, compost, post-ferment, management, fertilization, legal conditions, risks, environmental

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Spatial analysis of radar satellite imagery of degraded soils using additional modules of ArcGIS spatial analyst

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This article explores possibilities of the tool surface. As an input raster for analysis selected radar image of western part of the mountain Nurata. Radar images contain the geographic coordinates as well as elevations. Because of these properties, radar satellite imagery allows us to create a digital elevation model.

Isolines are a useful representation of the surface, as they can simultaneously visualize flat and steep areas, mountain ranges and plains. Shows a contour map of the study area, where it can be easily identified areas with the same absolute altitude. For example, the highest part of the mountain has the Aspect Tool - determines the direction of the slope maximum rate of change of values from each cell to neighboring cells. Data obtained from exposure tool has oriented nature and graded by 22.5 degrees relative to the sides of the light. Figure 3 slopes oriented to the north (0-22.5 stretch and 337.5-360 degrees) have a red phototonus slopes oriented to the east (stretch 67.5-112.5 degrees) have a yellow phototonus and the remaining slopes oriented in other parts of the world are represented in the legend of the map with the altitude 1700 - 1968 meters and represented as red color.

Key words: integrated analysis, spatial images, phototone, digital module of the relief

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Environmental assessment of pollution of heavy metals soil Baku

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One of the major sources of negative impacts on the environment in Baku is road transport, which contributes significantly to soil contamination with heavy metals. The effects of heavy metals on the activity of soil enzymes of urban soils of Sabail district of Baku have been studied.

As a rule, lead is considered to be one of the most significant pollutants of soil in the cities, influence of lead on the biological properties of urban soils of Baku has been surveyed.

With the increase of lead in the soil, as far as we are concerned, a regular increase in catalase activity has been observed. Thus, compared with the control, an increase in catalase activity with lead content in soil occurs yet at the concentration of 1 MAC (maximum permissible concentration), which is greater than 33%.

With the increase of lead content in the soil tends to decrease the influence of invertase activity under the lead.

With the increase of lead content in the soil, tendency to a slight increase of urease activity is observed. Thus, from the explored parameters of the enzymatic activity, the greatest response to soil lead contamination has been observed in the enzyme catalase. This allows the catalase activity of soil to be used as an indicator of pollution of urban soils of Baku with heavy metals, including lead.

The obtained results allow us to judge about the changes of catalase activity of soil under the influence of anthropogenic pressure and shows that catalase activity may serve as a biological indicator of soil pollution by hydrocarbons.

Key words: biological activity of soils, heavy metals, soil enzymes, urban soils

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Vermicomposting from waste sludge of sugar factory

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In this study, it is intended to obtain vermicompost fertilizer from sludge (PKF soil and decanter sludge (DS) which creates a major environmental problem for sugar factories. The mixtures which were prepared in different proportions (A: 100% DS, B: 100% PKF soil C: 70% DS + 30% farmyard manure (FM), D: 70% PKF soil + 30%FM, E: 60% DS + 20% FM+ 20% Pulp waste, F: 60% PKF soil + 20% FM + 20% Pulp waste, G: 50% DS+ 50% FM, H: 40% DS+ 60% FM, I: 30% DS+ 70% FM, J: 25% DS + 75% FM, K: 20% DS + 20% PKF soil + 60%FM, L: 25% DS + 25% PKF soil + 50% FM and M: 100% FM) were placed in 2 kg pots and were exposed to 60% moisture. Ten pieces of *Eisenia fetida* were put in each mixture and pots were incubated in a climate chamber at 21^0C. Worms were collected manually from the pots at the 90^{th} day of incubation, vermicompost was dried and sieved from 2mm size and it was made the analysis of total carbon, nitrogen, C/N ratio, pH, EC, calcium carbonate, available P, total Cd, Pb, Cr, Zn, Fe, Cu, Ni , Hg, B, Ca, Na. Also, total Cd, Pb, Cr, Zn, Fe, Cu, Ni, Hg, B, Ca, Na analysis were performed after weighing to worms and determining how many worms were existing. According to experiment results, it was determined that; worms did not survive in the mixtures which included more than 50% DS or PKF soil while worms performed required activity and created vermicompost in the mixtures which included 20% - 50% DS or PKF soil. All the vermicomposts obtained from the mixtures between G-M treatments – except Ca - have required contents of worm fertilizer. Only in the mixtures with PKF soil, Ca content of worm fertilizer was determined higher than the Ca amount should be included in vermicompost fertilizer.

Key words: sugar factory, decanter sludge, vermicompost, Eisenia Fetida

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Thresholds of copper and arsenic toxicity in field-collected agricultural soils exposed to copper mining activities in Chile

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Several previous studies highlighted the importance of using field-collected soils—and not artificially-contaminated soils—for phytotoxicity tests. However, the use of field-collected soils presents several difficulties for interpretation of results, due to presence of various contaminants in the soil and unavoidable differences in the physicochemical properties of the tested soils. The objective of this study was to estimate thresholds of copper and arsenic toxicity in topsoils of 27 agricultural areas historically contaminated by copper mining activities in Chile. We performed emergence and early growth (21 days) tests (OECD 208 and ISO 11269-2) with perennial ryegrass (*Lolium perenne* L.). It was possible to determine EC_{10}, EC_{25} and EC_{50} of total Cu in the soil of 327 mg kg^{-1}, 735 mg kg^{-1} and 1144 mg kg^{-1}, respectively, using the shoot length as a response variable. We also performed standardized earthworm reproduction tests (OECD 222 and ISO 11268-2) with *Eisenia fetida*. Arsenic was a metal of prime concern for *Eisenia fetida*, while Cu exhibited a secondary effect. It was possible to determine EC_{25} and EC_{50} values for total As in the soil at 13 mg kg^{-1} and 21 mg kg^{-1}, respectively, for the response of the cocoon production, and EC_{25} and EC_{50} of total As in the soil of 18 mg kg^{-1} and 27 mg kg^{-1}, respectively, for juvenile production.

Key words: bioavailability, earthworm, *Eisenia foetida*, metal toxicity, ryegrass.

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The possibility of using waste biogas plant ("Samorodovo") as an organic fertilizer on maize varieties Kubanskiy 141 MV

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The most progressive method is anaerobic digestion (methanogenesis) or fermentation of liquid manure/litter. Biogas plants not only lower the class of danger of livestock waste and contribute to production of organic fertilizers that are easily absorbed by plants, but also allow to obtain electric and thermal energy. Object of research – a liquid biofertilizer "Samorodovo". It is a product of biotechnological processing of quail droppings. Bioenergy plant constructed by the company "EnergoRezhim" (Perm) in the peasant economy of Vladimir Raszyn (village Katishi Krasnokamsky district of the Perm region). Highest cellulolytic activity in the experiment was observed with the application of the fertilizer "Samorodovo" in a dose of 11.7 ml/kg. Lowest cellulolytic activity was obtained when fertilizer application is "Samorodovo" in a dose of 7.1 ml/kg. Study of catalase activity in soil showed that the highest activity was observed in the control variant. The lowest catalase activity in soil was observed in the variant with application of the fertilizer "Samorodovo" in a dose of 15.6 ml/kg. Firm "EnergoRezhim" (Perm) plans to conduct research on the use of for operation of the biogas plant *Heracléum sosnówskyi* M.

Key words: laboratory experiment, catalase activity, cellulolytic activity, *Heracléum sosnówskyi* M.

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Optimization of the soddy-podzolic soil structural condition at different sysytems of its cultivation

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According to our data, the use of the minimal cultivation contributes to decrease of the density of composing of the arable layer (0-20 cm) to 1.39 g/cm^3 in comparison with the moldboard cultivation, where this indicator is 1.46 g/cm^3.

The uniform distribution of agronomically valuable aggregates (10-0,25 mm) in almost all the examined layers is observed at ploughing.

At the same time, in the variant with the minimal cultivation, the maximum content of the agronomically valuable fraction and water-stable macro-structure is observed mainly in the top layer (0-10cm) and is 33,9% and 47.8% respectively.

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Approximation of soil aggregates wedging resistance on water content dependence

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The approximation parameters reflect the specificity and features of the soil characteristics for the studied object. The suitability of mathematical equations has been considered for the description of the wedging resistance of soil aggregates, the past as a function of the water content and the decomposition dynamics of the soil aggregates in time, the selection of the best model, and the statistical analysis of the parameters of the corresponding models. The quantitative analysis of the interrelations between the parameters characterizing the wedging resistance of soil aggregates *Pm* as a function of the water content, *W*. The exponential equations $Pm = b_1^{'} \cdot \exp(-b_2^{'} \cdot W)$ are best suitable for describing the dependence of the wedging resistance of the aggregates on the water content, the power equations $Pm = \left(\frac{W}{c_2}\right)^{-c_1}$ best approximate the dependence of the wedging resistance of soil pastes on the water content in the range from the liquid limit to the plastic limit. The use of mathematical parameters of approximation (*b1, b2, c1, c2*) provides more exact and profound comparative and quantitative analyses of soil objects.

Key words: mathematical models, quantitative estimation, comparative analysis, soil properties

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Classification of rubber zones using remote sensing and GIS

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The purpose of this paper is to guide rubber growers to plant rubber in the most suitable locations and appropriate areas according to the rubber zones. A new system has been developed for classifying rubber zones based on soil attributes, topography, climate, remote sensing and GIS. Rubber zones were delineated based on Landsat TM453 using visual interpretation technique and verified by field checking. Five classes of rubber were identified – young, matured, old, abandoned and rubber in mixed horticulture. Through GIS overlaying and analysis, rubber areas were zoned into three main categories i.e. topography, climates and traditional areas. The total areas delineated as rubber zones for Peninsular Malaysia was 1,145,634 ha; rubber zones based on topography was 589,563, based on climate was 161,543, and based on traditional areas was 155,071 ha. Based on the system, the rubber zones are mostly located in the northern part of Peninsular Malaysia i.e. in the state of Kedah, Perlis, Kelantan, Perak, Terengganu and Pahang. The location of rubber zones in other states were also systematically delineated and demarcated using the system. The study provide vital information for the formulation of sustainable development plan for rubber, and recommended that the system can also be adopted for other industrial crops.

Key words: Hevea brasiliensis, remote sensing, GIS, soil attributes, topography, climate.

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Legal mechanisms seizure of agricultural land

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The removal of agricultural land at the federal level is regulated by the Land Code, the Civil Code, the Federal Law №101 «On circulation of agricultural land».

The criteria for a significant reduction in soil fertility and environmental degradation are written in the regulations of the Government of the Russian Federation (№ 736, № 612, № 369). However, these criteria need to be improved for the following reasons:

1. The allowable percentage reduction of chemical indicators have no clear justification.
2. The list of criteria is not completed and can be significantly expanded.
3. There is no developed and approved methodology for determining the areas occupied by forest, bushes and hillocks.
4. It is very doubtful that the hillocks can occupy more than 20% of the land. Author's research shows that this index (percent) is significantly lower.

Thus, the legislation in the area of seizure of agricultural land needs some work.

Key words: land law, the criteria for a significant reduction in the fertility of land, failure to use the land, land with hillocks

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The Gene Pool of Volgograd region soils

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Initially, a soil is full of manifested and potential properties inherited from the parent rocks. Genetic diversity, provincial identity, age and evolution, individual characteristics, and morphological features are typical of any soil. Similarly to the Gene Pool of Living Organisms, we offer not only introduce a concept of "the Gene Pool of Soils", but to develop its content and structure.

A structure of the Fund of Soil And Genetic Diversity that consists of three sections is the most preferred; each section has to contain not only cadastral valuation, but also scientific and methodological recommendations for soil conservation and rational exploitation. 1. The soils of agriculturally used areas. 2. Soils alienated from ecosystems of non-agricultural purposes. 3. Soils of specially protected natural reservations (SPNR).

The Gene Pool of Soils will give a possibility to reveal a degree of soil specialness, evaluate the significance of zonal soils in each region, to preserve and restore disturbed soils. The Fund of Soil and Genetic Diversity is needed as a foundation for creating a real ecological and economic value of such unique natural, almost non-renewable resource as a soil.

Key words: the fund of soil and genetic diversity, provincial peculiarities

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Sandy soils: genesis and evolution

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In order to make a route on the sandy soils evolution in coastal region of southwestern Europe. The location of the analysis space is part of the Aveiro Lagoon (Portugal), which geologically dominate the wind sand and old sand dunes. Since this is a place of extreme fragility and buffeted by external agents to which it is exposed, the demand for its stabilization has been a constant over time. Usually the intervention of man appears as a negative factor to the balance of the ecosystem. Here the ecosystem construction (creation) had the man as principal balance search engine and appropriate solutions. It is known that sand, sedimentary rock not aggregate, evolves into sandy soils with great difficulty. This is because often existing instability due to their constant mobilization prevents the desired development of the ground. Here's how the man has a positive contribution to the establishment of sand and evolution of sandy soils through techniques that he himself is an active agent in this building through (1) control of the water, (2) implementation of vegetation, (3) vegetation control), (4) control of the winds, (5) Animal control action (...) among others.

Key words: sandy soils, anthropogenic factors, soil evolution, Coastline

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Main nutrient contents of karayemiş (*Prunus laurocerasus l.)* in different growing media

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Karayemiş plant known by the name of Taflan is cultivated as fruit and ornamental plant which is widely grows Eastern Black Sea region. In recent years, different mediums and ingredients are among the topics being studied on propagation and growth. In this study, the influences of inorganic and organic mediums on some nutrient element contents of Karayemiş cuttings were examined.

Trial was established according to randomized parcels experimental design and as five rooting mediums (perlite, pumice, forest soil, manure and hazelnut husk), six different mixes of the prepared in a 1:1 ratio (perlite:hazelnut husk, perlite:forest soil, perlite:manure, pumice:hazelnut husk, pumice:forest soil, pumice:manure), a total 11 mediums and a three replicates. As plant material, semi-woody cutting used in from laurel trees. At the end of trial, root and leaf dry weight, and the percentage of nitrogen, phosphorus and potassium of roots and leaves were investigated.

The presence of organic materials in growing medium was effective in increasing the plant's nutrient content. Organic mediums, especially hazelnut husk has remarkable effect on these parameters. Hazelnut husk has high N, P and K content, so it has been the most effective medium on the nutrient content of roots. Similarly, hazelnut husk media was effective such as leaf dry weight, P % and K % contents of leaves, but perlite:hazelnut husk media on N% content of leaves was determined to be effective. Hazelnut husk medium is recommended as a suitable media for cultivating of Karayemiş cuttings.

Key words*:* dry weight, nitrogen, phosphorus, potassium

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Dissolved organic carbon and sulfur fractions in the drainage water of hydroameliorated agricultural areas in Croatia

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This study provides the first investigation of dissolved organic carbon (DOC) and dissolved organic sulfur (DOS) in the drainage water of the experimental amelioration fields in the Sava river valley (45º33'52''N/16º31'33''E), the hydroameliorated agricultural area in Croatia Characterization of DOC and DOS fractions was carried out using electrochemical methods. Characterization of DOC includes measurements of surface active substances (SAS) and copper complexing capacity (CuCC). DOC concentrations varied between 1.065 and 9.928 mgC/L with average value of 5.163 ± 2.529 mgC/L. The relative concentrations of SAS were in the range 0.105 to 0.454 mg/L eq. of Triton-X-100, with average value of 0,359±0,102. mg/L eq. Triton-X-100. CuCC were in the range 0.103 and 1.400 µmol Cu^{2+}/L. The organic matter in the drainage water samples was mainly characterized as humic/fulvic type but the high precipitation event can influence in appearance of the strongly adsorbable/hydrophobic substances.

The characterization of DOS includes measurements of organic and inorganic reduced sulfur species (RSS) at the Hg electrode. The RSS concentration including inorganic and organic fractions was in the range between 0.236 and 0.357 µM. The organic sulfur fraction was lower (up to 36%) than inorganic fraction (up to76%).

K**ey words**: dissolved organic carbon, surface active substances, copper complexing capacity, dissolved sulphur fraction, drainage water

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Possibility of recovering soil nutrients from floodwater spreading

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Flood water contains high amount of sediment that can affect the fertility of the coarse grain alluvial fans and flood plains through increasing nutrients. In this study, the effects of the flood water spreading on the soil nutrients recovery were investigated during 10 years at the Poldasht Flood Spreading Station of West Azerbaijan in Iran. Flooded three upper strips were selected at the flood spreading system. Three composite samples resulted from mixing four samples, in each strip were taken at of 0-30 cm depth. At first, soil organic carbon (SOC) and total nitrogen (TN), exchangeable phosphorus (P) and potassium (K) were determined at the laboratory. To statistically analyze the data, t-test, in case of normal distribution, and otherwise non-parametric test of Kruskal Wallis were used. Results showed the amount of SOC and TN increased from 0.23 to 0.33% and 0.027 to 0.039%, respectively. Noticeably, SOC, TN and P content in the upper strips were significantly more than in the lower bands ($P \leq 0.05$). Also Exchangeable P and K were significantly increased from 2.69 to 5.32 and 145.93 to 206.52 ppm respectively, but there was no significant change in K content. These results showed that flood water spreading increased the soil nutrients which may mean reducing the fertilizer requirement.

Key words: sediment, exchangeable ions, soil nutrients, flood water spreading

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Optimizing land use Pattern to reduce soil erosion

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Soil erosion hazard in catchments are the major problems that can affect ecological balance of such areas. This study aimed to determine the optimal use of land to reduce erosion and increase the resident's income of Qushchi watershed in West Azerbaijan province. Income and expenses for the current land uses were calculated with field studies. Damages resulting from the soil erosion were estimated by soil depth equal to the specified land uses. For three different options including the current status of land uses without and with land management, and the standard status of land uses, multi-objective linear programming model was established by LINGO software. Then the optimization problem of the land use was solved by simplex method. Finally, the best option of land use was determined by comparing erosion rate and its cost in each scenario. Then the circumstances and the recommended conditions were compared. The results indicated that the current surface area of current land uses is not suitable to reduce erosion and increase income of residents and should change in the optimum conditions. At the optimum level, horticulture area of 408 to 507 (ha), irrigated land area of 169 to 136 (ha) and Dry farming of 636 to 570 (ha) should change while conversion of rangeland area not indispensable. In addition, the results showed that in case of the optimization of land use only, soil erosion and the profitability of the whole area will 0.75 percent decrease and 3.68 percent increase respectively. In case of land management practices, 42.27 percent will decrease and 21.39 percent increase and with the standard conditions 60.95 percent will decrease and 24.20 percent increase. The results of the sensitivity analysis showed that the change in the horticulture and range land have the greatest impact on increasing profitability and reducing soil erosion of Qushchi watershed.

Key words: linear programming, land management, soil erosion sensitivity analysis, profitability

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Background concentration of heavy metals in soils of modern delta of Ili river

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Kazakhstan is the tenth largest countries of the world on territory and currently according to all parameters of ecological status of natural and cultural terrains, it becomes more vulnerable to anthropogenic and technogenic environmental changes. Processes of aridity, soil degradation and pollution are strengthening. Environmental problems of downstreams of major rivers of the country are mainly related with irrational use and pollution of soil and water resources. It is a well known fact that all major rivers of Kazakhstan are trans-boundary and currently are under enormous environmental stress caused by pollution of industrial and agricultural flows from neighboring countries. All water sources of pollution, finally, fall into soil horizons of lower natural and technogenic irrigation terrains.In this regard, main objective of the research work is to determine the background of heavy metals in soils of modern delta of the Ili river.The research object - is soil surface in modern delta of Ili river that occupies the south-western part of the Balkhash-drainage basin. As a result of the research the background concentration of heavy metals in soils of modern delta of Ili river has been determined. Soils of saline and meadow rows distinguish in high concentration of gross and mobile forms of the investigated metals. Sandy and takyr soils in the explored area compared to the soils of saline, meadow and swamp rows are characterized by reduced concentration of heavy metals.Based on the obtained data we can conclude that accumulated heavy metals in soils, like other chemical elements are included in local and regional migration cycles, are redistributed and accumulated in soils according to the specifics of their formation and development. Their level of accumulation in certain soils is subject to the intensity of main manifestations of dominant zonal and intrazonal factors of soil formation and their combinations.

Analysis of cartographic material showed that according to the investigated metals, gross forms of explored heavy metals are concentrated in soils which refer to the 4th group or higher, and mobile forms mainly refer to the soils of 5th group and higher.

Key words: soil pollution, heavy metals, soil-formation factors

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Study of the direct seeding influence on the agronomic potential of the soil case the town of Tissemsilt-Center of Algeria

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The town of Tissemsilt is characterized by a very significant wind activity that is why a strong erosive power. In addition to this erosive effect, the case of the province of Tissemsilt is subjected to a high urban concentration and various economic activities, agricultural, industrial and and the port that threatens the ecological resources, which are basic balance . This work is a contribution to the diagnosis of the state of degradation of our study area subject to various agricultural and industrial constraints and which are subject natural resources soil and water. One important result of this approach that's the degradation exists in several forms at the same time remains undervalued because it hasn't taken enough attention from scientists or even socio-economic operators. This technological development must concern to the management of harvesting residues and at the seedling time, the crops implantation, the fertilization of fundus and the weeding practices. This technological development of crops chess in relation to the edaphic conditions. The direct seeding preserves the environment by reducing the loss soil and nutrient elements and practices the treatment products for the improvement the quality of the water and the air. The no-tillage is the privileged mean to combat water erosion and wind. In point of fact the cover by crops residues control the losses in Water by runoff and by wind.

Key words: tissemsilt, the direct seeding, degradation soil, pollution soil, water resources.

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Using WEPP-Road Model to Assess Forest Road Contributions to Total Sediment Loss within the Godrahav Creek Watershed

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Accelerated soil erosion is currently accepted as the most important environmental problem in Turkey, mainly due to excessive and inappropriate uses of natural resources for many years. Besides agricultural areas, disturbed forests, burned areas, forest roads can also be listed as the most important sources for soil erosion. However, estimating soil loss is both time consuming and costly process since so many factors including climate and soil properties, topographic conditions, vegetation cover and human interferences must be investigated. Therefore, the number of studies using models such as USLE (Universal Soil Loss Equation), SWAT (Soil and Water Assessment Tool) and WEPP (Water Erosion Prediction Project) to find out soil loss and/or sediment yield has been increasing and their application in the country is spreading especially in the last decade. In this study, sediment amounts occurring from forest roads within the Godrahav Creek Watershed, a sub-watershed of Çoruh River Watershed located in Artvin, were estimated using WEPP-Road Model. For this purpose, 12 different forest roads (each road was divided into 3 segments) were chosen. Data consisting of slope, length, width, type and surface of roads, traffic degree, fill slope and length, buffer zone slope and length, and rock content for each 36 segment were determined and the sediment amounts were estimated by running the model. The results showed that 16.87 ton/ha/yr sediment were produced from the forest roads while the amount of sediment yield reached to 746.15 ton/ha/yr when all the forest roads within the Godrahav Watershed were considered. Moreover, it was assessed that the contribution ratio of all the forest roads to the total sediment produced within the whole watershed was 2.6%.

Key words*:* coruh river watershed, forest roads, sediment yield, WEPP-Road model

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The methodology study for determining magnesium fertilizer requirements in hazelnut (*Corylus avellana* L.) cultivation

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Magnesium is the most important nutrient among basic cation and adequate supply of magnesium is required for the maximum yield and nuts with high quality. This methodology study aimed to determine magnesium fertilizer requirement depending on the existing magnesium levels of hazelnut orchard soils in the Black Sea region and it also aimed to be done the recommendation of magnesium fertilizer with a practical method. The trial was carried out at 'Tombul' hazelnut orchards in Hazelnut Research Institute for three consecutive years. The experiment was designed as a randomized complete block design with five different magnesium doses and three replications per treatment. Hazelnut orchards were fertilized with 0, 100, 150, 200 and 250 Kg ha^{-1} magnesium in each year. The modified Mitcherlich equation Log (A-y) = Log A-$c_1.b_1$ was used in order to determine the impact value of existing magnesium in soils and fertilizers. Using Mitcherlich equation, the impact value of the existing magnesium in the trial orchard soils was found as c_1=0.00266, the impact value of magnesium in the fertilizer was found as c=0.00182. Magnesium fertilizer amounts which should be used according to the contents of various magnesium nutrient elements in the soils were calculated by using the log (A-y) = logA-c_1b_1-cx equation. The obtained data were analyzed with regression and to achieve the maximum yield values at different rates, the formula $Y=a+b_{yx}X$ can be used on the calculation of the amount of fertilizer. The useable and practical methods on the magnesium fertilizer recommendations were determined as Y_{90}=549.4-1.46X, Y_{92}=602.7-1.46X, Y_{94}=671.3-1.46X, Y_{96}=768.1-1.46X, Y_{98}=933.5-1.46X and Y_{99}=1098.9-1.46X in order to obtain different high yield levels in hazelnut cultivation.

Key words: *Corylus avellana* L., magnesium, fertilizer requirement, yield

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Estimating of boron transport in different soil water flow velocities

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The presence of coarse materials in soils accelerates the water and solute transport on one hand and decreases the leaching efficiency on the other. In this work, it was aimed to know that the effects of cobble rate and size on the movement of reactive boron through the soil. The washed river cobbles were sieved to separate size classes (16- 8, 8- 4, and 4- 2) and mixed thoroughly in different rates (gravimetrically 0, 10, 20, %) for each cobble size. The mixtures were packed uniformly into plexiglass columns with the perforated bottom (height 20cm, inner diameter 5 cm). Soil columns were firstly saturated with 0.01N $CaCl_2$ solution by capillarity from the bottom of the columns before leaching and leached with 0.05 N H_3BO_3 without ponding by Marriott bottles. When the boron concentration of the effluents reach the initial concentration (C/C_0=1) leaching solution was replaced with 0.05 N $CaCl_2$ and leached until the constant concentration. Effluents were analyzed for EC, pH, and B by azomethine-H method and ICP-OES. STANMOOD software was run to estimate the breakthrough curves and to calculate the transport parameters. Breakthrough curves as a function of volume differed through the columns due to the various saturated hydraulic conductivity (K_s). All the breakthrough curves are asymmetric. The slope of the curves until C/C_0=0.8 has a steep behaviour, and afterwards began to decrease until C/C_0=1. Generally the analytically determined breakthrough curves are in agreement with the estimated curves.

Key words: boron, breakthrough curve; convection–dispersion equation, ion transport, transport parameters, water flow velocity

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Development of carbon balanced model of agriculture soil management on background of climate change

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21st century brought a new concern about sustainable utilization of resources along with exploration of renewable resources. This revision of resource planning has intensified due to an overture of a global issue i.e. climate change. Most of the resources are facing new challenges due to global warming and climate change. One of the most affected resources is Agriculture. This change may leads to severe impact on Indian agriculture and subsequently on food production. In addition with this, agriculture ecosystem is acting as a source as well as sinks for green house gases (GHG). Improper soil management practices are one of the major reasons for addition of CO_2 in atmosphere. On the other hand if we handle agriculture soil properly it can be act as a potential carbon sink for sequestration of CO_2 from the atmosphere. A soil resource has a potential of 2500 petagram carbon storage, from which 50 % of it was lost historically due to faulty management practices. In the present study various improved soil management practices were studied and it is observed that it is possible to achieve 50 – 241 % increase in organic carbon content of soil which is an indicator of carbon sequestration. Improved practices were followed in Groundnut-Onion rotation for two years and level of organic carbon was analyzed. It is observed that mulching increases soil organic carbon from 1.42 % to 2.14%; also addition of organic manure shows increase from 0.86% to 2.94% in organic carbon content. A carbon balanced model of agriculture soil management were studied and discussed in the paper.

Key words: agriculture, climate change, carbon sinks, carbon balance, soil management

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A combined gis-analysis of major forest-forming conifers, soils and climate distributions in central Siberia

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Our goal was to determine relationships between major forest-forming tree species and ecological factors (climates and soils) in central Siberia and to apply these relationships to modeling and predicting their distributions based on climatic and soil GIS layers. In our regional SibForClim model, the input climatic layers were: 1. growing degree days, base >5^{o}C; 2. negative degree days, base <0^{o}C, and 3. annual moisture index, representing respectively summer warmth, winter cold and dryness stress conditions. Permafrost was explicitly taken into account. The output layers were: a major forest-forming tree species and its productivity (site index). This model was updated with soil types that were derived from the Soil Map of Russia (1988). Superimposing forest tree species distributions from the Map of Russia's forests (1990) and soil types using the GIS-techniques we concluded that probabilities of each tree species occurrence were associated with particular soil types. Thus, the tree species distributions are to be mapped using surface climate, soil and permafrost layers. The next step to extend the SibForClim model is to include the soil climate being a function of surface climate, soil morphology and local microrelief.

Key words*:* a bioclimatic model, major tree species, soil types, central Siberia

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The dynamics of mineralization of plant residues in mineral substrates of various composition

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The dynamics of mineralization of plant residues (PR) of maize and clover was studied in incubation experiments. The substrates were as following: quartz sand, sand + 15 % bentonite, sand + 30 % kaolinite, and loam. The incubation was performed during 180 and 570 days at permanent conditions: 20^{o}C and 60% of water holding capacity. The kinetic parameters were calculated from the curves of dynamics using binomial exponential polynomial of the first order: the shares of labile (LP) and sustainable (SP) pools of organic carbon ($C_{org.}$), the constants of mineralization, and the times of turnover. It was shown that for all cases the kinetic constants of LP (k_1) mineralization exceeded those of SP (k_2). Minimal rates of LP decomposition of maize belonged to the loamy substrate, maximal ones - to the substrate with kaolinite, and k_1 (clover) >> k_1 (maize). Evidently, the labile components of maize were stabilized by loam stronger compared to those of the clover, and therefore, were more slowly decomposed by microorganisms. The turnover time of clover LP (4-9 days) for all substrates, of maize for sandy, kaolinite, and bentonite substrates (8-10 days) was typical for organic acids, amino acids, and simple sugars. The 46-day turnover time for LP of maize in the loam substrate was a result of strong stabilization of its components. The turnover time for SP of clover (0.95 years) was less than that of maize (1.60 years) and was in consent to the turnover time for biomass of plants.

Key words: labile and sustainable pools, stabilization, organic carbon

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The impact of floods on the structural stability of microaggregates in agricultural soils of the Republic of Serbia

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After the catastrophic floods in the Republic of Serbia, during May 2014, evaluation of the impact of flood waters on the structural stability of microaggregates in soil samples from fifty locations was done. The soil structure is one of the characteristics that greatly affects the fertility of the soil, and develops gradually through the complex physical and chemical processes. It is a very dynamic parameter, especially in the topsoil horizon (which was actually examined in this study), since the changes can occur under the influence of climatic factors, crops and tillage. In the analysed soil samples in disturbed state it was determined the ratio between the total content of particles of less than 0.002 mm (clay) in soil samples prepared with sodium pyrophosphate ($Na_4P_2O_7$ x 10 H_2O) and the content of such particles in soil suspension prepared with water (H_2O). The degree of the stability of microaggregates was expressed according to Vageler, in relation to their estimated stability index. The obtained results showed that the analysed soil samples had stable to very stable degree of the structural microaggregates stability and that flood waters have not significantly influenced the tested parameter.

Key words: agricultural soil, structural aggregates stability, clay, floods

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The use of humic preparation BIO-DON on chernozems

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Growth stimulating activity of humic preparations is due to the chemical composition and molecular structure of humic preparations, and associated properties, caused by the characteristics of raw materials to obtain them. Microbiological analysis of humic preparation BIO-DON, which is produced from vermicompost, has shown that this product contains valuable cultures of *Bacillus sp.*

The study of the influence of the preparation on the crop yield and properties of ordinary carbonate and south chernozems confirmed its high efficiency. Experiments have shown, that yield increase of winter wheat after treatment with humic preparation BIO-DON was up to 12 centners per hectare more in comparsion to control, sugar beet – 22 cwt\hectares, sunflower – 3.4 cwt\hectares.

The study of the dynamics of mineral elements, enzymatic activity, microbiological composition confirmed that humic preparation BIO-DON has an active influence on the proportions of nutrients in solution, promoting optimization of plant growth and development conditions. Preplant soil treatment with the preparation, especially in combination with foliar treatment contributes to the biological activity of soil. Stimulation of the numbers of soil microflora reached up to 150 % for some groups of microorganisms.

There was also an improvement in structural state: the number of agricultural valuable units and their water stability has increased, hence the water-air regime of soil is improved.

Key words: fertility, soil, Rostov region, humic substances

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The infrared imagery for the analysis of morphological and physical properties of soils

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The results of the study of radiometric temperature of soils in the infrared spectrum are presented. The possibilities of radiometric remote sensing technique for studying temperature distribution in the soil profiles and the soil structure, for determination of some soil morphological and physical properties are shown. The studies were conducted in natural and anthropogenic forest ecosystems of forest-steppe zone of the Krasnoyarsk Region in Central Siberia. Radiometric image analysis provides additional information about the structure of the soil profile. Configuration of horizons is well displayed on the radiometric portrait of the soil profile, characteristics and width of the transition zone could be marked out as well, which is not always possible by means of expert analysis. For natural soils the temperature gradient can be described by linear functions, separately for the upper humus horizons and lower mineral horizons reliably approximation R2 = 0,94 - 0,95. Temperature gradient can be described by logarithmic functions (R2 = 0,98 - 0,99) for abandoned agricultural soils and for technogenic soil of industrial zone as well. It was recorded that the radiometric temperature gradient magnitude is defined by external conditions and soil type as well.

Key words: radiometry, soil profile, horizons, temperature gradient

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Spatial disrtibution of exchangable potassium in paddy soils of Central Gilan, Iran

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For soil fertility management and proper use of fertilizers understanding the place changes and the way of distribution in exchangeable potassium is necessary. In paddy soils, the cultivation manner and soil humidity conditions, lead to more changes in nutrition elements in these soils rather than other soils. In present research, spatial variability of soil exchangeable potassium and other soil variables like percentage of clay, sand, silt and organic carbon, soil electrical conductivity, soil pH and cation exchange capacity have been surveyed in the area of 576.11 Km2, in Gilan province in north of Iran, in 2-Km regular grid. Semivariograms for each variable were calculated and a suitable model based on minimum residual sum of square and maximum of R2 was fitted to semivariogram models. Interpolation was done for estimating variable in non sampled points with two methods of Kriging and Inverse Distance Weighting (IDW) and the best interpolator were monitored with respect to some statistics such as mean error, mean square error and root mean square error. In this study, based on the best fitted models on semivariogram, the variable of CEC was in exponential model, pH followed linear model and for variable of silt (%), sand (%), clay (%), OC (%), EC and exchangeable K follow from spherical model. The maps were developed with the Arc GIS10.2.2 software. With the extracted map for exchangeable K the majority of rice farms existing in East half were lower than to West one and have the continual cultivation history without the adequate and suitable use of fertilizer, meanwhile in the West exchangeable K amount is average to high. These maps represent the fact that the fertilizer recommendation and distribution should not be similar in the region.

Key words: Interpolation, Inverse Distance Weighting, Kriging, Semivariogram

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Estimation of potential nitrogen-fixing activity of agrophytocenoses soils of the Subtropical Zone of Russia

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Potential nitrogen-fixing activity of various soil types of the subtropical zone of Russia varied within awide range (from 0,6 to 8710 ng C_2H_4/g h) during the vegetation period. High nitrogen-fixing potential was noted in brown weakly unsaturated forest soils, as well as the soils of garden agrocenoses. Minimum NA values were established for the zheltozem unsaturated podzolized soils of a tea plantation. An inverse correlation of potential activity of nitrogen fixation with the acidity of the soil solution (r = –0,74) was found. In the cut of the seasonal dynamics, two contrasting NA periods of soils were found: winter and spring–summer–autumn, which is associated with the climatic conditions (decrease in the temperature) and physiological state of cultures (period of relative rest).

Long-term application of mineral fertilizers inhibited the nitrogen-fixing ability of brown forest acid soil of tea plantation compared with background soil. NA values forest soils ranged from 0,69 to 2,1 ng C_2H_4/ghour, a tea plantation soils under the influence of fertilizers from 0,37 to 1,26 ng C_2H_4/ghour.

Key words: potential nitrogen–fixing activity, agrophytocenoses, subtropical zone

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Soil pore space dynamics study in freeze-thaw condition by micro-ct method

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Soil structure changes under different conditions. Dynamics of these processes are studied badly, but it became possible with the help of micro-CT method. The study was realized on loamy soil samples of different genesis and test mix of 10% sand and 90% kaolin clay. Scanning was done after 1, 5, 10, 20 stage of freezing and thawing in frozen condition. Each sample had it's own structure changes. Most of Albiluvisol topsoil microaggregates disintegrated after first stage and then the mass turned polygonal structure. Chernozem topsoil microaggregates stood 20 stages, but intermicroaggregate mass turned polygonal. Solonetz didn't get great transformations. Microaggregates were not disintegrated. It was the most heavy sample. Kaolin-sand mix had vertical and horizontal transformations. The sample got big splits filled with ice that form polygonal structure. Also big ice lens formed under sand particles what liftedthis particles inside the sample. Strength of sample, split formation and dynamics depends of interparticle bond formed during genetic processes in soil matter.

Key words: soil structure, microaggregate disintegration, splits formation

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Specificity of soil forming processes and properties of upland soils in the south-east of the Bolshezemelskaya tundra

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Soils in the south-east of Bolshezemelskaya tundra (Vorkuta river basin) forming in authomorphic landscapes of flat steely-sloping hilly steppe plains with birch suffruticous vegetation were studied. For study of soil genesis the complex approach was used (it has never applied before for Subarctic soils), which includes analysis of both structural organization and differentiation of functioning products; revealing cryogenic and pedogenic processes; lithochemical method of determining of maturity and weathering degree; analysis of humic pedorelicts. Soils of southern tundra authomorphic landscapes are forming on silty loamy deposits, permafrost is massive-island, permafrost table is of 2-5 m (cryomethamorthic gleezens) and 90 cm (cryoturbated gleezems) deep. Cryomethamorthic gleezems are characterized by subparallel microschistosity, lensoid and thin-platy aggregates in upper horizons being the result of present day cryogenesis and concentric structure of ooid aggregates in middle and lower horizons (result of paleocryogenesis). Analysis of inner aggregate mass reflects eluvial-illuvial differentiation preserved from Middle Holocene soil forming and sandy-silty coatings diagnose Al-Fe-humic illuviation together with gleyzation refer to tundra stage. Calculation of lithochemical indexes confirm different ages of profile. Cryoturbated gleezems differ maximal intensity of cryoturbations, poor development of pedogenic processes, and preservation of inherited signs: humic pedorelicts, fragments of clay coatings. Specificity of upland soils on loamy deposits in southern tundra is polygenesis which revealed by diagnostic criteria.

Key words: cryoturbated gleezems, cryomethamorphic gleezemse, meso-micromorphology, inherit signs

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The research of urban soils sealed with artificial surfacing**

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The condition of sealed soils in urban areas has been under the study; increased solidity and sand content especially in the upper soil layer have been detected. Substantial decrease of actual acidity of the sealed soils has been revealed. Such soils are characterized as weak alkali or even moderate alkali soils (pHwater=7,76-8,84). The majority of petroleums are concentrated in the upper layer of the sealed soils being in the closest contact with the outer artificial surfacing. The petroleums content in the researched samples varied within the limits of 0,06-0,91 mg/g of soil. Heavy metals accumulation intensity in the sealed soils diminish as Pb>Cu>Zn>Cr>Co>Ni>Mn. The priority contaminant among heavy metals belongs to lead. The MPC exeedance of this element in 1,04 – 1,57, the background level in 2,9 – 5 times has been detected. The variation in microbiological environment in the researched soils, revealed as the change of microorganisms composition, is observed. *Azotobacter chroococcum* ranks dominative positions in microbial pool of contaminated poorly aerated soils. The reduced activity is not completely developed thus proving conservation condition of sealed soils and the lack of self-purifying processes in them. Consequently morphological and physical-chemical properties of the sealed soils considerably differ from natural grey forest and turf-podzol soils of the Vladimir region and from open urban non-sealed soils in Vladimir. Biological activity of sealed soils is low, variation in microbiological environment of the researched soils, revealed as the change of microorganisms composition has been detected.

Key words: sealed soils, contamination, heavy metals, petroleums, biological activity

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Effects of long term organic-inorganic fertilization practices on soil microbial biomass in Mediterranean Turkey

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Microbial biomass is a sensible indicator of the changes in soil environment and it affects the ability of soil to supply nutrients to plants through soil organic matter turnover. In the present study, a 13-year field experiment was conducted to explore the role of seasonal different fertilization treatments (chemical fertilization, farmyard manure, plant compost, and mycorrhiza-inoculated plant compost) on soil microbial biomass under a crop rotation of wheat (*Triticum aestivum L.*) and corn (*Zea mays L.*) in Çukurova, Mediterranean Turkey in 1996. Soil samples were collected in May, August, and October 2009. General properties, microbial biomass carbon (MBC) and nitrogen (MBN) were assessed. No significant difference in soil organic C related to long-term fertilization treatments and sampling seasons were determined. There were no significant changes in soil pH and plant-available N in relation to seasonality. Whereas treatment effects were statistically significant. Soil plant available phosphorus was significantly correlated with both fertilization treatments and seasonal samplings (ranged between 11.47-33.47 $mg.kg^{-1}$ in spring, 10.47-33.19 $mg.kg^{-1}$ in summer, and 10.36-33.75 $mg.kg^{-1}$ in autumn, respectively). Similarly for MBC, correlation between fertilization treatments and sampling seasons were significantly (226.64-841.8 $mg.kg^{-1}$ in spring, 167.81-728.4 $mg.kg^{-1}$ in summer, and 191.6-526.4 $mg.kg^{-1}$ in autumn, respectively). The effect of long term organic-inorganic fertilization on MBN was statistically significant but no meaningful changes was observed in seasonal data. Moreover, there was statistically significant correlation between MBN and MBC. Using processed organic fertilizer in combination with AMF seemed to stimulate available P and microbial biomass better, comparing to traditional chemical fertilization.

Key words: chloroform fumigation-extraction, Mediterranean Turkey, long-term organic-inorganic fertilization, soil microbial biomass C and N

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Effects of giyttja on some soil quality parameters

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The maintenance of soil quality or enhancement of the soil properties has a critical importance for sustainable agricultural production. One of the most important soil quality indicators is soil organic matter content. Gyttja which low-cost and locally available natural materials is a mixture organic and inorganic materials as calcareous and clay, its content of organic matter generally varied from 40 to 50 % by weight, and located on lignite deposits. The aims of the present study are to determine the effects of giyttja on some soil quality parameters. The experiment was carried out in a randomized complete block design with three replications on soils which classified as Haploxecrept. Doses of the gyttja 0, 40, 80 and 160 gr added to each pot containing 4 kg soils, and soil samples were incubated ten months in 2014. Soil pH, electrical conductivity, organic matter and lime contents, cation exchange capacity, total N, exchangeable K, available P, dehydrogenase activity, catalase activity, basal soil respiration, microbial biomass carbon (Cmic), organic carbon (Corg), and Cmic/Corg were analyzed to determine the effectiveness of the gyttja. The obtained data indicated that the giyttja had statistically important effects on soil quality parameters such as organic matter, cation exchange capacity and soil microbiological indicators. The results suggested that gyttja could be used to maintain and improve of the soil quality.

Key words: gyttja, organic matter, soil, quality, parameters

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Parcel structure of complexes invertebrates animals in mountainous-forest brown soils

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Studying of complexes of invertebrates have been carried out in parcels of oak trees and herbaceous vegetation. In oak parcel the total quantity of invertebrates forms 35.5 specimen/m^2. Among them dominate insects - 16 specimen/m^2 or 45.7% of the total quantity. The second place belongs to mollusks 8.4 specimen/m2 or 23.6%. The interim place is occupied by woodlouses (Isopoda) - 5.8 specimen/m2 or 16.3% whereas earthworms (Lumbricidae) and Chilopoda count for 3.3 specimen/m2 or 9.3% and 2 specimen/m2 or 5.1% of the total quantity. Herbaceous vegetation consisting of plants of various systematic groups (Cereals, Legumes, Labiatae, Compositae, Crucifers, Spurge family) created more favorable conditions for vital activity for soil animals. Given the total quantity of invertebrates of 40.6 specimen/m2, the number of earthworms (Lumbricidae) forms 12 specimen/m2 or 29.5% of the total quantity.

The number of insects and woodlouses (Isopoda) is 9.2 specimen/m2 or 22.6% and 8 specimen/m2 or 19.7% respectively. Mollusks and Chilopoda count for 7.4 specimen/m2 or 18.2% and 4 specimen/m2 or 10% of the total quantity of invertebrates. Changing of the overall number of invertebrates is reflected in their biomass as well which forms in both parcels 7.58 and 8.70 g/m2 respectively.

The character of diversification of invertebrates in the studied parcels forms their trophic structure the activity of which stipulates decay and subsequent humification of plant residues which is so important for proper assessment of various phases of humus formation in forest sols of mountainous regions.

In oak parcel about 70% of invertebrates are comprised of phytophages, 25% saprophages (as well as phytosaprophages) and 5% zoophages. In herbaceous parcel significant portion of invertebrates, i.e. 75% is formed by saprophages, 21% by phytophages and 4% by zoophages. Thus, the results obtained out of the study works are of significant biodiagnostic value.

Key words*:* saprophages, phytophages, zoophages, invertebrates

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Characteristics of soils in the Northern Urals

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We have studied the conditions of formation and morphological features of mountain soils in the Northern Urals. The purpose of the research was to study morphological and genetic features and classify soils of the Homgi Nël mountain within the western North Urals macroslope. In mountain areas, a detailed morphological description of soils is particularly important since at higher altitude soil forming conditions cause formation of soils with pronounced differences in color, structure and thickness of the horizons. Subject of the research: mountain soils in"Vishersky" Natural Reserve, the fourth largest reserve in Europe. It is located in the extreme north-east of the Perm region in the riverVishera headwaters. Its territory is situated within mountains with 800–1200 meters level difference embracing fragments of central backbones of the Urals. The diversity of soil forming conditions causes diversity of soil cover. Based of morphogenetic soil characteristics, the following divisions are highlighted: leptosols, glandular-metamorphic, structural and metamorphic, and organo-accumulative. We have discovered the following basic morphogenetic soil characteristics: rubbility, truncated profile, distinct horizontation, gleyzation, ferrugination, and podzolization.

Key words: reserve, high-altitude zones, vegetation, mountain soil, genesis, morphological characteristics, classification

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The effect of some land characteristics on the hydraulic conductivity of soil in the city of Tekirdag

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In this study, the factors that affect hydraulic conductivity of the soil and their significance case were examined. As the field of study, the provincial borders of Tekirdağ was chosen, and sample points were determined by coinciding corine belonging to this city, land use, geology and soil maps in Arcmap program. The sample was collected from 53 different points. In 0-120 cm (0-30, 30-60, 60-90, 90-120 cm), the samples taken from 4 different depths were put to physical and chemical analyses. Hydraulic conductivity measurements were made with constant level permeability device in the laboratory, and the results were figured out according to Darcy's Law. The statistical analysis of the results was made with SPSS and MSTAT-C programs. In the statistical study, the following results were reached: significant relations were found between hydraulic productivity and clay, bulk density at negative and % 1 level; significant relations were found between hydraulic productivity and sand, specific weight and porosity at positive and % 1 level; insignificant positive relations were found between hydraulic productivity and silt, aggregate stability and organic matter; insignificant negative relations were determined between hydraulic and lime, pH, salt; and significant relations at % 1 level were found in the interactions made between hydraulic productivity and land use.

Key words : Hydraulic conductivity, texture, permeability, land use

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Biorestoration of textile effluent polluted soil through vermistabilisation – an earthworm aided microbial-geological system

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In the present study an epigeic earthworm, *Eudrilus eugeniae* is employed for the restoration of textile effluent polluted soil under laboratory condition. The changes in the soil fraction, physical and chemical properties of the soil were measured before and after biorestoration. The growth performance and fecundity of earthworms were assessed in polluted soil, textile mill sludge and were compared with that of normal soil for a period of 8 weeks. In spite of slow growth and poor reproductive performance of earthworms in polluted soil and sludge, the earthworms had significantly modified the physical and chemical properties of the polluted soil and the sludge. The percentage of nitrogen in vermistabilized polluted soil has significantly increased by 118% when compared to normal soil by 3% and sludge by 33%. The Phosphorus ratio, in the vermistabilized sludge has significantly raised by 135%, and 115% in vermistabilized polluted soil. The amount of NH_4-N and NO_3-N decreased by 12% and 16% in normal soil. Whereas, 56% and 8% increase in the ratio of NH_4-N and NO_3-N was observed in vermistabilized sludge soil and 105% significant increase in NH_4-N and 290% increase in NO_3-N were recorded in polluted soil. A high degree of stabilization was achieved in polluted soil after 8 weeks of worm activity. The physico-chemical properties of the vermistabilized polluted soil and sludge were almost equal to control (normal soil with cow dung), suggesting possible recovery of recyclable constituents from textile effluent polluted soil and textile mill sludge.

Key words: E*udrilus eugeniae*, textile effluent, vermistabilisation, polluted soil, biorestoration

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Vertical distribution of active organic matter in a profile of brown forest acid soil under natural ecosystem and tea plantations**

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Active soil organic matter (C_0) is a pool with turnover time of 3-10 years and vitally important in providing energy, substrates, and diversity of soil microorganisms and it is measured by biokinetic method based on (i) aerobic incubation of soil samples under constant temperature and moisture conditions during 150-180 days, (ii) quantitation of C-CO_2, and (iii) fitting of C-CO_2 cumulative curve by a model of first-order kinetic. The objective of this study was to estimate a distribution of C_0 through profiles of brown forest acid soil in the Greater Sochi. Total organic carbon (C_{org}) contents decreased with increasing soil depth from 2.40% to 1.26% and 2.32% to 1.83% under beech-hornbeam forest and tea plantations, respectively. Active C_0 content decreased from a maximum of 117 (5-26 cm layer) to 28 mg/100 g (> 70 cm layer) at the forest site and from 95-110 mg/100 g (5-40 cm) to 38-15 mg/100 g (80-120 cm layer) at the arable sites. Fertilized soils under tea plantations had significantly higher C_0 content along vertical soil profile when they were compared with unfertilized variant. On average, 4.5% of total C_{org} found as a C_0 pool at top soil layer and 1.1% at 80-120 cm.

Key words: carbon, mineralization, biological fractionation, C-CO2

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Amplitude and damping depth in soil solarization under different applications

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Soil solarization is an environment-friendly soil pasteurization technique which uses the solar energy to increase the soil temperature to diminish soil-related pests and pathogens. It is important to examine the formation of the lethal temperature area and heat transfer in prevent from diseases. In this study, the effect of new treatments such as dry-ice application (CO_2), basaltic tuff (BT), various colored PE (VCPE), organic matter (OM) on soil temperature variation, and due to this variations depth of heat advance in soil and amplitude were discussed. The trial was carried out in open-area and greenhouse for 32 days. Soil temperatures (5 cm) in open-area and greenhouse varied between 50.4–24.2 and 54–26.7 °C, respectively with applications and the lowest soil temperature was recorded under the control plot. The effect of the applications to soil temperature was significant ($p<0.05$). Additionally, the calculated amplitude values in open-area and greenhouse were nearly the same and were observed to decrease towards the sub-soil layers. Amplitude values in the open-area were between 3.9 and 7.9 °C at the 5 cm and in deeper soil layers (20 and 30 cm) were 1.5-2.6 and 0.9-1.4 °C, they were respectively 4.8–7.6, 1.8–2.7 and 1–1.4 °C in greenhouse conditions. The highest damping depth ($Sd_{30\ cm}$) in open-area was determined to be 18.9 cm under (Control), and 18.9 cm with (BT) application in the greenhouse. Damping depth increased under all applications compared with control plot in greenhouse, whereas the ranking of the treatments BT > FPE > CO_2 > OM+ CO_2 > OM > PE ≥ Control was maintained.

Key words: amplitude, damping depth, soil temperature, soil solarization

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Effect of different rate of basalt dust on soil chemical properties and growth performance of *Hevea brasiliensis*

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Rubber, *Hevea brasiliensis* is the main source of natural rubber in the world. Most of *Hevea* cultivation area was on problem soil such as Ultisols and Oxisols that were known as infertile soils. Basalt is the quickly weathered rock consists of few minerals such as of plagioclase, pyroxene, and olivine. This paper will present the effect of different rate of ground basalt application on Ultisol and response of Hevea brasiliensis grown on that soil. The experiment was carried out with five treatments, 0 g (control), 40 g, 80 g, 160 g and 240 g of finely ground basalt (less than 0.1mm) and six replications of RRIM 3001 seedling. The experiment was arranged in Complete Randomized Design (CRD). Data were analysed by Analysis of Variance (ANOVA) and Least Significant Difference (LSD) for comparison of the means. The results showed that the higher rate of basalt application improve the soil chemical properties in the rubber seedlings growth and also enhance the plant nutrient uptake. Results show that with application of ground basalt at rate of 240 g/plant would give significant result in term of plant height and girth (134.67 cm, 1.24 cm). In term of nutrient uptake, Treatment 5 (240 g/plant) gives the highest value of phosphorus content in tissue (0.2 g). Results show that soil pH increased with increasing rate of basalt application, 0 g (4.2), 40 g (4.24), 80 g (4.33), 160 g (4.36) and 240 g (4.75) respectively. Soil nutrients content of P, K, Ca, and Mg also increased with application of basalt. During soil sampling after 6 months, undissolved basalt was visually observed. Therefore, basalt is a good soil amelioration and functional as a slow release fertilizer for plant nutrient uptake in Ultisol.

Key words: soil amendment, fertility, rubber, basalt, Ultisol

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Use of low-volume preparation in growing cucumbers in southeast of Kazakhstan

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The relevant issue of the country in conditions of intensive development of economic relations in agricultural sector is a rational and efficient use and conservation of soil resources, in particular conservation, soil fertility reproduction and productivity of arable lands. In this connection it is necessary to improve the fertility of agricultural land. One of the main methods to increase soil fertility and crop yields are techniques using low-volume humic preparations- adaptogens.
Scientific bases of new methods of growing of cucumber are based on V.M.Inyushintheory of bioenergy systems and concept ofenergy-information land cultivation(EIL). Bookmark experiments carried out by the method F.A.Yudin.Research object isdark chestnut soils in Trans-Ili Alatau in piedmontzone whichare usedforrain-fedandirrigated agriculturefor growing cereals, fodder crops and vegetables.The practical significance of the use of preparations- adapogens lies in targeted increase of soil fertility and productivity of agricultural crops.As the result of conducted researches the most effective options with pre-planting treatment of seeds of cucumber with humic substances- adaptogens PA-2-1 followed by spraying of plants with work solution of preparation PA-2-1 with micro-dose of nitroammophos (0.05% solution) at intervals of 5-7 days (rate 200 liters of work solution per hectare).Application of new techniques on the background N60P60K60 and in drip irrigation provides a stable increase of yield of cucumber variety "Egolita" up to 126%. The average consumption of the preparation PA-2-1 during the growing season is 700 grams per 1 hectare.

Key words: soil, preparation-adaptogen, cucumber

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Modern soil physical methods and instruments of granulometric composition, rheological characteristics and properties of the solid phase surface soils investigation

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In soil science are widespread new instruments and methods measuring soil physical properties. We consider the data under the relevant soil parameters obtained with the new equipment. Laser diffraction particle size distribution for the soil granulometric analysis, determination of rheological characteristics and the contact angle of the solid phase surface are new, poorly understood methods of studying the properties of soils. On the one hand, they are extremely attractive in its capabilities, but on the other - require a lot of methodological work to compare with the traditional methods, to establish and identify the boundaries of their applicability, the optimal measuring range. In this conditions the soil properties are strongly depended on the content and composition of soil organic matter. New tools and methods require high methodological work to establish and identify the boundaries of their applicability in different soils, the measurement conditions and comparison with traditional methods of soil physical properties investigations. The comparisons of results of traditional methods and the new ones are discussed and focused on the value of the content of soil organic matter in the study of particle size distribution, rheology and surface properties (contact angle) of the solid phase of soil.

Key words: laser difraction, rheology, contact angle, soil organic matter

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Transformation of the soil and land resources in priyeniseyskaya siberia in the backgound of the global climate change

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The most probable forecast of climate change of Prieniseiskaya Siberia for the period until 2050 assumes global climate warming by 0.6–0.7 and further by ~1.7 °C, with the accompanying increase in precipitation by 30–50mm/year. On the basis of expert estimates, it is possible to predict the northward shift of natural zones. In the coastal territories, sea level rise is possible (supposedly by 15–20 cm); in its order, this will expand areas of swamped lands and hydromorphic soils. In cryolithozone, degradation of permafrost in the tundra and taiga zones will continue to expand the areas of boggy soils. At the same time, resulting from disappearance of screen effect of permafrost, drying of some soils is possible. During the summer period, water content will decrease within the uppermost one-meter-thick layer of tundra and sod-podzolic soils, whereas in chernozems and gray forest soils water content will remain the same. The area the steppe-altered sites will increase.

The climate warming accompanied by increase in summer and winter precipitation, winters getting softer, and vegetation period getting longer (which is favorable to sequential change of phenological phases cultural plants), seems to have favorable effect on development of marketable agriculture of the region, especially in the forest-steppe zone. In flatland taiga areas, at improved climatic parameters, soil conditions will be the limiting factor for agricultural activity. In steppe landscapes, development of irrigating.

Key words: soils, fertility of soils, climatic trend, agriculture

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Physical properties and water retention of voronic chernozems pachic, haplic solonetz albic and solodic planosols albic

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The physical properties and soil water retention curve retaining capacity of the soils of Voronezh region were studied. There were discovered the features of the soil water retention throughout the range of water content for Voronic Chernozems pachic, Haplic Solonetz Albic and Solodic Planosols Albic in the cycles of drying and wetting (soil hysteresis cycles). The evaluation was given to the degree of manifestation of the hysteresis of water retention curve these soils in terms of moisture and integrated energy of water retention. It is shown that the water-holding capacity of the soils of the steppe zone has a hysteresis in the whole range of humidity. The main factors determining the degree of manifestation of capillary-sorption hysteresis is the soil dispersion, as well as the swelling-shrinkage capacity. Integral water retention energy reflects the influence of the composition and properties of soils in the degree of manifestation of capillary-sorption hysteresis.

Key words: steppe zone soils, water retention, hysteresis of water retention curve, integrated energy of water retention

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The impact of varied fertilisation on the concentration of nickel and chrome in soil and organs of willow trees (*Salix viminalis*)

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In order to fertilise a plantation of common osier it is possible to use mineral and organic fertilisers as well as waste. Taking advantage of the ability of *Salix viminalis* to collect great quantities of heavy metals, sewage sludge may be included in its fertilisation without any fear of excessive pollution of the soil by these elements. However, bearing in mind the existing legal regulations, the sewage sludge requires immediate mixing with soil, which practically limits the possibilities to use them only before the establishment of any plantation. The paper presents the impact of varied fertilisation with sewage sludge on the concentration of nickel and chrome in soil and willow organs during the first three years of cultivation. The lowest mean concentration of nickel in *Salix viminalis* biomass was found in the plantation without fertilisation. The lowest mean content of chrome in the biomass of plants was found in the plantation with mineral fertilisers. Research has shown a significant effect of fertilization method on the chromium content in soil and biomass *Salix viminalis*. This metal was accumulated primarily in the willow roots. It has also been shown that the method of fertilisation does not have an impact on the nickel allocation in different organs. The highest content of nickel in the willow biomass was found in the roots.

Key words: sewage sludge, fertilization, heavy metals, *Salix viminalis*

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The prospects for integrated studies (from macro to micro-level) of agricultural soils of the steppe zone of the European part of Russia

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The steppe zone of European Russia has an extension from West to East of almost 5 thousand km and from North to South of more than 1.2 thousand km and it is nearly all under cultivation. One of the widespread soil degradation processes in the steppe zone is soil compaction. Globally, about 68 million hectares of arable land are compacted. In Russia, about 10% of the area of arable land affected by compaction are slightly compacted, 50% - moderately, and 40% — strongly compacted. In the literature the agrochemical and economic effects of the compaction were estimated as the decrease in the efficiency of fertilizer (more than 40%), yield reduction (25-50%) and rising fuel costs by 15%. Based on the study of the composition and structure of various aggregates of agrogenic soils of the southern part of the steppe zone of European Russia, it was shown that the multiscale studies (from macro to micro-level) allowed detecting that compaction could be promoted by different characteristic soil features: natric properties, vertic properties, mechanical (agro-) compaction. At the first stage we made joint tomographic and micromorphological analises of aggregates d=1-2 mm and d=3-5 mm from compacted horizons of different soils. We identified additional diagnostic features of natric properties such as low porosity of aggregates visible in the tomograms and infilling of a substantial part of the pores with illuvited substance. Vertic properties included large number interaggregate thin pores visible in the tomograms and low amounts of humus-clayey s-matrix in the intrapedal zone. We showed that a combination of topographic and micromorphological methods is prospective in studying of compacted horizons of arable soils.

Key words: chernozems, food security, kastanozems, land degradation, tomographic method

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Soil formation processes on the dried bed of the Aral Sea

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The consequences of the Aral Sea shrinkage are certainly the formation of a vast saline desert with an area of more than 5 million ha on the exposed seabed.

About 2 thousand square kilometers emerge from under water every year as a result of drying process. The exposed ground is illustrative of arid salt-accumulation, where specific type of intrazonal soil - coastal solonchak - is formed and differs from zonal soil in their specific features.

Those features consist of dynamic soil formation processes both in space and time. Regular monitoring of the dried sea bed and the Amudarya delta was conducted during 2005-2011. About 700 test sites were described and more than 300 soil profiles were cut. As a result, a soil map of the dried seabed was produced and soil dynamics was studied. Under the influence of changing hydrogeological conditions and arid climate, the soil is transformed progressively from hydromorphic to automorphic type.

With the lapse of time, the soil salt profile changes on the exposed bed. This is one of the main genetic features of solonchak types on the dried seabed.

Quantitative and qualitative salt changes in the soil were assessed depending on duration of the drying process. Preliminary Case Study was conducted in order to determine the microbiological composition of soil. This study showed to a change in species composition of microorganisms in relation to duration of the drying process.

Key words*:* Aral Sea, dried bed, microbiological composition, soil formation

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Investigation of benzo[a]pyrene content in soil-plant system of model experiment

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The purpose of the research is investigation of features of accumulation, migration and transformation of benzo[a]pyrene (BaP) in the soil-plant system. The new original method of the BaP analysis by subcritical water extraction was used for BaP extraction from soil and plant samples of the unique model experiment with the ordinary carbonate chernozem, polluted by different doses of BaP. Sampling of soil (carbonate heavy loamy chernozem, virgin, 0-20 cm topsoil) was carried out in the Persianovskaya steppe of the Rostov region (South of Russian Federation) located far from possible contamination sources. As a result the constants of BaP half-destruction (T50) and coefficients of BaP accumulation in a pollutant plants were calculated in the chernozem soil at different levels of pollution. Correlation dependences of these indicators on initial concentration of BaP in the soil were established. Further these characteristics will allow to create model of transformation of BaP and other the polycyclic aromatic hydrocarbons (PAHs) in chernozem of a steppe zone, in particular in a zone of emissions of Novocherkassk Regional Power Plant for 10 years of monitoring research. The main features of accumulation, migrations and transformations of BAP under natural conditions were conducted. This model can be used for forecasting of a situation in various regions subject to pollution by such dangerous organic pollutant as PAHs, and also will allow to estimate probability of PAHs accumulation in soil-plant system under technogenic pressure and their involvement in a food chain.

Key words: benzo[a]pyrene, soil-plant system, model experiment, subcritical water extraction method

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The main physical properties of the soil and its changes in the process of soil construction's functioning in conditions of the city

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More and more attention is given to methods of improvement of environmental ecology nowadays. Greening is one of this way, in which frameworks creating of specialized konstruktozems becomes more popular. Soil constructions are subjected rapid degradation. It is connected especially with those, which are situated in conditions of the city, where anthropogenic and technogenic loads are high. Transformation physical properties of konstruktozems soil may be one of main causes of this occurrence. The aim of this work was investigating of main physical and chemical properties of soil constructions and their changes in the process of functioning. In this regard model soil constructions with different structure were created: 1) ground (horizon A arable), 2) layered (horizon A arable-peat-sand), 3) mixed (the same components, as in layered). The main properties (ρ_s, ρ_b, ε, S, granulometric composition, rheological properties) were studied and monitoring of temperature regime was done. The analysis of soil properties revealed an increase in the density of the solid phase (ρ_s) on the background of decreasing the content of organic substances, the enrichment of fine fractions. This is particularly noticeable in the mixed variant and in the sandy layer, located under horizons of A arable and peat. Distinct changes were fixed in the rheological properties of soil, which showed the degree of transformation microstructures in the process of soil constructions functioning.

Key words: soil constructions, physical properties and regimes of soil, urban greening, rheological characteristics

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The dynamics of physical phenomena and chemicals in the high plateaus: the case of the province of Algeria Tissemsilt (soil, water, erosion, pollution

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The plateau of Tissemsilt represents a case of most affected ecosystem in Algeria by degradation of its soil and water resources. It is a sandy coastal area covering over 78 100 hectares, characterized by a significant wind activity and thus a strong erosive power. Additionally to this erosive effect, the plateau is under strong urban concentration and economic activities: agriculture, industry and port, which threaten as much its resources, that it's basic ecological balance.

This work is a contribution to the diagnosis of the state of degradation of the plateau of Tissemsilt subject to various agricultural and industrial constraints that affected its natural soil and water resources.

One important result of this approach is that the degradation of Tissemsilt plateau exists in several forms at the same time it remains undervalued because it has not benefited enough attention from scientists or even socio-economic operators. She half-opened, however, an investigation way of primary importance on ecological and environmental impacts of rapid development conducted in the region, in the medium and long term.

Key words: plateau, tissemsilt, degradation, soil

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Methods of increasing productivity and environmental sustainability of cotton on irrigated light gray soils of the South Kazakhstan region

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On the basis of previous researches a system of agrotechnologies aimed at enriching soil with organic matter, increasing soil fertility and yields has been developed, which is currently used on saline light gray soils of Hungry Steppe. One of the promising areas is the development and application of ecologically friendly agricultural technologies increasing bioenergy of seeds and plants in ontogenesis based on fundamentally new, bio-energy information products adaptogens, one of which is physiologically active humic drug adaptogen - PA- 2 made of brown coal and other special ingredients. Studies were conducted on secondary saline irrigated light gray soils in Maktaaral district of South Kazakhstan region. The soil has following characteristics: 0.62 % humus content, easy hydrolysable nitrogen – 30.8-28.3 mg/kg, mobile phosphorus – 34.0-30.8 mg/kg, exchangeable potassium – 375-320 mg/kg. Use of preparation adaptogen PA-2, including seed treatment and plant spraying, increases the resistance of cotton to the extreme environmental conditions in salinization, improves the growth and development of cotton, increases cotton yield by 5.35 % and improves quality of cotton.

Key words: humic drug adaptogen, harvest

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Boron toxicity of kiwifruit plants

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The present study was conducted out to determine the effect of excess boron fertilization on the yield and nutrient contens of leaves of kiwifruit plants. The experiment was planned in randomized complete block design with four replications. Boron fertilizer (10% B-5%Zn) was given approximately 200-370gr per vines by farmer accidentally. Lime was applied to the soil at the amount of 1.5kg per vines immediately. Trial was planned to after leaf B analysis according to the severity of toxicity. Five doses of Ca at the amount of 0.5-1.0-1.5-2.0-2.5 percent of foliar application was made for two times. According to the results, excess boron applications reduced fruit yield and mean fruit weight (MFW) in both seasons. The yields were 24.1-40.5 kg vine^{-1} and MFW 63.0-74.0g at the first year and 0-16.6 kg vine^{-1} and MFW 65-74g at the second year. Boron contents of leaves ranged from 291.7 to 1111.3 µg g^{-1} and 179.5-976.2 µg g^{-1} in 2007 and 2008, respectively. In 2007, boron application increased B contents of leaves, but in 2008, leaves boron contents were decreased. Increasing Ca application increased Ca contents of leaves regularly over controls. Zinc contents of kiwifruit leaves were changed by severity of boron. It was concluded that boron concentration of kiwifruit leaves under different Ca treatment was affected second sampling period in 2008.

Key words: kiwifruit, nutrition, toxicity, boron, calcium

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Changes in ammonia production of halophilic, alkalophilic and haloalkalophilic bacteria

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Salinity and alkalinity of soils are the most important limiting factors in agricultural lands in the world. Recent studies have shown that some microorganisms can enhance the crop tolerance to salinity and alkalinity. Halophiles, alkalophils and haloalkalophils microorganisms have been adapted to high level of salinity and pH. In this research, some halophilic, alkalophilic and haloalkalophilic bacterial isolates were isolated and purified from six saline soils in Khorasan Razavi Province (Iran) using the Ventosa moderately halophilic medium, Horikoshi (I) and a specific haloalkaliphilic bacteria culture medium respectively. The concentrations of ammonia by those isolates were estimated using the qualified method of Nesslerization. The results showed that the differences in ammonia concentrations among the halophilic isolates were significant, statistically ($P \leq 0.05$). Ammonia concentrations produced by halophilic strains varied from 0 to 155.4 ppm. H8 and H9 isolates produced the highest and the lowest ammonia concentration respectively. Maximum and minimum ammonia concentration among alkalophilic isolates was observed in A7 and A4 isolates. The amount of ammonia concentration among the haloalkalophilic isolates was not significant statistically ($P \leq 0.05$). The average of ammonia concentrations among the halophilic isolates (57.97 ppm) was 1.5 times less than the haloalkalophilic isolates. Alkalophilic isolates had the highest ammonia concentration (0.055 percent) among the extremophile isolates. The results of multiple regression analysis showed that there is no significant relationship between electrical conductivity (EC) and pH of culture medium with the amount of ammonia concentration. Regression coefficients were 0.209, 0.007 and 0.429 for Halophilic, alkalophilic and haloalkalophilic bacterial isolates respectively. It seems that some of the extremophile bacteria, by producing the ammonia, have the potential of helping plant under salinity and alkalinity stress.

Key words*:* haloalkalophilic, ammonia concentration, nesslerization

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Comparison of 3-indoleacetic acid concentrations in halophilic, alkalophilic and haloalkalophilic isolates

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In recent years, special attentions have been paid on microbial diversity in harsh environments. But the number of researches on extremophiles bacteria such as haloalkalophiles in the soil environments, in particular in connection with agriculture is still relatively low. Those microorganisms with beneficial activity on plant growth can be employed in agriculture. In this study, 15 halophilic, 19 alkalophilic and 14 haloalkalophilic bacterial isolates were isolated from saline and alkaline soil resources in Khorasan Razavi Province (Iran). They were purified on the Ventosa moderately halophilic, Horikoshi (I) and a specific haloalkaliphilic bacteria culture medium respectively. 3-indoleacetic acid (IAA) concentration were measured by UV/VIS spectrophotometer. The results showed that the IAA concentrations produced by the halophilic isolates were different statistically ($P \leq 0.05$). The amount of IAA varied from 20.36 (H8 isolate) to 0 ppm (H4 isolate). Alkalophilic isolates (A8 and A1) produced more IAA compare to the rest of isolates. Two other alkalophilic isolates (A11 and A13) had the second rank of IAA production among the alkalophilic isolates. The A7, A2, A14, A3, A17, and A6 isolates created the lowest concentrations of IAA. The highest means of IAA concentration was observed among the haloalkalophilic strains with 21.16 ppm. It was about 14.5 and 8 times more than the 3-indoleacetic acid produced by the halophilic and alkalophilic isolates respectively. Multiple regression analysis showed that there isn't any high significant relationship between independent variables (such as electrical conductivity and pH of culture medium) with dependent variable (IAA-concentration) among the isolates. The regression coefficients for halophilic, alkalophilic and haloalkalophilic bacterial strains were 0.533, 0.010 and 0.327 respectively. IAA-producing extremophiles bacteria may be able to promote the plant growth under saline and alkaline stress.

Key words: haloalkalophilic strains, 3-indoleacetic acid concentration, Iran, Multiple regression analysis, Salkowski

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Determining the Effect of Tea Waste and Farmyard Manure Addition on Plant Productivity Potential for Sediment Accumulated in Borcka Dam Reservoir Area

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Sediments as a result of the erosion process is one of the best examples that can be shown to degraded soils. In order to increase production potential and restoration of degraded soils, organic matter addition have been used in the recent years. This study was conducted to investigate changes on some chemical properties including organic mater content, total carbon, nitrogen and sulphur contents and pH after the tea waste and farmyard manure addition to the sediments in greenhouse condition. For this purpose, different amounts of tea waste and farmyard manure (0%, 2.5%, 5%, 7.5%, 10%, 12.5% and 15%) were added to sediment samples and left for incubation of 18 weeks. Statistical analyses showed that the organic matter application caused improvement in the examined properties of the sediments and this improvement tended to increase depending on application rates. The pH of the sediments were lower in tea waste application and it was found to have a tendency to decrease depending on application rates, while it was revealed that pH increased depending on application rate of farmyard manure.

Key words: Sediment, tea waste, farmyard manure, incubation, organic matter amendment

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Improvements in Aggregate Stability of Recently Deposited Sediments Supplemented With Tea Waste and Farmyard Manure

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Organic matter supplement is well-known to influence soil aggregate stability (AS), but the corresponding change in recently deposited fine sediment is not documented well. In this study, improvements in aggregate stability of recently deposited sediment supplemented with the farmyard manure (FYM) and tea waste (TW) during 18-week incubation under controlled conditions. The FYM and TW were applied to recently deposited sediment at different doses (%0, %2.5, %5, %7.5, %10, %12.5 and %15 on weight base). The AS was determined at different times after adding organic matter (2^{nd}, 4^{th}, 6^{th}, 8^{th}, 10^{th}, 14^{th}, and 18^{th} weeks) using wet sieving methods. The results showed that aggregate stability of deposited sediment treated with TW was statistically significantly higher than these of samples treated with FYM. Aggregate stability increased with increasing doses of both FYM and TW. In the FYM applied samples, AS reached the highest value at the end of second week, and declined within the following incubation period. However, in the samples treated with TW, AS reached the highest value at the end of eighth week. The results of this study were clearly indicated that tea waste and farmyard manure applications noticeably increased aggregate stability of recently deposited sediment, therefore it is suggested that TW and FYM could be used for structural stabilization of sediments.

Key words*:* aggregate, organic matter, tea waste, farmyard manure

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Anisotropy of water retention curve of gray forest soils

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At the present stage of soil hydrology development, the water retention curve, i.e., the dependence between the capillary-adsorption water pressure and the volume soil water, appears to be one of the most important hydrological parameters of soils. However, there is still no commonly accepted standardized experimental methods of soil sampling. However, it is unknown how significant is the sampling factor for the subsequent analyses of soil hydrological conditions including for use the prediction models.

The water retention curve (WRC) of medium-loamy gray forest soil horizons was studied in cylindrical-shaped samples of disturbed and undisturbed structure and different size. The soil monoliths were sampled in three directions: vertically, along the slope, and across the slope of intrasoil paleorelief formed by the cone-shaped second humus horizon. The experimental curves were approximated with the van Genuchten equation. The statistical analysis of WRC approximation parameters proved them to differ significantly in loose soil and monoliths, and for the different sampling directions, most often, for sampling across the paleorelief slope. It is shown that for the soils with marked structure and texturally differentiated profile, the sampling procedure should be obligatorily taken into account upon determining WRC and deriving pedotransfer functions. The noted variation in WRC approximation parameters may influence substantially the predictive estimation of soil water regimes. This fact suggests the necessity to indicate strictly the sampling procedure, in particular, in respect of the soil profile structure, asymmetry in soil properties, and sample sizes used for analyzing the hydrological properties of structured soils.

Key words: water retention curve, sampling, anisotropy, asymmetry in soil properties, modeling, soil monoliths

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Distribution of minor elements in residual soils and weathered rocks in Sri lanka

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The high grade metamorphic rocks of in Sri Lanka had been subjected under varying climatic conditions to considerable weathering. Well developed weathered profiles or the in-situ weathering products in different degree of weathering can be seen above the parent rocks in most of the places in the country. The objective of this research was to find out the pattern of the distribution of different minor elements in the weathered rocks and residual soils of different parent rocks. Samples were collected from different metamorphic rock types and in-situ weathered formations above the particular parent rock in different localities of Sri Lanka. The degree of weathering of rocks was identified according to the standard field methods. The parent rock types were charnockite, garnet sillimanite gneiss, hornblende biotite gneiss, migmatite, biotite gneiss, microcline gneiss, amphibolite and quartzite. About 10 grams of each sample were pulverized by employing the sample vibration mill. Selected minor elements were analyzed by X-ray fluorescence spectrometry on RIGAKU KG-X system, at the Department of Earth Resources Engineering of Kyushu University, Japan. The selected minor elements were S, Cl, F, Cr, Ni, Zn, As, Zr, Pb, Ga, Rb, Y, Cu, Sr, Ba, Co, and Nb. The total number of samples tested was 184. The results indicated that the distribution of each minor element in the residual weathered products above the parent rocks has no regular pattern. It is mainly due to the error of sampling location. For a better result borehole or core samples of weathering profile should be used.

Key words: weathered rocks, residual soil, minor elements, X-ray fluorescence

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Peculiarities of magnetic signal distribution in soils of different elements of geochemically conjugated landscape**

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The aim of this study was to identify patterns of distribution of a magnetic signal due to parent rocks, relief and the level of atmospheric moistening within the Ergeni Upland. The results show that the clay fraction has susceptibility by 2-5 times greater than the gross samples from which it is isolated. In the parent rocks and transitional horizons to them the ratio is 1.5. Thus, the main source of the magnetic signal is the clay fraction. For receiving ideas of the nature of the magnetic signal the magnetic fraction was isolated and its submicromorphology was investigated. In samples from A1 horizon of light chestnut solonetzic soil spherical magnetic particle size of 3-8 µm with smooth and rough surfaces often encountered. The particles with rough surfaces were apparently covered clay covers. The magnetic fraction isolated from parent rock is characterized by monotony of forms and consists of the anisometric particles with sizes of 5-50 µm. There are octahedral magnetite particles with distinct edges smooth. Thus, despite the close correlation of the MS parameter with content of total iron and physical clay the qualitative composition of the clay fraction provides decisive influence on the increase of the magnetic signal. Negative correlation of MS with the content of sodium, calcium, magnesium and sulfur indicates a discrepancy of accumulation conditions of gypsum and carbonate to synthesis conditions of ferrimagnetics. The differences between the soils of catena are defined by intensity and direction of the process of leaching, carbonatization, salt and humus accumulation modifying the magnetism of iron compounds. The comparative analysis of the MS growth curves with respect to rock shows that within the studied catena exposure of sandy rocks are observed.

Key words: clay fraction, magnetic susceptibility, magnetic fraction, total iron

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Changes in the composition of the microbial community chernozem soil at different types of plant litter

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Fresh plant material (e.g., litter) represents a readily available substrate for both soil microorganisms and soil fauna. Changes in the structure of soils microbial community caused by soil litter replacement (oak leaves and grasses) were investigated in this study. The method of microbial diagnostic based on gas chromatography – mass spectrometry of fatty acids, hydroxy acids and fatty aldehydes – was used for the study of the plants and soil microbial community. The amount of microorganisms in the microbial community under leaves and under grasses did not differ, but relatively to the untreated soil it was increased by 60%. The main increase was due to the bacterial phylum *Actinobacteria*, which is characterized by high hydrolytic abilities. Biomass of microscopic fungi that also possess hydrolytic capacities, on the contrary, decreased by 8 times. The plant substrate promoted *Protozoa* reproduction: their number increased by 2 and 3 times in the soil under leaves and under grasses, respectively.

Key word*:* plant litter, microbial community, gas chromatography-mass spectrometry (GC-MS)

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The role of 24-epibrassinolide in the formation of barley crop

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This paper presents the results of the action of different concentrations of 24-epibrassinolide (24-epiBS) on barley both with NPK fertilizers and without their usage (in conditions of different level of mineral nutrition) on soddy-podzolic and chernozem soil types. It is established that foliar treatment of 24-epiBS at concentrations that have stimulatory effect in the bioassay (10^{-9}, 10^{-8}M) is not always efficient for such integral indicator as grain formation in barley. This is largely dictated by the dependence of crop growth, the formation of its structural parameters (tillering, number of shoots, formation of the ear and the grains in it) on external environmental factors. Either high fertility level or high level of mineral nutrition elements in soil is not always optimal for forming good harvest. In these circumstances, i.e. under stress, the phytohormone effectiveness rises, contributing the formation of productive shoots, which are provided with high quality grain. In our laboratory and green house experiments, the interaction of 24-epiBS with gibberellic and abscisic acids is shown. Refereed articles confirm the 24-epiBS relation with phytohormones (A_3, IAA, ABA). The short-term effect of phytohormone on the membrane permeability and on the change in the concentration of NPK in plants organs (straw, grain) is established Thus, the transport function of brassinolide is confirmed. It is suggested that the action of 24-epiBS could be due to the regulatory ability of hormonal plant's status, depending on changing levels of mineral nutrition.

Key words: *Hordeum vulgare L.*, 24-epibrassinolide, foliar treatment, the crop structure

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Micromorphological properties of lamellae in some arid soils in central Iran

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The main objective was to study the micromorphological properties of some arid soilscontaining lamellae that are apparently formed by illuviation to better understand the mechanisms responsible for the formation of lamellae. One pedon has been chosen as representative pedon. Prepared samples were subsequently analyzed for physical, chemical and micromorphological soil properties. The result showed that lamella formation in this area occurred in a very thin layer of soil with smaller particles and pores than the overlying and underlying eluvial horizon. Argillic horizon was developed in this arid soils.

Key words: argillic horizon, Bedding plains, Illuviation, Isfahan province

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Sustainable development of territories and environmental requirements for land use

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In General terms the concept of sustainable development of humanity is a model of forward motion that achieves the satisfaction of vital needs of the present generation without depriving such opportunities of future generations. Sustainable development of the territory is possible only under certain interconnected environmental requirements. These requirements are based on the implementation of the concept, conventionally called "zero land degradation".

Zero land degradation (which corresponds to the background level of nature quality) cannot be reached in the process of real land use. Under the guise of zero degradation we understand the establishment of acceptable ecological state of the environment and permissible anthropogenic impact on it, wherein self-healing of nature quality is possible and there is no accumulation of irreversible environmental damage. That is, the certain constant of sustainable development is observed. The list of requirements can be divided into two areas: requirements to the criteria and standards of environmental assessment of environmental components, based on perceptions of their environmental functioning, with particular attention to soils and lands as natural connecting link of the biosphere; soils and lands are considered as independent components of the environment. Requirements to the level of tension of the environmental situation in programming and land use system and land management design, implemented on specific territories and land plots. The implementation of requirements is based on the principles of sustainable development and the organization of reversible changes, the quality of the natural environment and an appropriate environmental management system supported. In the heart of the control system is an integral system of environmental assessment, regulation, monitoring and environmental expertise.

Key words: ecological assessment, ecological regulation, sustainable development

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Effects of Gyttja and polyacrylamide applied to soils with different texture on soil erodibility

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In this study, time-dependent changes of structural stability of clayey and sandy soils treated with gyttja and polyacrylamide (PAM) were investigated. For the purpose of the study various dose combinations of gyttja and PAM were applied to the soils basis oven dry weight. Constructed experiment according to a randomized complete block experimental design was carried out in plastic pots kept under greenhouse conditions. Each group pots were deteriorated in 4^{th}, 8^{th} and 12^{th} months and necessary measurements were realized. Wet aggregate stability (WAS) and dispersion ratio (DR) indices were used for evaluating changes in the structural stability of soils. In addition, soil total organic matter concentration (SOM) was determined for each four-month periods. According to ANOVA results, effect of soil kind, dose or kind of applied conditioner and sampling time were found significant (P<0.001) on SOM. Thus, changes in WAS and DR values of experiment soils were usually affected by subjects as statistical (Duncan test α= 0.05). As a result, application of high dose gyttja with PAM (gyttja equal to 150 Mg OM per hectare + 6.25 kg PAM per hectare) produced the optimal effect on WAS and DR indices. Our results suggested that together usage of gyttja and PAM decreased erodibility in both soils.

Key words*:* dispersion ratio, Gyttja, polyacrylamide, wet aggregate stability

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The determination of Soil Compaction by Penetration Resistance in Football Field

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Soil compaction in football fields reasoning from the footballer or soil cultivation is the hidden processes and constraint the performance of the sportsmen. The aim of the work was to determine the compacted areas of the entire field. The workout field of Gençlerbirliği FC, established 6 years ago, was divided 10 m by 10 m in both directions. Soil penetration depths with 3 replications were measured by penetrologger in the intersection points. $1cm^2$ 30° cone type was selected. Soil moisture was measured by TDR in each measurement point and used for the correction of the penetration. Measurements were performed up to the compacted zone. The average of depths of compacted zone was used for interpolation in ARCGIS software. While the penetration resistance has the highest value (5.2-5.8 MPa) in front of the goal, where the highest struggle is, both side of the midfield (left and right wing) has the lowest resistance (3.8-4.8 Mpa). The penetration depths are concordant with the soil moisture. The lower soil moisture was detected in front of the goal due to the low infiltration rate reasoning to compaction. Monitoring of the penetration resistance in the football field is good tool for analyzing the behaviour of the footballer during the matches

Key words: compaction, penetration depth, soil resistance, soil moisture

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Particle size distribution of agrosoddy-podzolic soil morphons and morphemes by laser diffraction analysis

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Improvement of instrumental methods observed in the recent decades resulted in the growing potential of "information capacity" of the obtained data. Determination of particle size distribution (PSD) with the use of laser diffraction (LD) has a number of important advantages as compared with other techniques, among them: express analysis, small size of samples (50-600 mg) required and continuous PSD curve. In this work we tried to disclose the given advantages of this method used to analyze soil functioning processes with agrosoddy-podzolic soil of El'digino village (Moscow region) taken as an example. Ability of the LD method to analyze mg-degree samples made it possible to investigate minor soil components such as cutans and other soil neo-formations which was demonstrated in our research. We attempted to give a new vision of textural differentiation of soils. For this purpose we investigated PSD of average samples and made a comparative layer-by-layer analysis of cutans samples and intraped soil mass picked out from different depths. Also, we examined a possibility to adapt the grain-size soil characteristics obtained by other grain-size analysis methods to the outcomes of the LD analysis.

Key words: textural differentiation, podzolization, initial lithology heterogeneity, gleying

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Salinity composition changes in drainage water in soil columns irrigated with the different salinity and varying leaching fractions of water

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The quality of drainage water is related with the salinity contents of irrigation water beside the irrigation methods, the amount of irrigation water and soil type. The objective of this study was to evaluate salinity variations of drainage water for sunflowers irrigated with leaching fractions with different salinities of water. The study was carried out with sunflower in PVC soil columns with a diameter of 40 cm and length of 115 cm. The study was carried out with 3 different irrigation amounts, two of them with the leaching fractions, and 5 different salinity levels of irrigation waters, with 3 replications, in total with 45 soil columns. The three irrigation treatments are 75%, and 115% and 135% of the required water. The irrigation water salinities are 0.25 dS m^{-1} as a control treatment, 1.5 and 3.0 dS m^{-1} with NaCl+$CaCl_2$ salts and 1.5 and 3.0 dS m-1 with NaCl+$CaSO_4$ salts as saline treatments. Soil water contents were determined with the TDR probes installed at depths of 15, 45 and 75 cm in the columns. Drainage waters were collected from the leached columns using the plastic cups situated at the bottom of the soil columns. The EC, pH, Cl^-, SO_4^{2-}, CO_3^{2-}, HCO^{3-}, NO_2, and NO_3 were analyzed and evaluated in the drainage water obtained from the leached columns, which were irrigated with %115 and %135 more water of required.

Key words*:* leaching fraction, drainage water quality, salinity, sunflower

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Change in the salinity composition of drainage water in soil columns irrigated by different salinity and varying leaching fractions of water**

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The quality of drainage water is related to the salinity contents of the water used for irrigation as well as the methods of irrigation, the amount of irrigation water applied and soil type. The objective of this study was to evaluate the salinity variations of drainage water for different sunflower plants irrigated with leaching fractions of water with different salinity levels. The study was carried out with sunflower in PVC soil columns with 40 cm diameter and 115 cm length. The study was carried out with 3 different irrigation amounts, two of which with leaching fractions, and 5 irrigation waters with different salinity levels, repeated 3 times. 45 soil columns were used in total. The three irrigation treatments contained 75%, 115% and 135% of the required water. The irrigation water salinities were 0.25 dS m^{-1} as control treatment, 1.5 and 3.0 dS m^{-1} with NaCl+$CaCl_2$ salts and 1.5 and 3.0 dS m^{-1} with NaCl+$CaSO_4$ salts as saline treatments. Soil water contents were determined with the TDR probes installed at depths of 15, 45 and 75 cm in the columns. Drainage waters were collected from the leached columns by situating plastic cups at the bottom of the soil columns. The EC, pH, Cl^-, and SO_4^{2-} were analyzed and evaluated in the drainage water obtained from the leached columns, which were irrigated with %115 and %135 more water than required.

Key words: leaching fraction, drainage water quality, salinity, sunflower

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Experiment in the use of Kamchatka volcanic ash to improve soil fertility

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The aim of the work was to evaluate the efficiency of Kamchatka volcanic ash in growing crops. The experiment was conducted at the ochreous volcanic soils (Andosols Acroxic) on the experimental fields of the Kamchatka Research Institute of Agriculture (South Kamchatka, the Avacha River valley). The soils were stercorated with the combination of conventional mineral fertilizers and fresh volcanic ash of Sheveluch eruptions and converted ochreous Holocene volcanic ash of the transitional horizon of Kamchatka Andosols Acroxic. When using volcanic ash in combination with different doses of fertilizers for different variants of the experiment an increase in the productivity of potato was 37-72%. Volcanic ash contains a wide variety of mobile forms of chemical elements, but the amounts of them are not significant. It means, that the yield increase is not related to the additional nutrition elements. Ashes are catalysts of biogeochemical and stimulants of microbiological processes in the soil, they improve the nutrient status of plants, assimilability of nutrients in the soil and mineral fertilizers. The increase of starch in potato tubers (3-8%) confirms catalytic effect of ash.

Key words*:* Kamchatka, volcanic ash, catalytic properties, soil fertility, an increase in yields.

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Evaluation change space of metals in surface soil in El Tarf agro-system (North east Algerien)

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The severity of pollution not only depends on the total content of heavy metals from the soil, but also on the fraction of the mobile and the bio-available forms, which are generally controlled by the texture and other physicochemical properties of the soils. These metal pollutants can worsen the situation. Therefore, it is more appropriate to know the dangers of land use in agricultural areas of speciation, geochemistry and behavior of heavy metals in soil were studied.

The average contents of heavy metals namely Pb, Mn, Cu and Hg in the soil were determined using a chemical digestion process and analysis by ICP-MS to evaluate the mobility and availability to plants.

This study was conducted in both the surface horizons and during two seasons in the El Tarf region (North-East Algeria); mainly rural area where water resources are heavily used for agricultural activities.

Analytical results show that the samples analyzed soils are characterized by an abundance of certain heavy metals especially for Pb and Mn. Other elements Hg and Cu present no harm to the environment.

Key words: pollution, agricultural soils, heavy metals, North-eastern Algeria, ICP – MS

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The content of trace elements in soils of the Astrakhan region

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Soil - a very specific component of the biosphere, because it not only geochemically components accumulates contaminants, but also acts as a natural buffer that controls the transfer of chemical elements and compounds in the atmosphere, hydrosphere, and living matter. In the paper the basic soil of the Astrakhan region: light brown, brown semidesert, loamy and sandy soils.

Sampling was conducted by an envelope. Collection of soil samples was carried out in November 2013 and 2014 years. Mass fraction of metals in the soil samples was determined by tribal atomic absorption spectrometry.

Studies brown semidesert soils showed that the content of heavy metals in the soil does not exceed the maximum allowable concentrations.

Distribution of trace elements in different salinity, light chestnut and brown soils are very different. The study found that the most suitable for the cultivation of various garden and vegetable crops are considered to loamy soils.

Key words: soil, heavy metals, trace elements.

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