

ICEFSSS 2023

INTERNATIONAL SOIL SCIENCE CONGRESS ON “CLIMATE CHANGE AND SUSTAINABLE SOIL MANAGEMENT”

ABSTRACT

**Dedicated to the 100th Anniversary of Haydar Aliyev –
the National Leader of Azerbaijani People**

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SECTION 1.

BIOLOGY, AGROCHEMISTRY, MINERALOGY AND SOIL PHYSICS

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EFFECT OF MINERAL FERTILIZERS ON SUNFLOWER OIL YIELD IN GRAY-BROWN SOILS

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The article deals with the effect of mineral fertilizers on sunflower oil yield in gray-brown soils. The nutritional conditions of sunflower in our republic haven't been almost studied. Increasing the productivity and quality of sunflower is possible by using new cultivation technologies, and most importantly, mineral fertilizers. Mineral fertilizers affect the physiological and biological processes in the plant, the formation of valuable economic indicators and productivity directly. Therefore, taking into account its importance as a valuable food plant, optimization of nutritional conditions affecting the improvement of the productivity and quality of sunflower in the region is one of the urgent problems. It has been determined that besides the productivity, mineral fertilizers increase the oil yield of sunflower seeds. Due to the effect of mineral fertilizers, oil yield increased between 148.8-617.1 kg/ha, or 17.2-75.7%, seed yield per 1 kg of NPK between 5.62-12.22 kg, and oilseed crop between 0.83 -1.71 kg compared to the control option (no fertilizer). The highest oil yield was 1349.0-1484.7 kg/ha, growth was 581.0-617.1 kg/ha or 71.1-75.7%, seed yield per 1 kg of NPK was 7,70-8,42 kg, oilseed crop was 1,61-1,71 kg by observing in N₁₂₀P₁₂₀K₁₂₀ option.

Key words: sunflower, gray-brown, soil, mineral fertilizers, seed yield, oil yield

CONSERVATION OF GENETIC RESOURCES IN CLIMATE CHANGE ERA

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ABSTRACT

Over the past 25 years, the impact of climate change has led to an increased frequency of droughts and high temperatures, negatively affecting agricultural crop productivity. Numerous studies indicate that climate change has negative effects on various regions, such as Central Northern America, Northern America, Central Asia and Caucasus, including Azerbaijan, and Western Australia. Meanwhile, the global population is steadily increasing, with an annual growth rate of 0.7%, and is expected to reach 9.2 billion by 2050. Therefore, it is of paramount importance to conserve, maintain and sustainably use of biodiversity, particularly agrobiodiversity. The Genetic Resources Institute of Azerbaijan has been actively collecting genetic resources since 2003 through various international and local expeditions. Azerbaijan serves as a gene center for many crops, making its genetic resources valuable in addressing food security issues worldwide. Azerbaijan is the origin and cultivation center for numerous plant species, with approximately 5,000 higher plant species found in its natural flora. More than 40% of these plant species are ancestors and predecessors of cultivated plants. Over the past 20 years, the Genetic Resources Institute has collected over 10,000 accessions and preserved them in the National Genbank. Additionally, the Institute has developed 19 new plant varieties using the local genetic resources in the last decade. Furthermore, the Institute has prepared a strategic plan for the future and main goal is to increase the number of conserved accessions to 25,000 by 2030.

Keywords: climate change, drought, genetic resources, conservation, plant breeding

INFLUENCE OF HIGH DOSES OF NITROGEN FERTILIZERS ON THE ACCUMULATION OF HEAVY METALS IN THE VEGETATIVE ORGANS AND FRUITS OF TOMATOES

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ABSTRACT

Environmental pollution has become one of the most discussed issues in the current century. In our research, field studies were carried out on the experimental plot of the Research Institute of Vegetable Growing of the Ministry of Agriculture of Azerbaijan in the territory of the Absheron region (Pirshagi settlement). The experiments were carried out with the sort of tomato "Ilkin". "Ilkin" - is the first typical sort of tomato for canning purposes, for growing in open ground.

It is clear that heavy metals and nitrates reduce the nutritional value of tomatoes. Therefore, we set a goal to study the total amount of heavy metals in the roots, stems, leaves and fruits of tomatoes. Heavy metals were determined by the iCAP™ 7000 ICP-OES device. For this purpose, samples of tomatoes were selected from two variants. One of the variants is the control one, in which fertilizers are not used, and the other one is the variant of 10 t/ha manure + N₁₅₀P₉₀K₉₀, where the highest amount of nitrates is contained in tomato fruits.

The amount of heavy metals in the root, stem, leaves and fruits of the tomato plant in samples taken from the variant 10 t/ha manure + N₁₅₀P₉₀K₉₀ is higher than in the control variant. However, in both cases, the amount of heavy metals is the least in tomato fruits, and most of all in the roots. Although the leaves, stems and roots of the tomato contain large amounts of iron, copper, chromium, cobalt and silver from heavy metals, the fruits did not exceed this limit in both cases. It can be concluded that an increase in the doses of nitrogen fertilizers can lead to an increase in nitrates in tomato fruits, as well as to the accumulation of heavy metals in tomato plants that disrupt biochemical processes.

Keywords: tomato, ammonium nitrate, heavy metals

ECO-CHEMICAL STUDY OF SOILS AROUND GALA LAKE

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ABSTRACT

Soil samples were taken from the lands around the Gala lake, physico-chemical parameters and heavy metals were determined in them. In soil samples, zinc, chromium, molybdenum, nickel, and copper ions, and sulfates from anions, pass the MPC many times.

Keywords: Gala Lake, ecology, soil, heavy metals

Complex scientific-research works should be carried out in order to improve the ecological health of Lake Gala, which is located in the west of the Absheron Peninsula, and its surroundings. In the polluted areas of the Absheron Peninsula (Lake Gala and its surroundings), the proposal to investigate the current state of the organizational and social directions of ensuring the regulation of environmental problems, the normative basis of the efficient use of energy resources and its impact on the human body, and to reveal the reserve opportunities and ensure their efficient use, and consists of developing recommendations.

In the areas where oil and gas infrastructure facilities are located on the northern shore of the lake, oil pollution reaches a very high level and amounts to 30-70%. The depth of oil pollution on the northern side is 80-100 cm. Oil pollution in other areas is relatively low (10-20 cm). Remains of former oil wells and other oil and gas infrastructure facilities have remained in the area until now, causing oil pollution of their location and adjacent areas to varying degrees. The surroundings of the lake have been seriously polluted with oil residues, industrial and household waste. Residential or garden areas have been built near the lake, abandoned oil and gas wells have not been conserved according to modern requirements. There are open reserves, agricultural facilities, non-working oil wells, dirt roads, working and non-working communication lines, etc. in the area. The north side of the lake is filled with oilfield waters, pipelines, oil wells, etc. has been subjected to more serious pollution as a result of flows and leaks from sources. Crude oil hydrocarbons spread and absorbed into the soil polymerized and formed a layer of bitumen in perennial runoff areas. The amount of heavy metals was determined in the soil samples taken from around Lake Gala. The results of the analysis are given in table.

As can be seen from the table, zinc, chromium, molybdenum, nickel and copper ions, and sulfates from anions, pass YVQH many times in soil samples. Yol datın qatılıq hədləri (MPC) 01-20/147-11 dated 24.09.93 from the document "Maximum Permissible Concentration (MPC) of toxic waste in soil, approved by the Ministry of Health of the USSR, the Ministry of Agriculture of the Russian Federation, the Ministry of Environmental Protection of the Russian Federation" taken away

	Prescribed components	Unit of measurement	The name of the instance	Allowable Rigidity Threshold
			Castle area	
	pH	-	7.1	-
	Electrical conductivity	$\times 10^{-3}$ Sm/sm	4.41	-
	Chloride ion	%	0.218	-
	Sulfate ion	mq/kq	8142	320
	Nitrate ion	mq/kq	60	130
	Carbonate ion	mq/kq	0	-
	ionized hydrocarbon	mq/kq	549.0	-
	calcium ion	mq/kq	3086.2	-
	magnesium ion	mq/kq	642.6	-
0	Zn	mq/kq	35.0	23.0
1	Co	mq/kq	4.53	5.0
2	Pb	mq/kq	5.66	32.0
3	Ni	mq/kq	18.1	4.0
4	Cr	mq/kq	16.8	6.0
5	Mo	mq/kq	15.4	10.0
6	Cd	mq/kq	0.855	1.0
7	Cu	mq/kq	7.79	3.0
8	Fe	mq/kq	14800	37000
9	Mn	mq/kq	543	1500

CHANGES IN THE AGROCHEMICAL CHARACTERISTICS OF BROWN MOUNTAIN FOREST SOILS UNDER ANTHROPOGENIC INFLUENCE

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ABSTRACT

One of the our republic regions with great economic potential for the development of agriculture is the Lesser Caucasus. Assessment of the vegetation cover of the area is associated with soil erosion, pollution and other processes under the influence of anthropogenic factors. CO₂ is very low across almost the entire profile. CaCO₃ was relatively high and amounted to 3.29-4.26%. The amount of humus decreases from the upper layers to the lower ones, respectively, it was 5.8-7.2% in the upper layers and 0.7-0.3% in the lower layers. Organic carbon decreased from upper to lower layers in each section. In typical brown mountain forest soils, depending on the composition of forest and undergrowth herbaceous plants, accumulation of various nutrients and nitrogen is observed on the soil surface throughout the year. The amount of total nitrogen in typical brown mountain forest soils was 0.55-0.05%. Under the influence of forest cover and moisture regime, the reaction of the environment in these soils was slightly acidic and close to neutral. In typical brown mountain forest soils, pH varied from 7.5 to 8.4. In the washed brown mountain-forest soils, the pH was 5.6-6.0. The amount of absorbed bases in the washed brown mountain forest soils increases from the upper layers to the lower ones, the absorbed Ca in the upper layer was 32.2, in the lower layers 38.7 mg/eq. The transformation of forest cover into agricultural land affects the decomposition and accumulation of organic matter, sandy and silt fractions in the soil.

Key words: brown mountain-forest typical, washed mountain-brown, humus, absorbed bases, soil profile.

MAIN AGROPHYSICAL INDICATORS AND CLASSIFICATION OF SOILS IN THE DRY STEPPE ZONE OF AZERBAIJAN

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ABSTRACT

The results of studies on changes in the main agrophysical indicators of gray-brown soils [WRB (2008), Haplic Kastanozems / Haplic Calcisols] of the dry steppe zone of Azerbaijan, depending on their agricultural use, have been studied and presented. Changes in morphological profiles, granulometric and microaggregate compositions, structure and density of virgin and irrigated gray-brown soils were revealed. Statistical investigation of factual data the heavy loamy granulometric composition is characteristic for virgin soils of the arid field zone of A-layer. On average $< 0.01 \text{ mm} - 56.7 \pm 1.18\%$. A quantity of notable clayey particles $< 0.01 \text{ mm}$ is noted in the middle part (25-50 cm) of profile.

The high dispersion fraction is 45% of physical clay, this confirms clayey of the same profile. The weak loamy is noted in the one-metre layer, a composition of silt fraction is $28.3 \pm 1.08 - 31.8 \pm 0.83\%$ physical clay is $63.0 \pm 1.8 - 65 \pm 1.1$. It is accordingly 3-5%, more than virgin zonal soils.

An assessment is given and the dependence of soil density on factors: granulometric and microaggregate compositions, irrigation prescription, agricultural technology, etc. is given. Statistic study of the factual information indicates that the high water-proof aggregates of the arid subtropic soils are $54.08 - 2.47\%$ in the arid first half – meter layer of virgin soils, large aggregates are 20.25 mm.

The irrigative arid field soils zone have less water-proof aggregates in comparison with the virgin zonal soils ($45.29 \pm 1.26\%$).

Based on the results obtained, the place of grey Cinnamonic soils in the international classification system WRB (2014) was determined:

- virgin soils - Saturated gley calcareous heavy loamy - Duric Gleyic Calcic Kastanozems (Loamic);
- for a long time-irrigated Grey Cinnamonic (over 300 years Powerful gley cultivated for a long time irrigated calcareous heavy loamy Grey Cinnamonic - Gleyic Petrocalcic Kastanozems (Anthric, Loamic).

Key words: agrophysical indicators, classification, gray-brown soils, structure.

THE EFFECT OF THE NUMBER OF IRRIGATION AND MINERAL FERTILIZERS IN GRAY-BROWN SOILS ON THE COMPOSITION AND QUANTITY OF NITROGEN, PHOSPHORUS, POTASSIUM ENTERED INTO THE SOIL WITH ROOT AND STRAW RESIDUES

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The presented article is devoted to the effect of mineral fertilizers on the composition and quantity of nitrogen, phosphorus, potassium entering the soil with the roots and straws of oat (*Avena Sativa* L), against the background of the number of irrigations in the irrigated gray-brown soils of Ganja-Dashkasan economic region. It was determined that the amount of nutrients included in the nettle varies depending on the number of irrigations, mineral fertilizer rates, the amount of root and straw residues, and the chemical composition. 3.0-10.5 kg/ha of nitrogen, 2.1-5.7 kg/ha of phosphorus and 6.7-17.7 kg/ha of potassium entering the soil with root and straw residues due to the effect of mineral fertilizers on the background of 2 irrigations. Among the control-fertilizer variants, more nutrients entered the net in the $N_{90} P_{90} K_{60}$ variant. Against the background of the number of irrigations 3 times, due to the effect of mineral fertilizers, nitrogen entering the soil with root and straw residues is 3.9-11.0 kg/ha, phosphorus 2.2-7.0 kg/ha, and potassium 6.8-18. More nutrients entered the soil in the $N_{120} P_{120} K_{90}$ variant than in the control-no-fertilizer variant by 9 kg/ha. Against the background of the number of irrigations, the amount of nutrients entering the soil in 3 irrigations was significantly higher than in 2 irrigations in each of the studied options.

Key words: oat (*Avena Sativa* L), mineral fertilizers, nitrogen, phosphorus, potassium, root, straw

DENDROCHRONOLOGICAL STUDY OF *CARPINUS SCHUSCHAENSIS* H. WINKL. IN HIRKAN DENDROFLORA

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ABSTRACT

Because of human's poorly thought-out economic activity, biological diversity has been altered and degraded, and the range of species has decreased. The modern vegetation biological diversity does not match the contemporary climate as a result of the biological diversity of the vegetation being violated in various places of our Republic. Monitoring the areas where rare and endangered species are distributed, developing a plan of measures for the purpose of evaluating and protecting those ecosystems, and dendrochronological analysis of the processes occurring in the populations of rare species in the natural and cultural flora of Azerbaijan are the main goals of the scientific research work that has been conducted. Given this, it should be considered strengthening the oversight of environmental safety protection and executing challenging projects in other closely related areas. The old Shusha hornbeam (*CARPINUS SCHUSCHAENSIS* H. WINKL.) species was studied in the article using a sample from the Hirkan flora. Modern research techniques were used to examine the Shusha tree's age, development dynamics, and the impact of climatic conditions on the species.

Keywords: *Carpinus Schuschaensis* H. Winkl., Dendrochronology, Edificatory, Hirkan Flora, Radial Growth

ECOLOGICAL ASSESSMENT OF IRIS SPECIES SPREAD IN THE WESTERN REGION OF AZERBAIJAN BY SOIL FACTORS

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ABSTRACT

The increased anthropogenic pressure on natural ecosystems over the past decades has led to changes in the natural conditions of plant resources growth.

Changes in soil and climatic factors caused a decrease in populations of wild species of irises.

The purpose of this study is to determine the soil factors that have a limiting effect on the species of irises. The study is according to D. N. Tsyganov's scale, it is to determine the limiting soil factors affecting the distribution of some iris species (Iris L) in the western region of Azerbaijan.

For this purpose, an assessment of the potential and real ecological valence of species was carried out, the coefficient of ecological efficiency and the index of tolerance of species in relation to soil factors were calculated.

With the help of amplitude ecological scales, it is possible to determine the state of the growing environment of cenopopulations of iris species.

It was determined that the species of irises growing in the western part of Azerbaijan can be bioindicators of the environment. The narrower the ecological range of the species, the higher its indicative significance.

The results of the research can be used for phytoindication of territories and monitoring of plant resources.

Keywords: phytoindication; potential ecological valence; real ecological valence; soil moisture; species; tolerance index.

GEOECOLOGICAL CASES ON SOIL INVESTIGATIONS IN ABSHERON PENINSULA

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ABSTRACT

Presented paper covers issues of the study of environmental and eco-geographical issues of the territory of Absheron peninsula. Would be impossible to create a harmonious environment for live life without knowledge of efficient use of natural resources and systematic mechanisms. Our topic on environmental issues, based on substantive researches of reputable scientists is actual for Absheron peninsula and natural components. An article concerns of protection of diversity of soils, flora and fauna of the Absheron Peninsula, identification of endangered plant and animal, preservation of natural complexes of Absheron Peninsula, also touches study of the ecological and geographical characteristics of the Absheron Peninsula by using GIS.

We tried to introduce modeling and research methods, assessing the interaction of territorial development of the natural potential in Absheron peninsula, planning methods and strategic programs for the development of social and economic priorities.

Another aim was determination of the impact of social and economic development on Absheron peninsula on soils and biodiversity, use of indicative functions of bioresources in different fields of researches, impact of social and economic development on soil/land and water resources in Absheron peninsula, as well as assessment of impact of air pollution, optimal criterias for maintaining of natural balance in Absheron peninsula.

ON THE PRODUCTIVITY OF THE KHANDOGNY GRAPE VARIETY AND PRODUCT THE RESULT OF DIFFERENT CULTURAL OPERATIONS AFFECTING THE QUALITY

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ABSTRACT

The yield of grapes, increasing the quantitative and qualitative indicators of the product on a scientific basis is one of the important issues ahead. To the growth of the grape responsible achieve to be for grapes cultivated of the region climate-soil conditions, reprimand economic-technological features, to the trunk various of forms giving, spontaneous on the picture not differential of agricultural technology modern scientific to the basics leaning on application making many important of issues is one. Past of years according to the indicators in Azerbaijan various in the regions cultivated technical and the table grapes in accordance with the direction of use of varieties high productivity is possible. That's why to the relief in the grape fields, to the grape varieties to be planted should be treated with high care, modern cultivationwide space should be given to the application of systems. For this purpose, the end for the development of winemaking in our country grape varieties such as Khandogny, Madrasa, Bayanshire, Rkasiteli, which were in great demand at the time, are given ample space to create a vineyard. Therefore, in the Absheron Auxiliary Experimental Farm (Ampelography collection garden) differential of agricultural technology some elements application by doing Khandogny grapes of the variety Factors affecting productivity, product quantity and quality, that is, different loads on forms norms to give and to learn goal ahead is set.

Key words: agrotechnics, cultivation, fan shape, cordon shape, grape, cargo norm

AGROCHEMICAL AND ECOLOGICAL EFFICIENCY OF ORGANIC AGRICULTURE

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ABSTRACT

At uses of organic fertilizers accumulation of nutritious elements in soil considerably improves. Thanks to organic fertilizers there was possibility to raise a crop entering of organic fertilizers made of local waste products which pollute ecology promotes increase in accumulation of mineral forms of nutritious elements entering of organic fertilizers of local waste products which pollute ecology promotes increase in accumulation of mineral forms of nutritious elements. Organic fertilizers promote increase in the maintenance (contents) of nutritious elements in an elevated part of plants.

Azerbaijan has enough resources to produce organic fertilizer based on new technology. These include industry, agriculture, household waste, dry, water, lilies and so on.. Using new fertilizers made using bioconversion methods from named waste not only meets the need for organic fertilizers but also plays a major role in protecting environmental ecology in that zone. The physical properties of temperature, moisture and soil play a major role in the decay of the remains. In winter, at very low temperatures, the process of decay and humidity is weakened in cases of lack of moisture in the summer, since the microorganisms that create the process do not reproduce in such conditions.

Keywords: agriculture, fertilizer, organic, waste

LAND VALUATION OF DASHKASAN – GADABAY CADASTRAL DISTRICT

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ABSTRACT

Both negative and positive properties of soil affect the productivity and quality of agricultural, fodder and forest areas. This feature of the soil is considered very important in the formation of its potential fertility and the productivity of agricultural crops. The soft layer of the soil affects the water-physical properties of the soil, first of all, the field water content, the respiration coefficient, and on the other hand, the density and depth of the root system.

There is a need to check the reliability of numerous analysis materials by mathematical-statistical methods during the comparative assessment, i.e. validation, of lands. Since the 70s and 80s, mathematical-statistical methods have been used in the studies related to land valuation. At present, generally accepted mathematical statistical methods of finding price criteria are used when carrying out works related to land valuation.

One of the most important stages in land valuation is the establishment of the main valuation scales. In our republic, the main soil types and sub-types spread within the territory are taken when establishing the main soil quality scales. While compiling the main quality scales of the lands of Dashkasan - Gadabay cadastral region, large-scale (1:10000) soil research materials data on soil indicators (humus, nitrogen, UAC) of soil types and subtypes spread across the zone were collected and analyzed by mathematical statistical methods. , the relationship between the indicators of these criteria expressed in honey and agricultural plants was checked.

The existence of a correlation dependence between the genetic characteristics of the soil and the productivity of agricultural plants allows us to consider humus, nitrogen, and UAC as criteria of creditworthiness when compiling the main quality scales of the soils of Dashkasan-Gadabay cadastral region.

By using the price criteria selected for the lands of Dashkasan-Gadabay cadastral region, the main rating scales of the irrigated lands of the zone were drawn up. When drawing up the main rating scales, standard soils were selected for the area, and compared to them, the values of other soils of the area expressed in points were determined.

As a result, it should be noted that in the cadastral region: Washed mountain black - 92, Typical mountain black - 100, Carbonate mountain black - 85, Washed brown mountain forest - 67, Typical brown mountain forest - 52, Carbonate brown mountain forest - 68, Steppe brown montane forest - 58, Grassy montane meadow - 74, Washed blackish montane meadow - 76, Grassy montane-grass steppe - 63, Washed brown montane forest - 63, Typical brown montane forest - 64, Carbonate brown montane forest - 64, Dark mountain gray brown - 68, mountain gray brown - 23.

Keywords: soil, agriculture, land valuation, Dashkasan-Gadabay cadastral region.

DETERMINATION OF ELECTRICAL CONDUCTIVITY OF SOILS IN KURMUKCHAY BASIN

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ABSTRACT

Soil electrical conductivity is a fundamental concept in soil science and agriculture, and it is increasingly recognized as an important parameter in understanding and managing the health of river basin ecosystems. Soil electrical conductivity is a measure of the soil's ability to conduct electrical current, and it is influenced by several factors such as soil properties, water content, and organic matter. In river basins, soil electrical conductivity can be affected by geology, topography, vegetation, land use, and anthropogenic activities such as agriculture and mining. High levels of soil electrical conductivity can result in increased soil salinity, which can have detrimental effects on plant growth and ecosystem health. In addition, high soil electrical conductivity can lead to contamination from heavy metals and other pollutants, further exacerbating the impact on the ecosystem. Measuring soil electrical conductivity in river basins is important for managing and protecting the health of the ecosystem. It provides insight into soil properties, nutrient content, and water availability, which are essential for plant growth and ecosystem functioning. Soil electrical conductivity measurements can be used to identify areas with high levels of salinity or contamination, which may require remediation or restoration efforts. It can also help monitor changes in soil properties over time, which can provide insights into the effectiveness of management practices and the impact of climate change on the ecosystem. Several methods are available for measuring soil electrical conductivity in river basins, including soil solution extraction, electrical resistivity measurements, and electromagnetic induction. These methods can provide information about soil properties at different depths, which can be useful for managing soil fertility and irrigation practices. Overall, soil electrical conductivity is an important parameter in understanding and managing the health of river basin ecosystems. It provides valuable insights into soil properties, nutrient content, and water availability, which are critical to plant growth and ecosystem functioning. The measurement and monitoring of soil electrical conductivity can help identify areas of concern and facilitate the development of management practices that promote the health and sustainability of river basin ecosystems.

Key words: electrical conductivity, basin soils, soil fertility, ecosystem

MICROBIOLOGICAL ACTIVITY OF TECHNOGENICALLY AFFECTED SOILS OF THE ABSHERON PENINSULA

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ABSTRACT

This paper discusses the effect of oil pollutants on soil microbiocenosis and ecologicalfunctional reactions of rhizosphere microorganism. It appears that the structure and functional activity of the soil microbiocenosis is dependent on the time that has passed after hydrocarbon pollution. The greater density of microbial populations in the rhizosphere can testify to more favorable and stable conditions in the rhizosphere compared to soil without plants. Thus, the plant in the conditions of pollution is a factor that supports or increases thenumber of soil microbial populations.

It is known that the activity of biological processes in the soil cover primarily depends on the structure and functional state of soil microbiocenosis - various groups of bacteria, microscopic fungi, algae, and mesofauna. Soil pollution with hydrocarbons contributes to the development of numerous responses of this complex biosystem. The problem of bioassessment of technogenically impacted soil and water ecosystems is currently developing in various directions.

The adaptive and destructive potential of plants and their associated microbial complexes in the presence of hydrocarbon pollution can enhance soil purification, on the one hand, and change plantmicrobial interactions, on the other. The relationship between plants and microorganisms in the rhizosphere consists of mutually directed actions of partners. The impact of phytocenoses on the formation of microbiocenoses in the soil is realized through the provision of a niche for the habitation of microorganisms (the root system itself) and root secretions that regulate the development of microflora. In turn, the metabolic activity of microorganisms, their ability to produce biologicallyactive substances to a large extent ensure the growth and development of plants.

Keywords: gray-brown soils, oil-contaminated soils, hydrocarbon-oxidizing bacteria, phytoremediation, rhizospheric microorganisms

DEVELOPMENT OF EFFECTIVE MEDICINAL COMPOUNDS FOR PLANT PROTECTION USING MEMBRANE-ACTIVE ANTIBIOTICS

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ABSTRACT

Comparative physicochemical characteristics of dimethyl sulfoxide (DMSO) and polyene antibiotics (PA) are presented, the effects of the complex interaction of DMSO and PA with bilayer lipid membranes are considered, and the results of experimental studies of the physicochemical characteristics of amphotericin B and levorin in membranes are presented. On the basis of PA, a theoretical model for the creation of effective membrane-active drugs against viral and fungal plant diseases has been developed.

Key words: Amphotericin B, Dimethylsulfoxide, Bilayer lipid membranes, Viral and fungal plant diseases, Levorin, Polyene macrolide antibiotics

THE EFFECT OF MINERAL FERTILIZERS ON THE DYNAMICS OF NUTRIENTS UNDER WINTER WHEAT IN MOUNTAIN GRAY-BROWN SOILS ON THE NORTHEASTERN SLOPE OF THE GREATER CAUCASUS. (IN THE EXAMPLE OF KHIZI DISTRICT)

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ABSTRACT

As in all mountainous areas of Azerbaijan, the relief of the northeastern slope of the Greater Caucasus is much more complex than the southern slope. The territory of the Greater Caucasus is mainly mountainous, and it is distinguished by the richness of its soil and vegetation. The soil and vegetation of the Greater Caucasus are distributed according to the law of vertical zonation. The individual zones differ sharply from each other in terms of soil and vegetation. Agricultural plants have been cultivated in all these zones since ancient times. However, mountain farming is more developed in the middle and low mountain zones. Vegetation is quite rich. In most mountainous regions engaged in agriculture, cereal crops, especially winter wheat, dominate. The erosion process has spread and sharply reduced the fertility of the soil in the hillside crops, which have been used for a long time under grain crops, where no soil-protecting agrotechnical control measures have been carried out. The application of mineral fertilizers plays a major role in improving the fertility of eroded soils, obtaining a high and stable yield from such soils, as well as protecting the soil. The normal development of plants and the production of high-quality crops depends on the amount of absorbed forms of nutrients in the soil. Depending on the climatic conditions, the relief of the area, the degree of erosion, and the cultivation methods of the soil, all forms of nutrients change dramatically, especially the amount of their active forms. This change occurs more often during the vegetation period of the plant, it weakens their height and development. Applying fertilizers on the slopes significantly increases the above-ground and underground mass of the plant. Thus, the effectiveness of fertilizers on the slope not only increases the productivity of agricultural crops and its quality, but also protects the soil from erosion.

Key words: Soil, erosion, mineral fertilizer, nutrients, mountain gray-brown, winter wheat

EFFECT OF TOBACCO WASTE APPLICATION ON BULK DENSITY AND MOISTURE CONSTANTS OF A SANDY LOAM SOIL

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ABSTRACT

In this study, effect of tobacco waste (TW) application on soil bulk density and soil moisture constants were determined in a sandy loam soil. Tobacco waste was applied into soil surface (0 - 15 cm) with 4 different rates (0, 2, 4 and 6%) and three replications in a randomized plot design. After eight months, changes in soil organic carbon content, bulk density (BD), total porosity (F), field capacity (FC), permanent wilting point (PWP) and available water content (AWC) were determined for each treatment. TW application rates significantly increased organic C contents, F, FC, PWP and AWC values while they significantly decreased BD values of sandy loam soil. While the highest rate of TW increased OC content from 1.03% in control to 1.46%, it decreased BD from 1,45 g/cm³ to 1.24 g/cm³. The highest application dose of TW increased F, FC, PWP and AWC over the control as 22.6%, 21.9%, 17.6% and 27.6%, respectively. It can be concluded that application of TW into coarse textured soil improved soil physical properties and moisture constants with increasing OC content of the soil.

Key words: Tobacco waste, coarse texture, moisture constant, soil structure.

ENVIRONMENTAL IMPACT OF GAS WASTE FORMED AT THE BAKU STEEL SMELTING PLANT ON THE LITHOSPHERE

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ABSTRACT

As it is known, it is important to carry out research based on scientific and technical literature related to the subject before conducting any research work. In accordance with the subject of our research work, based on the information given in some sources about the waste generated in the production areas of "Baku Steel Company" LLC, studies were initially carried out on environmental analytical analyzes that had been carried out to a certain extent. It has been determined that in several production areas of that enterprise, during different steel casting and processing processes, wastes of various composition, characteristic gas-aerosol, liquid and solid waste are formed. Along with the causes and composition of the sources of each waste in that enterprise, the implementation of scientific research on ecological pollution of the lithosphere of those wastes is considered urgent environmental issues of the period.

In connection with the above-mentioned studies, we initially conducted environmental studies in the sanitary-protection zone and residential areas near that enterprise. Along with the mentioned works, in the beginning of June of this year, concentrations of harmful substances released into the atmosphere from that enterprise and causing pollution of the lithosphere were determined by the "Drager" gas analyzer device in the air outside the enterprise. As a result of the research, many ecotoxicants H₂S, SO₂, SO₃, NO_x, Cl₂, HCl, HCHO, PH₃, etc. It has been determined that harmful substances in gas form have a much higher concentration than the sanitary standards. In this regard, it can be noted that gaseous substances, even aerosol wastes, dilute in the air in a short period of time and come closer to sanitary standards.

As it is known, the spread of each harmful gas and aerosol waste up to hundreds of kilometers, depending on the meteorological conditions, ultimately leads to the change of the natural chemical composition of the lithosphere. The main sources of these wastes in the mentioned enterprise are created during the process of preparing mold and filling mixtures. Thus, determining the actual environmental condition of the atmospheric air environment in that enterprise, mainly in the working zone and sanitary protection zones, and performing the analysis of concentrations of harmful substances in the air several times at different times is one of the most important problematic issues. Therefore, scientific research work is being continued in various directions to determine the environmental impact of each of the gas and aerosol wastes formed in the mentioned enterprise, mainly on the lithosphere, as in other spheres.

As can be seen from the above-mentioned general explanations, depending on the composition and characteristics of harmful substances released into the atmosphere from any source, it directly causes a change in the natural composition of the lithosphere, which is the main component of the biosphere.

Key words: steel casting, gas and aerosol wastes, mold and filling mixtures, working zone, sanitary protection zone

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LANDSCAPE-ECOLOGICAL CONDITIONS OF ARID MOUNTAINOUS GEOSYSTEMS OF AZERBAIJAN

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ABSTRACT

One of the urgent problems is the optimization of nature management based on the assessment of natural and anthropogenic factors that affect the landscape and ecological situation in all mountainous areas. In particular, the issues of formation of soils, vegetation and relief under the influence of geomorphological factors, protection of biodiversity are in the focus of attention of many specialists working in this field. In this regard, the mountain-steppe and mountain-forest landscapes of the Greater Caucasus, which is characterized by the manifestation of complex exodynamic processes, is no exception.

The presented article provides a systematic analysis of the factors influencing the formation of landscapes in the mountain-forest and mountain-steppe belt of the republic, based on the determination of the composition and properties of soils and vegetation, the spatial and temporal dynamics of forests, the nature of transformation and the degree of environmental load. On the basis of the conducted studies, it has been established that, for the prevention of desertification, the main measure is the regulation of anthropogenic impact. To regulate the level of anthropogenic pressure on pastures, a proper grazing system is necessary, as well as watering pastures and creating artificial irrigation systems improves the ecological state of landscape complexes. Considering that uncontrolled felling of trees and shrubs in the study areas leads to the creation of potential centers of desertification processes, a strict ban on felling trees and shrubs is of great importance to prevent this process.

Keywords: ecolandscape condition, mountain geosystems, arid and semiarid landscapes, anthropogenic pressure, desertification.

CHANGE OF THE QUANTITY OF MICROORGANISMS IN IRRIGATED MEADOW-GRAY SOILS UNDER THE INFLUENCE OF BIOHUMUS AND ZEOLITE

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ABSTRACT

The main goal of the study is to study the dynamics of the effect of different rates of biohumus and zeolite on the amount of microorganisms under beans in irrigated meadow-gray soils. The research object is irrigated meadow-gray soils (Irragic Calsisols) of the subtropical zone, bean-mung bean (*Vigna Angularis*) plant. Scheme of the experiment: 1. control; 2. biohumus 5 t/ha; 3. zeolite 5 t/ha; 4. biohumus 5 t/ha + zeolite 5 t/ha; 5. biohumus 7.5 t/ha; 6. zeolite 7.5 t/ha; 7. biohumus 7.5 t/ha + zeolite 7.5 t/ha.

Biohumus and zeolite caused a significant change in the ratio of physiological groups to the total amount of microorganisms in irrigated meadow-gray soils. It was 55.3% bacteria, 19.8% spore-producing bacteria, 24.6% actinomycetes, and 0.2% microscopic fungi of the total amount of microorganisms in the 0-25 cm layer in the control option; in the biohumus 5 t/ha option: 56.4%; 20.2%; 23.2% and 0.2%, in zeolite 5 t/ha option: 62.5%; 15.9%; 21.3% and 0.2%, in biohumus 5 t/ha + zeolite 5 t/ha option: 59.7%, 18.7%; 21.4%, and 0.2%, in the biohumus 7.5 t/ha – 62.7%; 16.3%; 20.7% and 0.2%, in the zeolite 7.5 t/ha – 62.0%; 17.1%; 20.7% and 0.3%, in the biohumus 7.5 t/ha + zeolite 7.5 t/ha – 61.5%; 17.1%; 21.2% and 0.2%. The application of different doses of biohumus and zeolite alone and in combination created favorable conditions in the soil compared to the control, resulting in a decrease in the percentage of sporulating and actinomycetes from the total amount of microorganisms. Although the application of biohumus and zeolite significantly affected the number of bacteria and actinomycetes, no significant change was observed in the amount of microscopic fungi. The intensity of mineralization in irrigated grass-gray soils varied from 0.26 to 0.45 in all options. The intensity of mineralization was higher in the control.

Key words: irrigated meadow-gray soils, biohumus and zeolite, fertilizer rate, bean plant, microorganisms

EFFECT OF FERTILIZER RATES ON DYNAMICS OF EXCHANGEABLE POTASSIUM (K₂O) IN CHESTNUT SOILS OF MOUNTAINOUS SHIRVAN

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ABSTRACT

The main agrochemical indicators of the light-chestnut soils of the Mountainous Shirvan have been studied. According to the results, the depth of 0-25 cm of the experimental area is weakly alkaline, and the depth of 25-50 and 50-70 cm is highly alkaline. The tillage layer of the experimental area soils is carbonate, and the deep layers are medium carbonate. Because the amount of calcium carbonate at a depth of 25-50 and 50-70 cm changes between 15.50-17.30% on average. The soils of the experimental field are of medium quality. The total amount of humus in the tillage layer changes between 2.22 and 2.29%. The analysis shows that the average amount of easily hydrolyzed nitrogen at a depth of 0-25 cm varied between 52 and 74 mg per 1 kg of soil. The amount of active phosphorus was 30.5-33.3 mg/kg at a depth of 0-25 cm during 2 years, and the amount of variable potassium was 274-297 mg/kg, which gradually decreased in the lower layers. The dynamics of potassium in soil were determined in relation to the growth stages, sowing, and fertilizer rates of the “Jalilabad 19” barley variety.

Keywords: soil, fertilizer, plant, barley, potassium

FEATURES OF IDENTIFICATION OF MINERALS USING WorldView-3 HYPERSPECTRAL IMAGES AND THE APPLICATION OF MARKOV RANDOM FIELDS

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ABSTRACT

As digital technologies continue to permeate all aspects of human life and activities, remarkable innovations are being introduced in the area of remote Earth observation (EO). Particularly, the area of remote Earth observation satellites is undergoing constant advancements, with significant progress being made. One notable example of the above is the continuous enhancement of the spatial and spectral features of sensors installed on these satellites. Notably, satellites equipped with hyperspectral cameras exemplify this advancement, boasting an impressive resolution of 30 cm and the ability to capture images across a wide range of bands in the short-wave infrared spectrum. Worth noting that improving all characteristics of hyperspectral images has necessitated the development of new processing algorithms.

The primary concern lies in broadening the scope of application for hyperspectral image development and enhancing the accuracy of results. The present article addresses the issue of identifying specific minerals in the soil using WorldView-3 hyperspectral images. Furthermore, it is worth emphasizing that this method stands out as an indispensable tool, particularly when investigating inaccessible regions such as mined or roadless areas.

DETERMINATION OF HEAVY METALS IN THE SAMPLES TAKEN FROM THE AGRICULTURAL SOILS OF DASHSLAHLI VILLAGE, KAZAKH REGION

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Due to the slower migration of pollutants in soil, special attention is paid to soil contamination during ecological assessment.

Heavy metals occupy a special place among biosphere pollutants. Unlike degradable organic pollutants, metals can only be distributed among the individual components of the earth's crust and accumulate easily in soil, but are also difficult to remove from soil. For example, the cycle of zinc (Zn) removal from the soil is equal to 500 years, cadmium (Cd) - 1100 years, copper (Cu) - 1500 years, and lead (Pb) several thousand years. Metals are easily accumulated by the bodies of humans, warm-blooded animals and hydrobionts. Some heavy metals are important for the human body, they act as catalysts in many reactions and ensure the normal course of physiological processes. Some are toxic. However, excess amounts of even vitally important heavy metals have the potential to produce high levels of toxic effects

All the processes in living organisms take place after complexation reactions of heavy metals with biomolecules. The most important feature of heavy metals is that small amounts of all of them are of great importance for living organisms and plants. Heavy metals are involved in biochemical processes that are important for life in the human body. However, their exceeding the permissible amount causes serious diseases in the human body.

Taking into account the above and the relevance of the problem, heavy metals were analyzed in the samples taken from the arable land of Dashsalahli village, Gazakh region.

Samples in clean plastic containers were air-dried in an oven at a temperature of $40 \pm 5^\circ\text{C}$, then 25-30 g were taken for analysis. The sample was well crushed with a clean mortar and the crushed sample was passed through a small sieve. From that sample, 0.5 ± 0.2 g was taken for analysis. Then the sample was extracted with 5 ml of nitric acid in a microwave oven, the obtained acid extract was diluted to 25 ml with distilled water and processed in a centrifuge to precipitate before analysis. The obtained extract was analyzed on an ICP-OES (optical emission spectrometry with inductively coupled plasma) device manufactured by PERKIN ELMER. The results of the analysis are given in table 1.

Table 1.

**Amount of heavy metals (mg/kg) in samples taken
from cultivated soils of Dashsalahli village, Gazakh region**

Metals (mg/kg)	Amount of Metals (mg/kg)	PHL (mg/kg)*
Arsenic	4.9	2,0
Copper	36	3,0(33)
Cadmium	<0.08	0,5
Cromium	186	6,0
Manganese	720	1500
Lead	8.2	32,0

**<https://applied-research.ru/ru/article/view?id=8425>*

As can be seen from the table, the amount of arsenic (As), copper (Cu) and chromium (Cr) metals exceeded the permissible hardness limit (PHL). The reason for this, in our opinion, is related to the presence of a construction materials plant near the sampled areas.

TRANSFORMATION OF BROWN MOUNTAIN-FOREST SOILS OF THE SHAMAKHI REGION

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ABSTRACT

The article provides information about the regularity of distribution of the geographical diversity of brown mountain-forest soils in the Shamakhi region, and its changes to one degree or another as a result of the impact of human economic activities of various nature and intensity. As a result of unsystematic cutting and grazing of livestock, lowering of the upper border of the forest and destruction of other parts of the forest, depending on the slope and steepness of the slopes, different types of grass cover were formed on the site of the forests. After a certain period of time, a new type and subtype of soil begins to form under the sod-forming grass cover.

As a result of many years of anthropogenic impact on the territory of the Shamakhi region, brown mountain forest soils were transformed, and mountain black soils appeared in their place due to the replacement of forest cover with other plant formations. The modern condition of the brown mountain-forest soils distributed on different slopes of the middle mountain-forest belt of Shamakhi region, under the forest and in the areas freed from the forest (research area) was studied. Thus, as a result of erosion processes in the steppe regions, the number of surface watercourses increases, which causes an increase in ravines in this region, causing serious damage to agriculture. At the same time, the increase in surface water flows washes away the top fertile layer of the soil from the fields and, as a result, weakens the biological processes in the soil (reduces the collection and use of solar energy) and weakens the enzymatic activity.

Keywords: transformation, forest, anthropogenic factor, humus, erosion, humidity

THE EFFECTS OF TOBACCO PRODUCTION WASTE ON MICROBIAL BIOMASS CARBON AND BASAL RESPIRATION OF MAIZE RHIZOSPHERE

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ABSTRACT

Farmers prefer the precise regulation of nutrient amounts in the soil through the use of inorganic fertilizers, as they are convenient, require less time and labor compared to organic sources. Inorganic fertilizers provide immediate effects on yield, unlike organic sources that take time to decompose and release nutrients. Consequently, the intensive agricultural practices in Anatolian soils lead to a decline in soil fertility due to the loss of organic matter. This decline in soil fertility is often accompanied by a reduction in organic matter, soil structure deterioration, decreased water infiltration, soil compaction, increased erodibility, and leaching, resulting in decreased nutrient holding capacity and a less favorable environment for microbial activities. To preserve or restore soil fertility, the common approach is to incorporate organic matter, preferably in a stabilized form that can yield beneficial effects.

This study aimed to investigate the impact of tobacco production waste on microbial biomass C and basal respiration in clay loam soil and maize plant rhizosphere (*Zea mays indandata*) soil under greenhouse conditions. The tobacco production waste was thoroughly mixed with the soil at a rate equivalent to 50 g kg⁻¹ based on air-dried weight. The experimental design followed a randomized plot setup in the greenhouse, with replications. The soil moisture content was maintained at approximately 60% of the maximum water holding capacity by daily weighing of the pots. Changes in microbial biomass C and basal respiration were assessed in soil and rhizosphere samples, as well as root-free soil, collected at 15, 30, 45, 60, 75, and 90 days after the commencement of the experiment. The results indicated that the addition of tobacco production waste to the soil significantly increased microbial biomass C and basal respiration compared to the control ($P<0.01$) throughout all the experimental periods. Furthermore, the rhizosphere soil exhibited higher microbial biomass C and basal respiration than the root-free soil following the application of tobacco production waste ($P<0.01$).

Key words: Tobacco production waste, Soil, Rhizosphere, microbial biomass C, basal respiration

ENHANCING VERMICOMPOSTING EFFICIENCY AND ASSESSING CD ACCUMULATION USING EISENIA FOETIDA IN SEWAGE SLUDGE-AMENDED FEED MIXTURES

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ABSTRACT

Vermicomposting plays a crucial role in integrated waste management strategies. In this study, the potential of the epigeic earthworm *Eisenia foetida* was investigated for transforming anaerobically digested sewage sludge (SS) when combined with hazelnut husk (HH) and cow manure (CM) in varying proportions under laboratory conditions. The research aimed to determine the optimal medium for earthworm growth and reproduction, analyze heavy metal concentrations in different feed mixtures before and after vermicomposting, and explore the accumulation of Cd in earthworms inhabiting sewage sludge with different feed mixtures. The number and biomass of earthworms, as well as the heavy metal contents in the feed mixtures and earthworms, were monitored periodically throughout the vermicomposting period. The findings revealed that the highest earthworm biomass was achieved in the feed mixture comprising 20% SS, 40% CM, and 40% HH. Meanwhile, the greatest number of earthworms was observed in the feed mixture consisting of 30% SS, 35% CM, and 35% HH. Over time, the Cd concentration in all feed mixtures decreased, indicating the potential of vermicomposting to mitigate Cd levels. Furthermore, the Cd content in the feed mixtures was lower than that of the initial mixtures. The analysis of earthworms demonstrated significant bioaccumulation of heavy metals in their body tissues. Moreover, the proportion of SS in the feed mixtures positively influenced the Cd content in earthworm bodies. These findings highlight the potential of earthworms to accumulate heavy metals, emphasizing the need for caution when utilizing vermicompost derived from SS with higher SS proportions. In summary, this study demonstrates that vermicomposting, using *E. foetida*, effectively transforms anaerobically digested sewage sludge when combined with HH and CM. It provides insights into the optimal feed mixture compositions for earthworm growth and reproduction, showcases the reduction of heavy metal concentrations during vermicomposting, and underscores the bioaccumulation of Cd in earthworm tissues. These findings contribute to our understanding of the potential applications of vermicomposting in waste management and sustainable soil restoration practices.

Key words: Vermicomposting, *Eisenia foetida*, sewage sludge, feed mixtures, heavy metal accumulation, earthworm biomass, Cd.

BIOGEOCENOSIS - AN ELEMENTARY STRUCTURAL COMPONENT OF THE BIOSPHERE

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ABSTRACT

The biosphere, according to the figurative expression of V.R. Vernadsky, is the planetary shell of the Earth. The biosphere, as a planetary phenomenon, is based on the transformation of matter-energy and information cations by living matter in a long evolutionary time. The evolution of the biosphere is closely connected with the evolution of the forms of living matter and the complication of their biogeochemical functions. The elementary structural unit of the biosphere is biogeocenosis. Biogeocenosis, as a natural-historical body, is the fate of a homogeneous topographic microclimatic, biocenotic, soil, hydrological and geochemical relationship.

Biogeocenosis includes a certain community of organisms, soil, soil and ground water and the lower layers of the troposphere. If we take into account that each biogeocenosis is formed in different environmental conditions, then it is natural that each of them has its own cycle of substances and a certain nature of solar energy flows, the functions of which are the creation of bioproducts.

In this article, in a generalized form, on a methodological basis, fundamental research in the field of soil science, ecology and soil biology is covered, which are applied to all types of soils with their natural habitats, natural and cultivated biotopes. First of all, this refers to the problem of the energy of soil formation and agro-energy. As a component of the biosphere, the soil and its constituent elements are interconnected by a common energy flow. In natural ecosystems, biomass energy is accumulated in humic substances, determining soil fertility. In agroecosystems, a significant part of the energy is alienated in the form of plant and animal mass, which leads to a violation of the established biogeochemical cycles.

The soils of Azerbaijan are distributed in various geographical areas with arid, humid and semi-humid environmental conditions. The study of the nature of soil formation in these regions showed the formation of very specific morphogenetic soil profiles. On the one hand, these studies confirm the basic principle of vertical zoning of soils, and on the other hand, the diverse biological activity of living organisms as a biological factor in soil formation. Therefore, characteristic complexes of soil invertebrates and microorganisms can be used in soil diagnostics as biological tests. Finally, it should be noted that each farm must individually develop model programs for the intensive development of specific sectors (for example, tea growing) of agricultural production. In this regard, model options for soil fertility, environmental assessment and monitoring of soils in the Lankaran region are being successfully developed.

Keywords: biogeocenosis, soil, biosphere, energy

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INFLUENCE OF ORGANIC-MINERAL COMPLEXES ON THE DEVELOPMENT OF AGROCENOSSES ON THE BACKGROUND OF MINERAL FERTILIZERS

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SUMMARY

Increasing the production of agricultural products has created a foundation for the development of the industry related to agriculture. For the implementation of works in this direction, our Republic has favorable soil and climate conditions and great internal possibilities.

Protection and improvement of fertility and its physical, chemical, biological indicators should always be in focus, along with crop production, in conditions of intensive use of land in agriculture. In terms of providing plants with air, water and nutrients, soil fertility has important agroecological importance.

Increasing the productivity of agricultural crops in the republic is always relevant as an unchanging priority. In addition, the availability of environmentally friendly products on a global scale is a very important issue from both the health and food safety point of view. The mentioned factors coincide with the requirements of the time, the achievement of high productivity with the application of organic-mineral fertilizers obtained from natural resources.

In this regard, the research work carried out by researchers conducting research in the fields of geology, technology, chemistry, agrochemistry and botany was devoted to studying the mineralogical and chemical properties of various raw materials and waste products available in Azerbaijan, obtaining organic-mineral complexes from them and studying their effects on the cultivation of agricultural plants. has been done.

There are various raw materials and wastes in our country, which have both reserves and rich mineralogical and chemical properties. For this reason, it is possible to use these resources as fertilizers in various directions, mainly in agriculture, in the direction of preserving soil fertility and increasing crop production. Although these resources have a high application potential, their use has not been resolved. [2]

It is relevant and important to satisfy the biological characteristics of plants and fertilization requirements, to determine the level of soil nutrient supply and to apply recommended fertilizer rates.

The article is devoted to the investigation of mineralogical and chemical characteristics of combustible shale, plant residues and wastes from sewage treatment, and at the same time, to the preparation of organic-mineral complexes using their various proportions and to the study of their effects in the cultivation of agricultural plants.

In the conducted complex research studies, it has been confirmed that raw materials and wastes that have not been used so far have the necessary properties as organic-mineral fertilizers, and that they have a better effect on the development and productivity of agrocenoses cultivated with traditional fertilizers.

Keywords: organic-mineral complex, plant residue, fertility, yield, chemical composition, mineralogical composition.

STUDY OF THE SALT COMPOSITION OF THE TARTARCHAY WATER

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ABSTRACT

The Little Caucasus province particularly differs from other regions with its unique geographical position, relief and climate characters. The relief complexity of the relief has led to the formation of dry, cold winter and mountain-tundra climate types. The following regularity prevails in distribution of the atmospheric precipitations in the Little Caucasus as in all mountainous countries: the least precipitation falls in the foothills, an amount of precipitations also rises with the increase of the sea level.

An annual quantity of the atmospheric precipitations changes from 300-400 mm to 600 mm in the Little Caucasus. Such diversity of the precipitation quantity is related to the relief complexity, air masses coming from different direction.

The hydrographic network of the Little Caucasus province developed to a different degree depending on climate, relief, geological structure, surface sloping, vegetation and other ecological factors. The river network developed well in the middle-mountainous stripe occupying the heights of 1000-2500 m, but it developed weakly below and above the heights.

The article deals with the changes in salt composition of the Tartarchay water (near the Barda district). River waters perform a great job in the migration of chemical elements and having the highest speed of movement among natural waters. They wash and decompose rocks and soil, mixing suspended and dissolved substances. Thus, the study of salts dissolved in river waters used for various purposes is carried out in the field of salinization of soils, irrigation of agricultural crops, use of river waters as drinking water, construction of hydraulic structures, etc. of great scientific and practical importance. The salt composition of river waters differs sharply from each other due to the variety of formation conditions. The reasons of these diversity are the following: physical and geographical situation, morphometry, the content of dissolved substances entering the river by tributaries, general anthropogenic loading, etc.

The Tartarchay – a total length of the river is 200 km, an area of the basin is 2650 km². The Tartarchay is the right tributary of the Kur river with the highest wateriness. The river flows from the zone of 4 regions - Kalbajar, Aghdara, Barda and Tartar. 14% of the flow is formed from rain, 28% from snow and 58% from underground water. The snow water forms floods in the river in spring and summer seasons. The flood begins from March and continues till June, July (100-120 days). The water becomes diminished in August-September months. The rains of October-November months form little floods in the river again.

The water samples of the Tartarchay have been taken and dry residue, salt ion, the environment content and other indicators have been studied to learn a composition of the river waters in here.

It is seen from the analysis results that the salt quantity was 0.870 g/l in the water of the Tartarchay. CO₃ ion hasn't been followed in these waters, but the other ions change depending on rivers. A quantity of Cl⁻ ion in the river water was 0.224 g/l. The middle Jurassic sedimentaries newly spreaded in the volcanogen facies of the Tartarchay basin. Cracking of the rocks is explained by over feeding of river with underground water. Here, an amount of SO₄⁻² ion was 0.214 g/l, but a quantity of HCO₃⁻ ion was 0.288 g/l. An amount of Na+K¹ was superior compared to Ca⁺² and Mg⁺² among cations. Its amount was 0.078 g/l in the composition of the investigated river water. An environment of the water was 7.82 and it has a alkaline character.

Keywords: mineralization, river, water quality, ions, salt quantity, salinization

FERTILITY INDICATORS OF BROWN-MEADOW AND GREY-BROWN SOIL (in Azerbaijan)

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ABSTRACT

One of the important problems in agriculture is to ensure establishment of organic substances and nutrient of the soil, to protect fertility.

A main aim of the research is to study nutrient along the profile in the sections of the grey-brown and brown-meadow soil. A research object is grey-brown (Kastanozems) and meadow-brown (Gleyic Kastanozems) soil of the north-eastern part in the Great Caucasus. An amount of the nutrient in the soil was determined according to general adopted method.

An amount of nitrate along the profile in Section 5 is from 1.47 mg/kg to 2.85 mg/kg, in Section 6 it is from 1.26 mg/kg to 2.61 mg/kg and in Section 7 it is from 1.24 mg/kg to 2.86 mg/kg. Its most quantity was on the upper layer of the profile.

Less provision of grey-brown and brown-meadow soil with nitrate is related to the nature of the soil type on the one hand, on the other hand intensive utilization by plants.

An amount of absorbed ammoniac changed in a decreasing direction along profile in the section. This index is 3.6-8.2 mg/kg along the profile in section 5; 3.7 -7.8 mg/kg in section 6; 3.4-12.3 NH_4 in section 7. The ammoniac quantity is more compared to section 7. An amount of absorbed ammoniac was more than nitrate form of nitrogen in the research soil. It is seen that it related to periodic excess of moisture.

A quantity of gross phosphorus was 2.3-14.4 mg/kg at 0-132 cm of layer in section 5; 2.3-13.3 at 0-149 cm of the layer in section 6; 2.5-12.2 P_2O_5 mg/kg at 0-120 cm of layer in section 7. The research grey-brown and brown-meadow soil is characterized with insufficiency amount of gross phosphorus. This index changed in the decreasing direction in all sections along profile.

Key words: north-eastern part of the great Caucasus, grey-brown soil, brown-meadow soil, absorbed ammoniac, nitrate form nitrogen, sections

MONITORING LAND AREA CHANGES IN THE CASPIAN SEA COASTAL ZONE USING REMOTE SENSING DATA

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ABSTRACT

Since the Caspian Sea has no access to the ocean, its level changes are irregular and cover a wide range. These fluctuations affect the coastal zone and cause both quantitative and dynamic changes in the processes on the coast (abrasion, accumulation, etc.). Thus, it is directly interesting for the local economy of the state to monitor the changes in coastal characteristics over time in the coastal zone, to determine the quantitative indicators of the increase and decrease of land areas in the coastal zone. The lowering of the level of the Caspian Sea in recent years has a serious impact on the infrastructure of the coastal zone.

Thus, by using distance sensing data and satellite data, a comparative analysis of the years 2005 and 2021 was carried out in the research work, and the geographical position of the coastline and the morphometric indicators of the changes occurring in the area were determined in the coastal zone around the Kyzylagac Bay of the Azerbaijan water area of the Caspian Sea. In the research work, using Landsat satellite indicators, using the Tasseled Cap and DSAS-Digital Shoreline Analysis System method, the high-risk areas were identified as a result of a comparative analysis, and the land areas increased and decreased. It was determined that during the years 2005-2021, the land area in the coastal zone increased by 250 km². The applied method allows us to evaluate the changes occurring in the coastal zone in a short time in a large area.

Keywords: remote sensing, satellite images, coastal zone, land areas, DSAS.

INFLUENCE OF SURFACE-APPLIED COMPOST ON SATURATED HYDRAULIC CONDUCTIVITY AND OTHER SOIL PROPERTIES

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ABSTRACT

Overall positive effect of compost incorporation to the soil is generally known. Usually it leads to reduced bulk density, enhanced infiltration and hydraulic conductivity, and increased soil water content. However, the latest environmental policies require maximizing soil surface coverage and minimizing soil movement, especially in erosion-prone areas. For example planting of catch crops between two main crops is widely supported. In combination with strip tillage it effectively contributes to erosion control, enhancing soil water retention and infiltration. In addition it reduces the operational costs, saves fuel and reduces the wheel track induced soil compaction. In line with this policy is application of stable compost on the soil surface as a mulch, without incorporation.

Aim of this study was to observe the soil behavior at several localities after the surface application of compost in terms of saturated hydraulic conductivity and other soil properties such as soil water content, porosity, soil organic matter content, pH and EC. The study was conducted in three localities in the Czech Republic (Jevíčko, Velké Hostěrádky, and Praha-Uhřetěves), each locality representing different ecological and farming conditions, and amount of compost. Texture of the soils is silty clay loam or silt loam. A total of 77 undisturbed and 28 disturbed representative soil samples were collected from control plots and plots treated with surface-applied compost. Sampling occurred between one to six months after compost application.

The results showed improvement of all analysed soil properties on compost amended treatments. Increase of saturated hydraulic conductivity was from 20 to 71 % and increase of actual water content by volume was from 8 to 19 %. These findings have important implications for the development of sustainable soil management strategies that can effectively address issues related to soil degradation and support agricultural production.

Keywords: Compost, Mulch, Saturated hydraulic conductivity, Soil physical properties, Soil surface management, Sustainable soil practices.

THE ROLE OF ABIOTIC AND BIOTIC FACTORS IN THE FORMATION OF MOUNTAIN GRAY-BROWN SOILS

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ABSTRACT

Gray-brown soils were identified for the first time by the Russian scientist A. N. Rozanov in the east of the Caucasus and included in the systematics as an independent soil type. Previously, these soils were combined with brown soils and shown as one soil type, but as shown below, the genesis, physical and chemical properties of these soils differ significantly from each other. Gray-brown soils are defined as the transition between the gray soils of semi-deserts and dry steppes, and the brown soils of arid forests and bushes. The article provides a comparative analysis of the similarities and differences between the gray-brown soils of the Aleppo and Homs plains of the Syrian Republic with a Mediterranean climate type in the Middle East and the gray-brown soils of the southeastern slope of the Greater Caucasus (Shamakhi region) and the Russian Federation (Republic of Dagestan).

Although the vegetation period is very different, both regions have specific characteristics with certain suitable natural conditions in the formation and development of these soils. So, taking into account that the distances of the gray-brown soils formed here between the Republic of Dagestan of the Russian Federation and the Aleppo and Homs plains located in the northwest of Syria in the Middle East are thousands of kilometers in the geographical latitude and longitude directions, the genetic characteristics are similar (subtropical and Holocene soils of tropical regions,) regularity is that these areas are subjected to appropriate evolutionary processes.

Keywords: damping coefficient, forest, anthropogenic factor, humus, erosion, humidity

EVALUATION OF BIOLOGICAL INDICATORS OF IRRIGATED YELLOW-GLEYIC SOILS SUITABLE FOR VEGETABLES IN CROP ROTATION

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ABSTRACT

Research object gleyey-yellow soils (Gleyic Livosols), the five-field vegetable-beans crop rotation: 1. tomato; 2. maize for white head cabbage+silage; 3. head onion; 4. vegetable bean; 5. vegetable bean and permanent plants: a whitehead cabbage, tomato, maize, head onion and vegetable-bean.

The potential (ferments activity, ammonification and nitrification ability, biogenness) and actual activity (shattering intensity of the linen located in the soil profile and CO₂ decomposed from soil) have been learnt in dynamics.

The biological indicators were defined and biodiagnostics was given under the growing plants on the crop rotations and constant tillage in the irrigative yellow-gleyic soils for definition of the biological indicators change in what direction inside the same soil type.

The soils biodiagnostics was reflected on the basis of the soil biological parameters under the growing plants on the five-field vegetable-leguminous crop rotation and constant tillage in the irrigative gleyey-yellow soils.

Using of the virgin land, sowing fertilizing, applying of the agrotechnical measures under the agricultural plants were a reason for appearance of the biological activity change in a different form.

Biodiagnostics of the gleyey-yellow soils shows a change of the biological parameters under the plants in a different direction. The catalaza ferment activity, nitrification process intensity and microflora quantity were higher in yellow-gleyic soil type, the rest indicators changed depending on soil type character. A change of the biological parameters in which direction can be clearly seen from the comparison of the cultured soils with the virgin versions.

Integral index biological state soils (IIBSS) was calculated for the complex biological parameters. IIBSS vibrated by 70-100% on the crop rotation, 53-77% on the constant tillage.

The ecological-biological state of the integral parameter was calculated for definition of the change of the different biological parameter in what direction depending on using direction of the soils.

Key words: irrigated yellow-gleyic soils, biological activity, crop rotation, permanent plants, vegetable plants, evaluation of biological.

THE EFFECT OF SUPER ABSORBENT POLYMER APPLICATIONS ON SOIL WATER RETENTION AND WHEAT PLANT (*TRITICUM AESTIVUM*) GROWTH

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ABSTRACT

In this study using Potassium Acrylates Copolymer, it was tested in 3 different sizes (fine, granular, coarse) and 5 doses (0-25-50-72-100 g m⁻²) in pot experiment. The experiment was carried out with 1 kg of soil (sandy loam textured) and 10 wheat plants in each pot. The seeds were sown on 24.03.2023 and harvest was done on 22.05.2023. Irrigation was done seven times during the vegetation period. According to the results, the fine sized polymer was more successful in water saving. Compared to the control, 75 g m⁻² fine polymer application provided 10,86% water savings. The highest fresh weight was determined as 0.771 g plant⁻¹ in 100 g m⁻² granular polymer application.

Keywords: Potassium Acrylates Copolymer, Pot experiment, Soil, Wheat

Acknowledgment

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HISTORY OF AZERBAIJAN SCIENTISTS PUBLICATIONS IN «AGROCHEMICAL HERALD» JOURNAL

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ABSTRACT

The journal «Agrochemical Bulletin» is the legal successor of the journal «Fertilizer and Harvest», which is confirmed by the letter of the NGO «All-Union Book Chamber» dated December 2, 1992 No. 0212, which gives the editorial board the right to indicate on the title page of the publication the wording «Founded in June 1929».

One of the initiators of the publication of the journal became Academician D.N. Pryanishnikov. The first head of the editorial board became E.V. Britske, L.L. Balashev (deputy). The circulation of the journal was originally 2000 copies.

The journal «Fertilizer and Harvest» in 1932 was renamed «Chemization of Socialistic Agriculture» and became the organ of the People's Commissariat of Agriculture of the USSR and the All-Union Research Institute of Fertilizers, Agrotechnics and Agrosoil Science K.K. Gedroits (VIUAA). The head of the editorial board became O.K. Kedrov-Zikhman.

The journal also published official documents: «On the organization of the All-Union Institute of Fertilizers», «On the Association of the Institute of Fertilizers and Agrosoil Science», as well as chronicles and articles – personalities. The content of the journal was duplicated in English and German, the circulation of the journal was 1875 copies, reaching in 1938 – 9660 copies.

In 1956, the journal was restored under the name «Fertilizer and Harvest» as a monthly scientific and production journal of the USSR Ministry of Agriculture and the USSR Ministry of State Farms. In the future, the journal repeatedly changed its founder, publisher and its name: «Chemistry in Agriculture», «Chemization of Agriculture». The circulation of the journal was also different, reaching its maximum (64000 copies) during the period of active chemicalization of agriculture in 1960-1970. With the collapse of the Soviet Union and the subsequent economic transformation in the 1990s, circulation declined significantly. In 1997, the journal acquired its current name «Agrochemical Herald».

The first discovered publications of scientists from the AzSSR date back to 1964 and were published regularly until 1990, at least 2-3 per year. In modern history, the publications of scientists of independent Azerbaijan resumed in 2012.

Keywords: Scientific journal, History, Soil science, Agrochemistry, Agroecology, Plant protection.

ZINC FORTIFICATION AND ALLEVIATION OF CADMIUM STRESS BY APPLICATION OF LYSINE CHELATED ZINC ON DIFFERENT VARIETIES OF WHEAT AND RICE IN CADMIUM STRESSED SOIL

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ABSTRACT

Sustainable and cost-effective methods are required to increase the food production and decrease the toxic effects of heavy metals. Most of the agriculture land is contaminated with cadmium (Cd). The present study was designed to minimize the toxic effect of Cd stress (0, 10 and 20 mg kg⁻¹) on tolerant and sensitive varieties of wheat (Punjab-2011; Sammar) and rice (Kisan Basmati; Chenab) under Zn-lysine (Zn-lys) application as foliar spray (0, 12.5 and 25 mM) and seed priming (0, 3 and 6 ppm). Remarkable decrease was observed in plant growth, physiology and biochemistry as well as increase in Cd uptake, roots to shoots and grains of both crops. Cd significantly reduced the root and shoot lengths, root and shoot dry weights, transpiration rate, photosynthetic rate, stomatal conductance and water use efficiency as well as chlorophyll contents associated with enhanced electrolyte leakage (EL), malondialdehyde (MDA) and H₂O₂ and Cd uptake in different plant parts including grains of both crop varieties. The foliar application of Zn-lys (0, 12.5 and 25 mM) ameliorated the toxic effect of Cd on growth and physiology associated with decrease in EL, MDA and H₂O₂ and improved the activities of SOD, POD, CAT and APX enzymes with decreasing Cd uptake in tolerant varieties of wheat and rice as compared to seed priming. Furthermore, it has been investigated that the foliar application of Zn-lys is effective to improve quality of wheat and rice tolerant varieties (Punjab-2011 and Chenab) under Cd contamination soils.

Keywords: Wheat, Rice, Zinc lysine, Foliar spray, Seed priming, Cadmium stress

RESEARCH OF HEAVY METALS ON THE LANDS OF THE WESTERN TERRITORY OF AZERBAIJAN

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ABSTRACT

From an ecological point of view, the study of the soil crust is of great importance. For this, environmental studies were taken from the western region, where industrial areas are located. Since the migration of chemical contaminants in soil is difficult and time consuming, this area needs to be studied. Excessive levels of some heavy metals in the study were an important factor in assessing the state of the environment.

Soil contamination with heavy metals has recently become very relevant. Heavy metals are non-ferrous metals with a higher density than iron (except zinc). These include lead, copper, nickel, cadmium, cobalt, chromium, mercury, etc. The most important feature of heavy metals is that a small amount of all of them is of great importance for living organisms and plants. More than 150 thousand tons of Cu, 120 thousand tons of Zn, 90 thousand tons of Pb, 12 thousand tons of Ni, 1.5 tons of Mo, 800 tons of Co, 30 tons of Hg are emitted annually from metallurgical enterprises. In copper smelting, 1 g of blackened copper contains 2.09 g of powder, of which 15% Cu, 60% Fe and 4% Al, Hg, Zn, Pb. Mechano-chemical wastes contain 1000 mg/kg Pb, 3000 mg/kg Cu, 10000 mg/kg Cr and Fe, 100 g/kg P, 10 g/kg Mn and Ni.

Increased attention to environmental protection is causing particular interest in the effects of heavy metals on soil. Elements such as Fe, Mn, Cu, Zn, Mo and Co are very important for plant life, and therefore for humans and animals. They are sometimes called micronutrients because plants need very little. Microelements also include such common metals in the soil as O (46.6%), Si (27.71%) and Fe (8.1%), which ranks 4th after Fe. All trace elements have a negative effect on plants when the specified concentration is exceeded, and Hg, Pb and Cd, which are not important for plants and animals, are harmful to humans even at very low concentrations [3,5,10]. Heavy metals can be adsorbed or incorporated by microorganisms involved in the migration of the respective metals. Heavy metals pass through the trophic chain in the soil to plants, and then are processed by humans and animals [3,6].

Fresh soil samples are dried in the laboratory in special places in the open air, in the shade or in drying cabinets at a temperature of 30-40°C. Dry samples are poured onto parchment or roots and crumbs are removed, and the roots are shaken to remove dirt. Coarse soils are crushed in solution to a particle size of 5-10 mm. The sample is mixed and distributed in the form of a square on the screen. The average sample (approximately 200 g) is poured into a numbered box or jar for storage (pre-filled with a label filled with sample data) using the double-squaring method and recorded in a laboratory journal under a serial number [2,5].

Soil analysis.

The main purpose of soil chemical analysis is to solve theoretical and practical problems of agriculture. The study of the chemical characteristics of the soil is of great importance in the development of agrotechnical measures. Radionuclides, pesticides, herbicides, etc. in the soil. The detection of toxic substances is also of great importance from an environmental point of view. The extraction of the studied compounds from the soil for analysis is carried out by extraction with various solvents, solutions (water, saline, acidic or alkaline). In some cases, the soil is loosened by dissolving carbonates with a small sample and working with hydrofluoric acid or a mixture of acids (HCl + HNO₃; H₂SO₄ + HNO₃). Most analyzes use air-dried, mortared, sieved soil 1 mm in diameter.

When extracted with water, the alkalis contained in the soil, chlorides of alkaline earth metals and easily soluble organic substances in water pass into the solution. Water-soluble salts can also be harmful.

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MICROORGANISMS AND THEIR ROLE IN SOIL FORMATION

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ABSTRACT

Many groups of soil organisms in the process of life form an interconnected system that is in balance with the environment. Organisms (plants, animals, microorganisms) and soils form biogeocenoses, which change depending on the characteristics of the geographical environment. Microbial cenoses are an integral component of the soil environment. Soil microorganisms are unevenly distributed along the soil profile, which is associated with the content of humus and the influx of fresh organic residues.

The formation of microbiological cenoses and the intensity of the activity of microorganisms depend on the hydrothermal regime of the soil, its reaction, conditional aeration, mineral nutrition, as well as the quantity and qualitative composition of organic matter. Microorganisms and individual groups perform very important and diverse functions in the transformation of substances and energy during soil formation. The main ones are: the transformation of organic substances, the formation of various salts from the components of mineral and organic compounds of the soil, participation in the destruction and neoformation of soil minerals, the migration of soil formation products, the accumulation and transformation of the energy of organic residues.

The activity of microorganisms is an indispensable link in the biological cycle. Some types of nitrogen fixers are able to assimilate atmospheric nitrogen. The process of transformation of substances by microorganisms is carried out with the participation of various groups of enzymes. Enzymes of the hydrolase group carry out hydrolytic cleavage of proteins, carbohydrates, lipids, lignin, tannins; redox enzymes (oxidoreductases) catalyze the processes of oxidation and reduction of organic residues. The activity of microorganisms is associated with the formation and dynamics of the biochemical, nutritional, redox and air regimes of the soil. They are actively involved in the decomposition and hydration of phytomass residues.

Keywords: Biogeocenosis, Enzymes, Humus, Microorganisms, Soil

THE ROLE PHOSPHORUS IN SOIL FERTILITY

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ABSTRACT

In nature, the parent rock of most soils is made up of apatite minerals, which are derivatives of orthophosphoric acid. The forms of phosphorus compounds in the soil and their absorption by plants are one of the main issues of agrochemical research. In the study, the effect of organic fertilizers with different contents on phosphorus transformations in the soil in different growth phases of the sugar beet plant under the conditions of gray-meadow soils was studied. For this purpose, a field experiment with sugar beet plant was established in the Dayag station of the Institute of Soil Science and Agrochemistry in the village of Garabork, Ujar region. In the experiment, ammonium salt, simple superphosphate, potassium sulfate, semi-rotted manure, biohumus and "Shirvan" compost were used as organic fertilizers. When comparing options with organic fertilizers, the highest amount of phosphorus forms was obtained in the option with 7 tons of biohumus per hectare. From the results obtained from the field experiment, it was determined that as a result of the effect of the given fertilizers, an increase in the amount of phosphorus forms was observed in all variants compared to the control variant. When comparing options with organic fertilizers, the highest amount of phosphorus forms was obtained in the option with 7 tons of biohumus per hectare. In this version, phosphorus-13.9, which is soluble in water in the phase of formation of 3-4 leaves under the sugar beet plant; activated phosphorus-34.2; Soluble in 0.5n CH₃COOH-248.4; 478.2 mg/kg soluble in 0.5n HCl; according to the phase of mass maturation - 9.8; 26.7; 252.3; 486.8; at the end of vegetation - 6.3; 21.2; 260.5; 489.0 mg/kg was observed. Looking at the obtained results, we see that the amount of soluble and mobile phosphorus in water decreases towards the end of vegetation, 0.5n CH₃COON; The amount of phosphorus dissolved in 0.5n HCl increases towards the end of vegetation. This is explained by the fact that a certain part of phosphorus is absorbed by plants, and a certain part goes into a form that is difficult to dissolve.

Keywords: biohumus, fertilizer, organic, phosphorus, soil.

INFLUENCE OF POULTRY MANURE ON FERTILITY OF SODDY-PODZOLIC SOIL

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*Keywords: Poultry manure, Soddy-podzolic soil, Fertility, Granulometric composition,
Agrochemical parameters, Agrophysical properties.*

ABSTRACT

The poultry industry is one of the most important components of the agro-industrial complex of the Republic of Belarus. With an increase in the production of the main products, at the same time, the flow of waste from poultry farms proportionally increases, the most voluminous of which is poultry manure. In terms of nutrient content, it surpasses any organic fertilizer, and in terms of availability it is not inferior to mineral fertilizers. The organic matter of the manure (the main part of the dry matter of this fertilizer) improves the structure of the soil, its water and air regime, physicochemical and agrochemical properties. But poultry manure can adversely affect the environment: through the migration of substances along the soil profile to groundwater; through the imbalance of soil nutrients, due to the long-term use of high doses in permanent areas; accumulation in plant products of nitrates and other elements that adversely affect human or animal health.

The change in the properties and level of soil fertility under the influence of anthropogenic impacts in different natural zones and regions has very different rates and directions, which depend on the general soil and ecological conditions of the territory. Under such conditions, there is an urgent need to assess changes in the agrophysical properties and agrochemical parameters of soils, taking into account the specific features of the impacts on the soil cover. The degree of influence of manure fertilizers on soil fertility depends on the dose of application, the crop under which they are applied, the duration of application, and the granulometric composition of the soil. Under such conditions, there is an urgent need to assess changes in the agrophysical and agrochemical properties of soils, taking into account the specific features of targeted and non-targeted impacts on the soil cover.

Research on the study of changes in the properties of soddy-podzolic soils when using poultry manure was carried out in the production conditions of OJSC "Vitebsk Broiler Poultry Farm", at the Department of Soil Science and the Chemical and Ecological Laboratory of the Belarussian State Agricultural Academy. Content of nutrients in poultry manure, agrochemical parameters of soil were determined according to generally accepted methods. Agrochemical parameters largely determine state of soil cultivation. As indicators of soil cultivation, value of acidity (pH), content of mobile forms of phosphorus and potassium, humus and microelements are used.

In order to determine the effect of poultry manure on fertility of soddy-podzolic soil of different granulometric composition, results of the 13th round of agrochemical survey of these areas were taken as the initial content of nutrients. According to the degree of acidity, the soil is neutral and favorable for the cultivation of crops that are demanding on the reaction of the soil solution. The weighted average content of mobile phosphorus for 4 years increased on cohesive sandy loamy soil by 62 mg/kg, which is higher than the optimal values (200-250 mg/kg), on medium loamy soil by 114 mg/kg and corresponds to the optimal value (250-300 mg/kg). The content of available potassium increased by 74 mg/kg on cohesive sandy loamy soil, by 12 mg/kg on medium loamy soil, which is lower than the optimal value for medium loamy soils (220-250 mg/kg). The content of mobile potassium at the level of the optimal value (200-240 mg/kg).

With the systematic introduction of high doses of chicken manure, there is an increase in soil fertility and at the same time, there is a real threat of contamination of agrobiogeocoenosis with nutrients. When assessing the impact of industrial poultry enterprises on the environment, it is necessary to strictly control the chemical composition, the doses of manure and the granulometric composition of the soil.

ORGANIC FARMING IN AN ORGANIC PRODUCT INSTALLATION

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The most global problem in the world is to preserve soil and vegetation for future generations by using nature and its resources efficiently. Over thousands of years, as the society developed, its needs also increased, the more the volume of needs increased, the more natural resources decreased.

The complete violation of the natural balance between society and nature - the reduction of vegetation cover, the destruction of fauna and flora, the drying up of rivers, desertification, the release of millions of tons of carbon dioxide into the air and the lack of greenery that cannot absorb this carbon, the degradation of 52% of arable land in the world due to various reasons is modern. has put a person in front of difficult facts and incurable diseases. If this attitude continues, in the next 40-50 years, modern civilization will end and the development of the human race may stop!

Globally, the annual loss of fertile soil from cropland is 75 billion tons, which means a loss of agricultural products worth USD 400 billion annually. Land degradation affects the nutrition of 1.5 billion people per capita.

Since 1960, when the mass application of chemical fertilizers and pesticides to agriculture began, people have tried to get the maximum yield by using large quantities of these chemical fertilizers and pesticides. However, the toxic substances (nitrate, nitrite, pesticide residues) collected in the products obtained by technological methods seriously damage people's health and expose people to incurable diseases. Scientists have determined that a pesticide applied to the soil to kill 1 pest kills 1,700 beneficial organisms living in the soil. Millions of tons of N, P, K fertilizers are applied to the soil every year, so that 40-45% of each 100% nitrogen fertilizer applied is collected in the air and 20-25% in groundwater and water bodies. 20-25% of the nitrogen taken by the plant cannot be completely digested by the plant, and its residues are converted into nitrous compounds, which causes the formation of cancer in the human body. The P₂O₅ active ingredient in the superphosphate given to the soil is 19%. The remaining 81% are additives and heavy metals that even industry cannot clean. Heavy metals in 1 kg of simple superphosphate fertilizer Ca (H₂PO₄)₂: Ar-1,2-2,2; Ca 50-70; Cr 66-243; Co 0-9; Pb is 7-92 mg. However, the permissible limit for cereal crops alone is 0.02 g. In recent years, diseases that have increased rapidly and reached the level of a pandemic make people think more: Why can't we protect our loved ones from such diseases?

Key words: soil, nitrogen, phosphorus, chemical fertilizer, diseases

COMPARATIVE ASSESSMENT OF SUDANESE GRASS AND PEARL MILLET GENOTYPES IN THE ARID CONDITIONS OF SOUTH-EAST KAZAKHSTAN

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ABSTRACT

Agriculture continues to be one of the sectors most affected by extreme weather events. In 2021, abnormally high temperatures caused a drought in the southern regions of Kazakhstan that resulted in crop losses. Early introduction of particularly drought-resistant, high-yielding crops capable of growing throughout the country is the most effective solution to the problem. Sudanese grass and African millet are among the most promising drought-prone crops in the region. In the conditions of the south-east of Kazakhstan drought-resistant crops (Sudanese grass and African millet) are highly productive, valuable by quality fodder crops, providing high yields of biomass and grain. If the cultivation technology is observed, the yield of green mass of Sudanese grass and African millet up to 40 t/ha, of grain up to 1.7 t/ha and 2.2 t/ha accordingly are formed. For cultivation in the republic it is necessary to expand the sowing of Sudanese grass and African millet, as the most adapted to the extreme agro-ecological conditions of annual crops.

Keywords: Sudanese grass, Pearl millet, Yield, Biomass, Plant height

SECTION 2.

SOIL RESOURCES MANAGEMENT, SOIL FERTILITY, ENVIRONMENT AND AGROECOLOGICAL ASSESSMENT

AGROECOLOGY ASSESSMENT OF SOILS OF THE MUGAN STEPPE OF THE AZERBAIJAN REPUBLIC

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ABSTRACT

The Mugan plain is located in the southeastern part of the Kura-Araz lowland of Azerbaijan. The area of the Mugan steppe of Azerbaijan is 505,000 hectares of the zone. In order to fulfill the tasks of studying the soil cover in the study area in 2018–2021, we conducted the field soil investigations, put 24 soil profiles, summarized fund materials of soil studies performed by specialists from the Institute of Soil Science and Agrochemistry and the results of our own research. When developing the soil assessment of the Mugan steppe, we were guided by such methodological guidelines as “Methodological recommendations for the assessment of soils carried out in Azerbaijan”, “Soil assessment”, “Methodological guidelines for the assessment of soils under vineyards in the Azerbaijan SSR”, as well as a mathematical analysis of many years of statistical and experimental material collected on the object of study. According to the results of studies by V.R. Volobuev, R.H. Mamedov, M.E. Salaev and others, the following types of soils are common in the study area: gray-brown (chestnut), alluvial-meadow, meadow-gray, meadow-swamp and salines. According to the methodology, gray-brown dark soils with the highest parameters were chosen as the standard of internal diagnostic features in the soils of this zone, and the level of fertility of other soils was determined in relation to it. The assessment of the soils of the Mugan plain was carried out for 10 types and subtypes of soils; gray-brown ordinary (88 points) and dark meadow-gray (87 points) soils have higher fertility compared to other types of soils. Light gray-meadow, meadow-swamp, light-meadow gray soils have low fertility (bonitet points 60, 45, 68). It should be taken into account that there are some natural factors (erosion, salinization, alkalinization, granulometric composition, irrigation, cultivation, etc.), under the influence of which the level of soil fertility increases or decreases. Such factors are not constant, they are changeable and therefore, according to the methodology, they should not be taken as a standard, they are taken into account as correction factors.

Keywords: Mugan steppe, soil quality, bonitet scores, fertility.

IMPACT OF EROSION PROCESS ON ECOLOGICAL PARAMETERS OF THE SOILS IN ALPINE AND SUBALPINE MEADOWS IN SHAHDAG NATIONAL PARK

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ABSTRACT

Recently, both in our republic and globally, large-scale human interference in natural ecosystems, disregarding land and ecological laws, has led to degradation of the vegetation cover. The uncontrolled grazing of cattle in high-altitude and mid-altitude areas, at the boundary of summer pastures and forests, has resulted in the lowering of these forests' upper limit, intensification of erosion processes, and other exogenous processes. Natural landscapes have often been replaced by secondary landscapes or entirely transformed by humans into agro-landscapes. On the whole, unchecked human interference in nature has caused the soil cover, considered a critical component of the biosphere and a fundamental element in agriculture, to be subjected to varying degrees of erosion. This process, primarily noticed alongside a decrease in humus, a primary and vital soil indicator, continues to this day. It's worth noting that currently, an area of 3743.5 thousand hectares, constituting 43.3% of the entire territory of the republic, is experiencing some degree of erosion.

In the Shahdag National Park, these lands are mainly used as summer pastures and meadows, with a portion (particularly the mountain-meadow-steppe areas) allocated for growing grains and root crops. Research has determined that favorable hydro-physical and physico-chemical properties, coupled with dense grass coverage, slow down the formation of water runoff and the development of erosion processes on these lands. However, in some areas, these lands are subject to various degrees of erosion due to inconsistencies in the livestock grazing rotation system and the impact of overgrazing. To protect these soils from erosion, enhance their fertility, and boost the productivity of grassy plants, it's necessary to regulate the number of large cattle per hectare of pasture (the recommended grazing standard is 4-8 heads), increase the extent of artificial grass plantations, and conduct landscaping works in certain areas. Meanwhile, on some plots, especially in mountain-meadow-steppe lands where cultivation takes place, it's vital to adhere to erosion control measures and limit their cultivation.

Keywords: Erosion process, Grazing rate, Meadows, Mountain-grass steppes, Shahdag National Park, , Summer pastures.

SELECTING LANDSCAPE AND SOIL INDICATORS FOR ECOLOGICAL MONITORING IN THE GILGILCHAY BASIN CONDITION

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ABSTRACT

It is devoted to the issues of ecological monitoring of lands of Gilgilchay basin and establishment of land administration. A comparative analysis of observational materials shows that compared to 2000 and earlier years (1986-1987), there have been significant changes in the natural landscape in the Gilgilchay basin due to the expansion of settlements, increased economic activity and other reasons. This has manifested itself both in changes in the boundaries of natural landscapes and in the transformation of landscapes. In order to conduct a comparative analysis of aerial photographs taken at different times, landfills were selected within the various landscape zones in the Gilgilchay basin. Preliminary research shows that the changes in the following landscapes are more pronounced. The first landfill was Agbash settlement, located in the territory of Siyazan region, within the semi-desert landscape of the middle and weakly divided mountain plains. In 1987, the area of the Agbash station was 87 hectares, but in 2020 this figure increased to 163 hectares (Fig1).

a)



b)



Fig. 1. Perennial dynamics in the area dimensions of Agbash settlement within the semi-desert landscape of the middle and weakly divided mountain plains:

a) 1987: b) 2020

This means that the total increase in the area of the settlement over 32 years was 76 hectares (47%) (Fig 1).

The increase was mainly due to grazing and shrub areas around the settlement, as can be seen in the

Soils and landscapes within the Gilgilchay basin have been exposed to various anthropogenic impacts. According to modern concepts, land and landscape management should be realised based on the formation of the optimal ratio of "nature-economy" relations. Based on this position, a conceptual model of ecological zoning management of lands and landscapes within the Gilgilchay basin has been developed.

Keywords: monitoring, landscape, settlement, polygon, aerial photographs.

ASSESSMENT OF LAND USE IN URBAN LANDSCAPES ON THE BASIS OF GIS

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ABSTRACT

In the article, we have analyzed the territorial and population development of the Saatli urban landscape located in the Mugan plain in the territory of the Republic of Azerbaijan, and we have shown the results of its impact on the environment. For this purpose, a 1:10 000 scale topographic plan of the city dated 1975, and satellite and space images of the XX and XXI centuries were used. As a result of the analysis of the territorial development of the urban landscape, it was determined that the arable lands in the surrounding areas were replaced by construction sites, and even the 30-hectare oxbow lake of the Araz River was turned into a construction site. Population dynamics show that the city was included in the group of medium-sized cities in 2020.

In order to determine the anthropogenic impact on the urban landscape, aerospace images for 1989, 2014 and 2022 were detected, construction sites were vectorized and analyzed. For the analysis of the level of urban development, satellite images for 2022 were detected by us and the surface cover was studied.

Images from Landsat 5 and 8 satellites were used to analyze the current and past situation in the vegetation and water basins.

If the area of Saatli city was 8,9 km² according to the topo plan of 1975, in 2022, based on the decoding of aerospace images, it was found that the city area expanded to 18.4 km². This means that the average annual area growth is 2,27 %. If we look at the direction of expansion of the city, we see that it is expanding mainly in the south-west and north-west. This is due to the existence of rural settlements in other directions, resulting in limited opportunities for expansion and the water canal passing through the area. If we look at the space image, we can see that the city has arable land in the south and south-east. This will lead to problems with food supply, destruction of fertile lands, provision of fodder base for livestock in urban landscapes.

Keywords: GIS, Landsat, Land use, Remote Sensing, Saatly city,

THE EFFECTS OF FOREST FIRES AND POST-FIRE MANAGEMENT ON SOIL AS A BASE FOR POST-FIRE VEGETATION DEVELOPMENTS

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ABSTRACT

Forest fire is recognized as an important feature in the dynamics of soil and vegetation in fire-sensitive areas. It is known that fire sensitive areas are gradually expanding in the world. Depending on the change of vegetation and soil characteristics by the fire, the hydrological regime of the burned area and the sediment transport dynamics can also be changed. In this study, it is aimed to assess the soil vegetation development after fire by reviewing the effects of forest fire on the soil. It is also focused that this relationship will provide basic information on the content of post-fire forestry management activities. The most important fire characteristics affecting soil and vegetation properties are fire intensity, heat transfer, fire duration, flame depth etc. The physical, chemical and biological properties of the soil are directly affected by the consumption of organic matter during a fire, and soil water repellency, runoff and sediment yield and erosion are also increased after the fire. Soil-vegetation interactions continue after fire under extreme conditions that affect vegetation growth rates and species composition. The first years after fires are more important to increase the nutrient capacity of the soil and the development of vegetation. It should be an important goal to improve the vegetation succession rate and increase the primary C source going underground from belowground to restore the soil flora and fauna, ensure sustainable vegetation dynamic after the fire. Therefore, post fire forest management activities after the fire to be carefully planned.

Keywords: Forest Fires, Soil and Vegetation Properties, Post Fire Management

DYNAMIC EXCEL TABLES FOR SOIL DATA PROCESSING

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ABSTRACT

There are indicators that are critical to assessing the state of land and the environment. The results of soil studies depend directly on the accuracy or reliability of the soil data. This is through the mathematical and statistical treatment of soil data. Soil appraisal decides the quality of the soil in terms of property scores, which correlate with yield. The purpose of assessing soil fertility is to develop a unified system of quantitative characteristics of soil productivity, to justify the implementation of the principles of land cadaster, soil fertility management and crop planning. Land assessment should necessarily be related to specific areas or cadastral zones. In this regard, soils, as the main object of such valuation, have an important advantage over other elements of the natural landscape.

There are techniques for conducting soil appraisal and mathematical processing of the data. To speed up data processing, to make soil indicators informative, dynamic, updatable, and mobile, and to make spatial analysis of soil data available, we have compiled them in dynamic Microsoft Excel tables for Windows. Typing soil analysis data into Excel tables is the most time-consuming work, then the process goes on automatically. According to soil appraisal method, soil type data transferred to 0-20, 0-50, 0-100 cm depth. The soils evaluated first in a closed and then in an open appraisal scale using a 100-point system. Mathematical and statistical analysis decides the degree of reliability of the data. Excel formulas as well as some built-in Excel functions such as "AVERAGE", "COUNT", "DEVSQ", "SQRT", "MIN" and "MAX" were used to calculate translation of soil data values to 0-20, 0-50, 0-100 cm depth, and to calculate mean value (M), mean square (σ), mean error (m), coefficient of variation (C), precision index (P) and reliability (t).

Keywords: Excel, Soil Assessment, Soils Data, Soil Management, Statistical Data Processing.

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ENVIRONMENTAL ASSESSMENT STUDY OF LAKE MASAZIR

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ABSTRACT

The natural resources that nature provides to us meet the needs of human beings. Generally, natural resources are components of nature that humans use in their life and economic activities. How much of our natural resources are useful today? But can such wealth be preserved today? Unfortunately, the answer is no. Such resources must be protected and passed down from generation to generation. However, our natural resources, rivers, and lakes are being polluted, drained, and destroyed day by day. We know that reservoirs are destroyed because of heavy pollution of rivers. At present, the water quality in the lakes is quite low, even not suitable for meeting technical needs. According to the chemical composition and types, pollution of groundwater and lakes occurs by bacteriological, radioactive and thermal ways. These include household waste and wastewater. Thus, in order to prevent the pollution of the Caspian Sea, lakes and water bodies, which are the natural resources of the Republic of Azerbaijan, a large number of projects are needed to carry out cleaning works by applying modern technologies in the world.

Keywords: contaminated area, environmental protection, mud bath, salt reserve, unsanitary, wealth in the lake

THE PROBLEM OF ESTABLISHING A SOIL QUALITY MONITORING SYSTEM IN AZERBAIJAN

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ANNOTATION

A new model of agrochemical service and soil quality monitoring systems, which are completely out of order due to the collapse of scientific-methodical and organizational bases in our country, should be developed in accordance with modern world experience and international standards. The most unpleasant situation in land use in the country today is that extensive soil surveys and analyzes have not been carried out in any region or district for the last 30-40 years, fertilization studies are carried out blindly without any scientific basis. This ultimately increases the concentration of any element that enters the soil through fertilizer, leading to soil pollution or weakening of the soil's nutrient regime due to its scarcity. The large scale of this process is very dangerous in terms of maintaining soil fertility.

Key words; Soil monitoring, nutrients, Soil fertility, certification.

DESICCATION OF SOIL AND VEGETATION IN THE SOUTHEASTERN PART OF THE GREATER CAUCASUS AND THE IMPACT OF DEGRADATION ON ECOLOGICAL CONDITIONS

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ABSTRACT

At the stage of modern development of human society, the purity and cleanliness of the environment is the most valuable and important resource for people's life and production activities. That is why, when using individual territories, natural endogenous and exogenous processes occurring there - water erosion, deflation, irrigation erosion, pasture erosion, as well as the influence of soil-vegetation pollution to one degree or another as a result of human economic activity, detection, research and forecasting of very dangerous areas from an ecological point of view is of particular importance. In order to prevent negative processes occurring in the environment, the study of the ecological environment should be carried out in a comprehensive manner.

It should be noted that the constantly increasing aridity in the southeastern region of the Greater Caucasus is subject to ecological changes as a result of the intensive activity of natural and anthropogenic factors affecting it. In particular, the anthropogenic impact on the natural environment is increasing day by day. In such a case, the ecological potential of each ecosystem and the future of the anthropogenic landscape, which has been used intensively for a certain period of time, are undoubtedly in danger. This should especially apply to the soil-vegetation cover of the steppe zone.

SOME ASPECTS OF ENVIRONMENTAL DAMAGES OF SOIL RESOURCES IN AZERBAIJAN

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ABSTRACT

The subject of the paper covers one of global issues – ecologically-safe aspects, including environmental balance, elimination of pollution, prevention of soil degradation due to contamination of natural components of ecosystems.

Azerbaijan – is the South Caucasian state with unique natural potential, enormous quantity of resources, distinctive tertiary floristic and abundant faunistic diversity, as well as compact, but fertile soil funds.

Author emphasizing major affairs of recovering liberated areas of Azerbaijan and building of environmentally friendly habitat for society and biodiversity. The region of Karabakh and adjacent areas were about 30 years under illegitimate occupation by neighbor state, and these caused violation towards our nature. Immediately after Historical Victory in 2020 Azerbaijan started rehabilitation of natural landscapes, counting soil assets.

Another topic is Sustainable Development on national scale for present and future generations of citizens of Azerbaijan to meet their needs in comprehensive meaning.

Dual relations between Nature and Society have considerably extended history, covering millenniums and current conditions of natural ecosystems have not the best level of quality; outer world has huge influence to the wildlife. We can name this impact ‘anthropogenic pressing’ due to incredible tension.

DETERMINATION OF LAND DEGRADATION AND DESERTIFICATION USING MEDALUS MODEL CASE STUDY; INEBOLU WATERSHED

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ABSTRACT

Land degradation and desertification causes extinction of function of soil layer which is one of the most important terrastral ecosystems and formed hundreds of years. Many studies were carried out and many kind of models have been developed. This study was performed in Inebolu Watershed and aimed to determine the zones that are sensitive for degradation by using MEDALUS Model. In first step, the indicators that are soil, climate, vegetation and management were calculated and mapped separately in this model. In second step, all indicator layers were combined to determine sensitive areas getting the geometrical average of those four index in GIS medium. According to results, environmental sensitive areas defined as critic and fragile in classification system were observed as fragile F3 and one of the important degradation C2. 35.65% of areas was classified as critic whereas, it was found that 18% of the total area was fragile.

Key words: Desertification, Land degradation, MEDALUS, Inebolu Watershed

CONNECTIONS BETWEEN PLANT FEEDING, N, P, K AND QUALITY IN FRUIT GROWING

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ABSTRACT

Scientists research for food requirements of fast growing world population and looking of alternative food resources. Problems of food resources are still at the top of the world agenda. The other problem of the food resources is improvement of quality in fast growing agricultural production. Manure usage increases yield but also increase or decrease quality of products. Excessive or insufficient usage of manure lowers yield but also lowers quality, durable and taste of fruit. Excessive usage of manure cause some compounds which are harmful for human health.

ASSESSMENT OF EROSION PROCESSES IN THE ABSHERON PENINSULA OF THE CASPIAN SEA USING REMOTE SENSING TECHNIQUES

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ABSTRACT

Remote sensing methods are widely used (1990s) to study erosion processes. Remote sensing makes an important contribution to the assessment of erosion at various spatial levels. The use of remote sensing techniques has the potential to identify eroded areas and monitor erosion processes at the regional level. Lines, zones of influence of geomorphological processes and quantitative indicators. The coastline and its dynamics of the coastal areas of the Absheron peninsula (according to geomorphological zoning: from Sumgayitchay to the Jeyrankechmez river) were studied using ArcGIS software using Landsat MSS, TM, OLI images of the coastal zone of the Caspian Sea for 1986, 2002 and 2019. The calculation was carried out using the WLR statistics of the DSAS method. The calculation was carried out using the WLR statistics of the DSAS method. Negative values obtained during the calculation indicate erosion, while positive values indicate accretion. Remote sensing based methods provide a cost effective way to investigate erosion or build-up where there are no available areas or direct field methods are expensive. An analysis of the compatibility of remote sensing data for identifying areas of erosion and accretion processes (accumulation), monitoring, assessing the impact on soil and other objects, shows the use of a number of images to solve these problems.

Keywords: geomorphology, remote sensing, erosion and accretion processes

EFFECTS OF FOLIAR FERTILIZATIONS AT DIFFERENT GROWTH STAGES ON YIELD PARAMETERS OF WHEAT

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ABSTRACT

In this study, effects of NPK foliar fertilizer applications at different growth stages on yield parameters of wheat were investigated under greenhouse conditions. Foliar applications of NPK fertilizer containing 10% N, 5% P₂O₅, 5% K₂O were done 0.5% and 1.0 % doses at tillering (T), stem elongation (S), heading (H) stages of wheat plant and three combinations of these stages (T+S, T+H and S+H). Biological yields of wheat increased with increasing application doses from 0.5% to 1.0% over the control. While the highest biological yield (7,38 t/ha) and stem yield (4.83 t/ha) values were obtained with the application of 1.0% foliar fertilization at stem elongation stage, the highest grain yield (2.65 t/ha) was obtained with the application of 0.5% doses at stem extension stage. The both foliar fertilization applications increased stem yield values more than grain yield values of wheat plant. The percentage mean values for the increments of biological, grain and stem yield values over the control for both application doses at all over the growth stages were 17.5%, 8.9% and 24.0%, respectively. Although all yield parameters increased over the control with both foliar fertilizations, the harvest index decreased with the foliar fertilization applications at all growth stages due to higher increase in stem yield values. The mean percentage increments in the biological yield over the control were ordered as follows 30.2% at S, 21.8% at H, 16.2% at T, 14.5% at S+H, 11.8% at T+S and 10.5% at T+H stage foliar fertilization applications. The foliar spray of 1.0% NPK solution was generally found to be most effective for increasing yield parameters of wheat when sprayed at stem elongation stage.

Keywords: Foliar fertilization, NPK, wheat growth stages, yield parameters.

DIRECTIONS OF SOIL FORMATION IN ARID SUBTROPICAL FIELDS IN THE CONDITIONS OF MODERN CLIMATE CHANGES

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At present the main characters of the changes happened in climate are actually accompanied by increase of temperature and decrease of rainfalls. Firstly, this affects the landscape transformation, soil processes and evaluation. Increase of the temperature in a small quantity index of the arid climate condition, enervations in water regime cause transformation in the landscape, change of soil processes and evaluation. Density of plant cover reduces and the botanical composition undergoes noticeable change. A quantity and composition of organic residue weaken as a result of aridity occurring in the plants. This process is mainly noticeable in the pasture soils of the research zone.

The climate changes are reflected in quantity indicators of the temperature and amount of rainfall. We determined the differences of these indicators of the climate in the research zone on seasons of 1961-1990 compared to 1991-2021 years. An analysis of the temperature was performed on the basis of data of the meteorological stations in this physical-geographical province.

It was determined that strong changes happened in the arid subtropics in the last years. The information of the separate metrological points indicates that the temperature has risen and an amount of the precipitations has decreased everywhere in the Kur depression. The temperature has risen +1.0-1.5⁰C and a quantity of the precipitations has decreased 10-60 mm.

These indicators are mostly felt in the summer and autumn season. Increase of temperature and decrease of rainfall had a negative effect on organic residue entering the soil, the biological activity was weakened and mineralization was intensified. Soil formation, including humus formation weakened. Therefore the change is mostly felt in the grey-brown and in the upper 20 cm layer of the grey soils which are used as a pasture, but this change isn't felt towards depth. Mixing of the soil mass at 0-25 cm due to cultivation in the upper horizon in the sowing soils, strong changes doesn't happen in soil formation due to application of organic and mineral fertilizers.

Grey-brown, grey, grey-cinnamonic and salinities of various origin are characteristic for arid landscapes. Zoning plays a main role in soil distribution. Resistance of these soils to erosion is weak and sensible for salinity. The change indicators of the temperature and precipitation is one of the reasons of the degradation development for semi-desert and arid field landscape.

The plant residues decomposed in a hot-dry climate are slowly mineralized. Their mineralization is very fast under conditions of high temperature (50-60⁰C) and humidity (50-60 % from soil weight). In these perished plant residues it is seen that the thermophilic microorganisms actively participate.

Increase of temperature and decrease of moisture occurred as a result of the climate changes, and this changed a direction of the soil-formation in the arid subtropics. Weakening of microbiological activity stops humus-formation direction and accelerates mineralization in dry-hot period of the year. An amount of organic reserve sharply weakens in wormwood-ephemeral biocenoses. Occurrence of weakening in soil-formation has a negative influence on its fertility indicators.

Key words: Climate change, arid subtropical fields, soil formation, temperature, moisture, humus, organic residue.

DEVELOPMENT OF MATHEMATICAL MODELS AND INTELLIGENT EXPERT SYSTEMS FOR INTEGRATED USE OF FRESHWATER RESOURCES

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ABSTRACT

Considering management problems and new realities in water management, distribution of freshwater resources is one of the important issues to be solved in the region. Here, it is important to consider the interests of each of the parties, conduct negotiations and find compromise solutions. To analyze the above-mentioned problems, to understand their essence and to find compromise solutions, it is important to create four-system mathematical tools and mathematical models developed on this basis. Creating dynamic monitoring and prediction models with probabilistic-statistical characteristics that consider all possible properties of underground and surface, natural and artificial water sources. Creation of method and program complexes for selection and management of operation mode of closed and open water basins based on dynamic mathematical models. Mathematical modeling of hydrological processes is one of the most promising areas of modern hydrology. It is believed that in the future all hydrological problems can be solved using various mathematical models. In Azerbaijan, where water resources are limited and unevenly distributed both over time and territory, these resources are gradually declining and their quality is deteriorating under the influence of economic activity and climate change. All this necessitates increased attention to the development of these and other related areas of hydrological science, one of the main tasks of which is the study of water resources, as well as the training of personnel at all levels in the field of hydrology.

Keywords: water-soil problem, complex use, mathematical models, predictions, expert systems.

ECOLOGICAL SOIL EDIFICATORS ON THE KARAMARYAM PLATEAU IN RECENT YEARS

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ABSTRACT

For the rational conduct of agriculture, the specialization its branches, the improvement culture of agriculture and the receipt the maximum amount of production, it is necessary to study the properties of the qualitative soil composition and the patterns of their distribution. Karamaryam plateau is located in the foothills of the Greater Caucasus between the Akhsuchay and Gokchay rivers. The studied territory, the total area of which is about 50 thousand hectares, has a heterogeneous soil cover. The amount of humus in upper horizons 2.9-3.8%, and below it gradually decreases and reaches 1% in the 80-100 cm layer. In the upper horizon, the humus composition is dominated by humic acids (14.97–16.50%). The ratio between humic acids and fulvic acids varies within 1.0-1.5, in the lower 30-60 cm horizon 0.4-0.8. The mechanical composition of the soils is heavy loamy and clayey. In layer B of the profile <0.001 mm 35-46%, <0.01 mm 67-75%. The silt content in physical clay is 55%. In merged horizons, the degree of silt reaches 60-63%. These soils are saturated with bases. The composition of exchangeable bases is dominated by calcium 11.50-33.54 mg-eq. The study of the current ecological state of the unique soils of the Karamaryam Plateau is very important for the development of agriculture in Azerbaijan and the satisfaction growing food supply of the population. Dominant groups of invertebrates in newly irrigated cereal and alfalfa agrocenoses are: Orthoptera; Hemiptera; Coccinellidae; Cryllidae; Noctuidae; Castropoda; Carabidae; Scarabaeidae; Lumbricidae. Dominant groups of invertebrates in natural cenoses are: Tettigonidae; Hemiptera; Cerambucidae; Tenebrionidae; Coccinellidae; Cryllidae; Castropoda; Arachnidae; Alleculidae.

Keywords: microscopic fungi, agrochemical indicators, invertebrates, ecological edificators.

ESTIMATION OF AGROECOTOURISM POTENTIAL IN DASHKESEN DISTRICT, AZERBAIJAN

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ABSTRACT

Agroecotourism, which combines agricultural activities and ecological tourism, has gained significant attention as a sustainable development approach that promotes rural economies while preserving natural resources. This paper aims to assess the agroecotourism potential in Dashkesen District, Azerbaijan. By analyzing the district's natural and cultural assets, agricultural practices, infrastructure, and market opportunities, this study provides insights into the feasibility and potential benefits of developing agroecotourism in the region. The findings contribute to informed decision-making and the formulation of strategies for sustainable rural tourism development. Title: Estimation of Agroecotourism Potential in Dashkesen District, Azerbaijan agroecotourism, a unique combination of agriculture and ecotourism, has gained significant attention in recent years as a sustainable and economically viable form of tourism. This study aims to estimate the agroecotourism potential in Dashkesen District, Azerbaijan, by assessing its natural resources, cultural heritage, and agricultural activities. The research methodology involved a comprehensive analysis of primary and secondary data sources, including field surveys, interviews with local stakeholders, and review of relevant literature. The natural resources of Dashkesen District, such as its diverse landscape, favorable climate, and rich biodiversity, were evaluated to identify their attractiveness for tourists seeking nature-based experiences. Additionally, the cultural heritage of the region, including historical sites, traditional practices, and local crafts, was examined to determine its potential to enhance agroecotourism offerings. The study also investigated the agricultural activities in Dashkesen District, focusing on the production of local crops, livestock farming, and traditional food processing techniques. These agricultural practices were analyzed in terms of their ability to provide immersive and educational experiences for tourists. The results of the study indicated that Dashkesen District possesses significant agroecotourism potential. Its natural resources, including the magnificent landscapes of the Greater Caucasus Mountains, the stunning Gyz Galasy (Maiden Tower) Canyon, and the abundance of flora and fauna, can serve as major attractions for ecotourists.

Keywords: agroecotourism, Dashkesen District, Azerbaijan, rural tourism, sustainable development

THE ROLE OF ECOTOURISM POTENTIALS IN SOCIO-ECONOMIC DEVELOPMENT OF OGHUZ DISTRICT, AZERBAIJAN

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ABSTRACT

Ecological tourism has been one of the fastest growing areas of the world tourism industry in recent times. This type of tourism has become a sector that is formed according to the natural resources and lifestyle of the local population and is supported by its contribution to the sustainability of socio-economic development. The creation of tourism infrastructure means not only tourism but also the economic development of the region and the country as a whole, helping to solve problems related to employment and raising the standard of living. For the Republic of Azerbaijan, the development of ecotourism is of great importance in terms of the development of alternative activities in rural areas and the provision of employment. This area has a positive effect on the development of villages and agriculture, the creation and development of socio-cultural service areas, and the improvement of the level of services provided by them, ensuring the employment of the population and increasing their income.

From this point of view, the article is analyzed the development possibilities of ecotourism in the socio-economic development of Oghuz district. Also, given the existing problems revealed in the revitalization of this district, the development of economic areas, increasing competitiveness, and social and cultural services in rural areas, as well as ways to solve these problems, a number of proposals have also been put forward.

Keywords: Ecotourism, Oghuz district, Sustainable development, Income, Social and economic impact

INFLUENCE OF CLIMATE CHANGE ON THE FOREST BELT IN THE SOUTHEASTERN PART OF THE GREATER CAUCASUS

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ABSTRACT

In contrast to the southern slope of the Greater Caucasus (the territory of the Balakan, Zagatala, Gakh, Sheki, Oghuz, Gabala administrative regions), the southeastern part, which we chose as the object of study, has undergone more intense anthropogenic changes throughout the entire mountain forest zone. Therefore, the existing forest composition here cannot be considered completely natural. Thus, with the upper mountain-forest belt in the Pirsatchay depression, only the right-bank slope at the upper forest boundary remained. However, beech-oak mesophylls, beech-oak xerophytic and other mixed forests on brown mountain-forest soils are widespread in the middle and low mountains within the study area.

In the southeastern part of the Greater Caucasus, forest formations are divided into mesophilic, xerophilic, and arid forest formations. Here the forest zone is located between the xerophyte-steppe zone of low mountains and the subalpine mountain-meadow zone. Beech-hornbeam-oak mixed forests are mesophilic in nature and form on brown mountain forest soils. Here, beech forests are taken as the leading plant. According to researchers, the main conditions for the development of beech forests are the duration of the growing season of at least 5 months, the maximum air temperature of more than 5 degrees on 245 days a year, and the average annual rainfall of at least 500 mm. Beech is considered a mesophilic tree genus. On fairly moist soils, it creates clean and productive light forests, but does not prefer dry and very wet places. Beech is a relatively cold-resistant tree species that grows to the subalpine zone. However, the climate of the beech forest belt in Azerbaijan differs significantly in places. Thus, in some areas of beech forests, the average annual temperature rises to 10.6 degrees, and the temperature of the hottest month - up to 22 degrees (Gabala).

Among the oak species in the southeastern part of the Greater Caucasus, the Iberian oaks are more common. The average annual temperature in the Iberian oak forest zone is 10.3-13.3 degrees, precipitation is 430-1327 mm, in the eastern oak zone 600-1400 mm. The Iberian oak is drought tolerant. The fact that the Pyrenean oak grows in conditions of relatively low rainfall and low relative humidity indicates that it is a xerophilous tree species. These climatic conditions cause the Iberian oak to completely form the belt.

Arid-type forests develop in the arid climate in the foothills of our republic, where most of the growing season lacks moisture, and are of great water-regulating and soil-protective importance. The juniper tree, which is the main component of dry forests, belongs to the cypress family. It happens in the form of an evergreen tree or shrub, and sometimes in the form of a bush lying on the ground. Since juniper trees have high phytoncidal properties, they purify the air and improve the climate of the area. In our research complex, the population of the foothill zone, where arid forests are common, has been engaged in intensive agriculture and animal husbandry since ancient times. In this regard, the original forest cover of the arid type here has undergone anthropogenic change, and the existing plant formations are mainly of the derived, steppe-xerophyte type.

Keywords: hornbeam tree, ash-tree, forest transformation, climate changes, fullness of the forest

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LAKE ZABRAT ON THE FLYWAYS OF WATERBIRDS

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ABSTRACT

As is known, Azerbaijan is rich in various types of ecosystems, among which the most labile ecosystems are stagnant waters and wetlands. They change seasonally depending on climatic conditions. Many of them attract migratory water birds, stopping at them for nesting, wintering, during migration.

One of these lands is Lake Zabrata, where, in order to determine the species composition, abundance and nature of the stay of migrant birds, we conducted field studies in the spring and early summer of 2022-2023. Based on the results of our own research and literature sources, the article provides data on 14 species of birds, both migrants and sedentary, belonging to 7 orders. The conservation statuses of 7 species included in the IUCN Red List are given.

Key words: Bird migrations, Endangered species, Lake Zabrata

MODERN STATE OF SALYAN PLAIN SOIL AND INCREASE WAYS OF ITS FERTILITY

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ABSTRACT

The comprehensive information about Salyan plain soil located in the Kur-Araz valley which has a good situation for growing of the main agricultural plants of the country in the article. The researches indicate that presence of the definite changes, less precipitations, soil salinization, water insufficiency etc. negatively affected getting a high and stable product from agricultural plants in the valley as a result of the climate changes occurring in the world in recent years. They decrease soil fertility and development and productivity of the agricultural plants. It was determined that a quantity of salt in the soil and subsoil mineralization are more in the places near the surface. The location depth of the groundwater in the plain changes depending on relief. The soil is grey soil type, its water leakage ability is various. Here sulphatic –chlorine type of salinization is available, but chlorine type of the salinized soil is found in some places. The water-physical characters of the plain soil deteriorated because it exposed to different types of salinization. Realization of agromelirative measures is important for improvement of the it was known from the results obtained in the sections of the selected experimental area in the village of Seyidsadikhly municipal soil in the Salyan plain that the plain soil is clayey and loamy for granulometric composition. An amount of salt was 0.11-0.20% for dry residue. In the same samples CO_3 ion wasn't observed, a quantity of HCO_3 was 0.012-0.024%, but Cl ion was 0.007-0.112%. CO_3 ion wasn't observed in the drains water passing by the side of the area, a quantity of HCO_3 was 0.195g/l; Cl was 3.668g/l. A quantity of salt in the drainage water was 3.56g/l. This shows that the same soil belongs to unsalted type. The absorbed bases were defined in the experimental area and the consequences indicate that their sum is 24.17-27.87 mg.eq at 0-50cm of the soil layer, but 27.02-33.87mg-eq at 0-100cm of layer. A value of pH in soil solution changed by 7.6-7.7 and productivity obtained from cotton plant was 30-35c/h.

Key words: irrigation, salinization, fertility, groundwater, productivity.

ZONATION MAPS BASED ON GIS TECHNOLOGY: A CASE STUDY OF SOILS OF SIALKOT DISTRICT, PUNJAB, PAKISTAN

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ABSTRACT

During the conceptualization and planning phases of civil engineering projects, geotechnical investigation studies are conducted. It is essential to the development of sustainable building designs, but it also drives up project costs and length of construction. In order to save time and resources, we can use already existing Soil maps can save a significant amount of time and money. The study proposes the use of ArcGIS to create spatial interpolation of the data retrieved from geotechnical investigation reports of over 70 different building site locations of district Sialkot. This will significantly aid in geotechnical characterization of the respective area. Furthermore, the research area's subsurface soil has been investigated in terms of soil type and resistance to standard penetration (SPT-N). The Spatial Analyst extension of ArcMap's Inverse Distance Weighting (IDW) algorithm was used to create zonation maps at various depths. During the feasibility stage of a planned project in the study region, these maps can be used to quickly estimate the type and strength of the soil and develop a preliminary ground model, which enables the project to be safer and cost-effective.

Keywords: ArcGIS, Geotechnical Zonation, IDW, Sialkot District, Spatial Analysis

STRUCTURE OF SHIRVAN PLAIN MUNICIPAL LAND FUND AND WAYS OF EFFECTIVE USE

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ABSTRACT

As a result of the research, it was established that the following soil subtypes are common in the Shirvan Plain: dark gray-brown soils - 12,624.69 hectares (5.11%); ordinary gray-brown soils - 27578.95 hectares (11.16%); light gray-brown soils - 7867.21 ha (3.18%); ordinary meadow-gray soils - 28849.64 ha (11.68%); light meadow-gray soils - 3869.24 hectares (1.57%); dark gray-meadow soils - 7936.55 ha (3.21%); ordinary gray-meadow soils - 98916.69 hectares (40.04%); light gray-meadow soils - 20967.27 ha (8.49%); boggy-meadow soils - 4572.91 ha (1.85%); alluvial-meadow soils - 15867.8 hectares (6.42%); solonchaks - 17981 hectares (7.29%). The total area of the Shirvan Plain was 661991.94 ha, of which 198182.66 ha are in the state, 265693.66 ha in municipal and 198115.62 ha in private ownership. It was revealed that the lands in municipal ownership are mainly located in Agsu and least of them in the territory of Hajigabul district. As a result of research, we come to the conclusion that non-saline areas are mainly in Agsu, and very strongly saline soils - in Agdash, and highly saline soils are the least in Agsu. In Agsu, salt marshes are not observed. Poorly alkaline soils are mainly located in Zardab, and non-alkaline soils are in Goychay. Medium alkaline soils are found in Agsu and Ujar districts. It was found that poorly and moderately eroded soils are observed in the Kurdamir, Ujar and Zardab areas. The area owned by municipalities and allocated for the future development of residential areas may be increased in the future due to population growth.

Keywords. Shirvan Plain, municipal lands, saline soils, meadow-gray soils, solonchaks, land fund.

GLOBAL CLIMATE CHANGE AND THE EFFECTIVENESS OF ANTI-DEGRADATION AND RECLAMATION MEASURES FOR THE SOILS OF AZERBAIJAN

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ABSTRACT

The emergence of global environmental problems is a new problem that entered human life in the 20th century. According to academics G.Sh. Mammadov and M.P.Babayev, aridification, desertification, violation of agro-ecological balance, including degradation of soil cover, loss of biological diversity in Azerbaijan manifests itself in the process of severe erosion of ecosystems in mountainous areas. Therefore, in countries like the Republic of Azerbaijan, desertification, desertification, and the increase in soil degradation are actual ecological problems. Desertification processes are more characteristic especially for Kur-Araz lowland. The development of irrigation agriculture in the Republic of Azerbaijan has led to the rapid increase in water demand, the washing of saline soils, the formation of large industrial centers and urban agglomerations.

In different years in Azerbaijan, irrigation canals, including Upper Karabakh, Upper Shirvan, etc. irrigation canals were built and extensive melioration measures were started for the development of agriculture in the irrigation conditions of the area they passed, collectors were built to strengthen the internal flow, and various long-distance collector-drainage networks were built in order to remove mineralized debris from the areas during the irrigation and washing process. Extensive reclamation works have been carried out. In order to solve the problem, increasing the water level of the existing irrigation canals from 0.5 to 0.65-0.70, 2.0-2.5 mln. m³ per year can allow to obtain water. For this, new water reservoirs, artesian wells and irrigation canals are being built in the regions freed from occupation, initiated by the President of the Republic, Mr. Ilham Aliyev. All these measures should contribute to the increase of productivity and economic income in our Republic.

Keywords: Desertification, Irrigation canals, Melioration measures, Soils of Azerbaijan.

ECOLOGICAL FEATURES OF MEADOW-GRAY SOILS OF THE SALYAN PLAIN OF AZERBAIJAN

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ABSTRACT

The Salyan plain is located in the southeastern part of the Kur-Araz lowland. Meadow-gray soils are common in the central, northern and northeastern parts of the Salyan Plain, occupying 3855.02 ha or 0.85% of the total area. These soils are subdivided into 2 subtypes: ordinary meadow-gray - 2117.65 ha and light meadow-gray soils - 1737.37 ha. Their development took place under the influence of surface waters, therefore the role of groundwater is insignificant and seasonal, depending on the irrigation of vegetation [4]. These soils are characterized by a short humus profile, and the formation of a soddy layer on the upper surface is noted in the virgin soil. Common features: dark gray, gray and light gray color of the profile, the top layer is soft, has a compacted structure in depth. The upper surface of the profile is slightly moistened, the depth is moist. Carbonate white-eyes are found at a depth of 50-60 cm. There are also rusty-colored remnants of the former meadow regime. According to the geomorphological structure, a strong influence of groundwater on meadow-gray soils is felt. Depending on the water-physical properties and the nature of the soil-forming rocks, the process of humus formation in meadow-graysoils proceeds very intensively [1]. Soil boiling is noticeable from the surface. The amount of humus in these soils was 1.90-2.2% in the upper layer (0-20 cm), 1.2-2.0% in the half-meter layer, 1.04-1.76% in the meter layer, these soils contain humates. There is also a gradual decrease in the amount of total nitrogen with depth: in the 0-20 cm layer - 0.10-0.17%, in the 0-50 cm layer - 0.10-0.15%. The low amount of total nitrogen is explained by the fact that humus is moderately supplied with nitrogen compounds [3]. The provision of these soils with gross phosphorus is weak: 0.16-0.23%.

Depending on the degree of availability of absorbed bases, these soils are moderately and highly saturated: 30.10–53.40 meq. The amount of absorbed Na⁺ decreases to 1.27-2.01 mg-eq with increasing depth, which is typical for gray soils in this area. The high amount of absorbed Na⁺ in places indicates the distribution of solonetzic species of meadow-gray soils in the area [2]. These soils are clayey and loamy in their mechanical composition. In most cases, the accumulation of silt particles in the upper layers of the developed territories is noticeable due to irrigation. According to the mechanical composition, these soils are medium loamy on the slopes, heavy loamy and clayey in the foothills: the number of particles <0.01 mm was 48.80-69.00%, the amount of silt fraction is also high: <0.001 mm - 22.64-33.72% . The pH value was 7.8-8.2, which indicates that these soils are slightly alkaline and alkaline. According to the results of water-extract analysis, along with non-saline variants of meadow-gray soils, saline species are also common in the territory: 0.24-1.90% [2]. These soils are mainly used for cotton.

Keywords: Salyan plain, meadow-gray soils, fertility, salinity

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ENVIRONMENTAL CONDITIONS AND PROBLEMS OF AZERBAIJAN'S WINTER PASTURES IN THE CONDITIONS OF GLOBAL CLIMATE CHANGE

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ABSTRACT

It is important to carry out scientific-research works in order to increase productivity by developing animal husbandry in the country in more advanced ways, to strengthen the protection of summer and winter pastures and hayfields, to increase the efficiency of their use and to ensure the preservation of biodiversity. From this point of view, the research work dedicated to the investigation of changes in the ecological condition of Azerbaijan's winter pastures under the conditions of global climate change stands out for its relevance. Winter pastures of our republic taken as a research object are 1460 thousand hectares, and summer pastures are 589.5 hectares. During research, cartographic,, mathematical-statistical, systematic analysis, comparison, etc. research methods were used, collected materials were summarized, grouped and systematically analyzed. Since a large part of our summer pastures of the republic has been occupied for 30 years, the overloading of winter pastures has resulted in soil erosion, salinization, humus, etc. leaching of nutrients from the productive layer of the soil, deterioration of its physical and mechanical properties occurred. During the years 1975-2000, 743.3 thousand ha of winter pastures of Azerbaijan, including 218.3 thousand ha of winter pastures in the Kur-Araz lowland, were subjected to varying degrees of desertification. Since the 90s, the intensity of the desertification process in winter pastures has increased 2-3 times. In this regard, it is necessary to implement complex measures to effectively use the winter pastures of the republic and to prevent desertification and bring them to a productive state.

Keywords: Kur-Araz lowland, Desertification, Winter pastures, Climate change, Soil degradation, Salinization

ENVIRONMENTAL ASSESSMENT OF FOREST-VEGETATION AREAS WITH HIGH AEROSOLS BASED ON SATELLITE I MAGES FROM LANDSAT TM/ETM+ SENSORS (IN THE EXAMPLE OF LACHIN, GUBADLI, AND ZANGILAN REGIONS)

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ABSTRACT

The research work determined the aerosol forest cover index (AFRI1600), vegetation cover index (NDVI), and hydrological conditions from 2000 and 2020 (2021) data. An environmental assessment based on the AFRI1600 index, the NDVI index, and field indicators of the hydrological state. The AFRI1600 index is conditionally divided into high, medium, weak and pure classes. Based on these gradations, we identified decreasing and increasing areas by comparing 2000 and 2021. The average decreasing class turned into a slightly increasing class, that is, in some parts of the areas with medium aerosols in 2000, the aerosol decreased, and in 2021 became weak areas. The environmental assessment will be determined on the basis of reduction and increase in areas. As a study of the impact on the NDVI index, field indicators were recorded reflecting the state of the NDVI index in 2000 and 2021. According to the histogram showing the areal indicators of the NDVI index of the study area in 2000 and 2021, it can be said that the treeless territory in 2000 was replaced by shrub and meadow in 2021, treeless areas decreased, areas of shrubs and pastures have increased. Based on the indicators obtained, it can be said that an increase in areas with high aerosol means a decrease in the NDVI index, which reflects the forest cover, that is, a weakening of the forest cover. Another object of study is the impact on the hydrological situation. Growth in areas with high aerosol in 2000 and 2020 is reflected in the length of the river network by class (grid code). Based on the histogram showing the study area, comparing 2000 and 2020, there was an increase in the river network of the 1st and 8th categories, while others decreased, but the total length increased by 31.77 km.

Key words : Aerosol, Forest, Grassland , Hidrology, NDVI

SOIL ASSESSMENT AND AGROECOLOGICAL CONDITIONS OF THE ECONOMIC REGIONS OF AZERBAIJAN

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ABSTRACT

The presence in Azerbaijan of 9 out of 11 climatic zones of the world has led to the formation of more types soils and various agro-ecological conditions. According to the vertical location of soil the plasticity of the relief, mountain-meadow, mountain-meadow forest, mountain-blak (chernozem)mountain-brown, mountain-yellow (Jeltozem), mountain-brown, mountain-chestnut, chernozem, jeltozem, brown, chestnut, brown, gray, gray-meadow alluvial-meadow, floodplain-meadow and swamp lands. On the territory of economic regions, there are 31 types of soils, 55 subtypes and their species diversity 1629. From the assessment of soil fertility, it is known that the most fertile are washed and carbonated mountain chernozem (100 points), mountain chernozem tipycal (98 points), mountain meadow (89 points). points), pseudopodzolic-gley - yellow (94 points), mountain-forest meadow and typical mountain-forest - brown (87 points). When assessing the natural fertility of the soil, the stock of humus, total nitrogen and total phosphorus (t / ha), absorbed bases in the 0-20, 0-50 and 0-100 cm soil layer, which has a close and good correlation with the biological productivity of cultivated agricultural plants (c In accordance with the increase in these indicators, credit scores should be increased. There are also soil indicators (deterioration of the granulometric composition and the amount of salts), their excessive increase leads to a decrease in the fertility and productivity of cultivated agricultural plants. At this time, the increase in these indicators should be reduced in proportion to credit scores. The optimal level of soil reaction and carbonization determines fertility and productivity. Decreases and increases from the optimal indicator equally and negatively affect the decrease in fertility and the decrease in plant productivity. The agro-ecological conditions of the country and its individual economic regions have been studied, and for the first time an assessment of agro-ecological indicators in terms of soil fertility has been given. In addition, agro-ecological characteristics of economic regions, plastics, water bodies, flora and fauna, and cultivated crops are widely reported. According to the results of soil and agro-ecological conditions of Sheki-Zakatal (100) and Guba-Khachmaz (99) economic regions are more favorable for agricultural production. The soils and agro-ecological conditions of the Baku (46) and Absheron-Khizi (59) economic regions are extremely unfavorable for agricultural production.

Keywords: *economic region, soil, agro ecological, flora, fauna, agriculture, fertility*

LAND USE IN CONFLICT AND POST-CONFLICT PERIODS

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ABSTRACT

As in the whole world, in our country, soil has always been a means of production that provides people with food. Today, several conflicts and wars are taking place according to land all over the world. In any case, the most serious damage to nature in the background of wars is manifested in the soil cover. So, in the conditions of Azerbaijan, this has existed in our practice. Twenty percent of Azerbaijani lands were occupied by Armenians since 1992. Before the occupation, the lands were mainly concentrated in the state land fund and were used mainly for farming and animal husbandry in various fields of agriculture. Since the beginning of the war and the conflict, the occupation policy of the Armenians has already shown its negative impact on twenty percent of the lands. Thus, various arable areas have been degraded under the name of military training grounds, trenches of various purposes and spontaneous infrastructure projects. The destruction of biodiversity in the occupied territories to a certain extent is impoverished against the background of destruction of forests in those territories, spontaneous cutting and sometimes burning of areas used as bushland. According to the obtained information, thousands of hectares of land in these areas by both Azerbaijan and Armenia reflect the tragic consequences of the war. Lands are subject to military erosion, their fertility has been destroyed by the firing of thousands of shells. During the period of occupation, the lands used under perennial crops were almost entirely involved in the cycle of illegal use. In general, no agro technical, agro reclamation or any other soil improvement measures were carried out in the occupied lands during that period. As we know, every conflict flares up again in the course of historical periods and no doubt continues to affect the land. In 2020, Azerbaijan liberated its territories from occupation in the name of the Second Karabakh War. Immediately after the end of the war, new approaches began to be applied to the lands freed from occupation in our country. Despite the fact that some areas were completely mined by the Armenians, the lands are partially cleared and immediately involved in the agricultural cycle.

Agriculture and land use methodology based on innovative technologies are applied in new areas freed from war conditions. Azerbaijan's method of using territories freed from occupation in the post-conflict period is almost highly appreciated. In our opinion, the application of the Azerbaijani method on lands of this category around the world can give a successful result.

Keywords: soil, agriculture, conflict, post-conflict

THE CURRENT STATUS OF UTILIZING SURFACE WATER RESOURCES IN THE KURA RIVER BASIN

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SUMMARY

During modern times, the significant scientific importance lies in the pollution and problems caused by contaminants and pollutants in natural components, particularly water resources. In this context, the article explores the issues arising from the utilization of surface water resources in the Kura River basin, which serves as the main water artery in Azerbaijan, a country with limited water resources. The article also analyzes the current status of utilizing the Kura River basin for various purposes.

A comprehensive evaluation of Azerbaijan's surface water resources, particularly those in the Kura River basin, was conducted before assessing the surface water resources in terms of their exploitation for economic activities, including the assessment of the availability of water resources required for domestic and agricultural use. The analysis revealed that 68% of Azerbaijan's total water resources (31 thousand cubic kilometers) are transboundary, with a significant portion flowing through the Kura River basin. The location and significance of the Kura basin within the water balance were also determined.

The analysis indicates that 44 out of 63 districts in Azerbaijan, accounting for 69.8%, 55 out of 78 cities (70.8%), 147 out of 261 towns (56.3%), and 2899 out of 4248 rural settlements (68.2%) are located within the Kura River basin and are actively engaged in various activities. The Kura River basin also holds great economic importance for agricultural activities in Azerbaijan. Research conducted in 2017 revealed that 81.6% of the total cultivated area, 77.8% of irrigated and rain-fed crops, 97.6% of technical crops, and 95.9% of cotton cultivation areas in Azerbaijan fall within the Kura River basin. It is noteworthy that in the arid climate zone of the Kura basin, more than 99.8% of the total cultivated area is used for irrigation agriculture.

The analysis also highlighted the significant role of the Kura River basin in ensuring food security, with 77.8% of cultivated land for cereal and mixed farming, 55.6% for meat production, and 73.3% for water production being attributed to the basin. This emphasizes the strategic importance of the basin in terms of water resources and territorial considerations for the Republic. The analysis further underscores the need for the effective utilization of the basin's water resources, elimination of potential risks in the context of global climate change, and the development of a comprehensive utilization strategy in collaboration with the countries of the South Caucasus region, given its location in the downstream part of the Transcaucasian region.

Keywords; surface water resource, basin, climatic changes, transit river, river flow, The South Caucasus region, hydrological observation, ecological flux, water scarcity, anthropogenic factors

REMOTE SENSING STUDY OF WIND ENERGY POTENTIAL IN AGSU DISTRICT

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ABSTRACT

The study begins by assessing the geographical and meteorological conditions that contribute to the region's wind resources. Agsu benefits from its location in a hilly terrain, which accelerates wind speeds due to channeling effects. The prevailing winds, influenced by regional climate patterns, are favorable for wind energy production. Historical wind data and simulations are analyzed to estimate the average wind speed and direction, which are crucial factors in determining the viability of wind projects.

Natural resources is the main self-supplying way which is being studied in paper. Ecological clean and independent clean energy stock is wind one. Furthermore, the abstract presents an overview of the existing infrastructure and policies related to renewable energy in Azerbaijan. The country has demonstrated a commitment to diversifying its energy mix and reducing reliance on fossil fuels. The government has implemented supportive regulations, such as feed-in tariffs and incentives, to attract investment in renewable energy projects, including wind power. The potential benefits of wind energy development in Agsu are discussed, including environmental advantages such as reduced greenhouse gas emissions and enhanced energy security. The economic benefits, such as job creation and increased local investment, are also highlighted.

Finally, the abstract addresses the challenges and considerations associated with harnessing the wind potential in Agsu. These include the need for appropriate site selection, potential impacts on local ecosystems, and the integration of wind power into the existing grid infrastructure. Technological advancements, such as improved turbine efficiency and storage systems, are identified as key factors in optimizing wind energy generation.

This potential is firstly studied by applying remote sensing way. In any coordinate of the district wind energy potential has been determined by measuring the potential applying radar technique which give possibility to reveal 2 D view. At several heights including 10,50,100,150,200 m^s the measurements have been realized. The achievable power generation for m² in the district was calculated. Daily, hourly and monthly wind energy potential data were graphed and schemed in the paper. Energy, environmental, economical advantages of wind energy for Agsu district was investigated by analyzing radar spectral measurements after remote sensing process. Agsu region in Azerbaijan offers substantial wind potential that can contribute to the country's renewable energy goals. With the supportive policy framework and growing interest in wind power, further exploration and development of this resource can lead to a sustainable and clean energy future for Azerbaijan.

Keywords — wind potential, spectral radar analysis, ecological clean energy, ecological safety

METHODOLOGY OF PREPARATION OF SOIL-GEOLOGICAL MAPS

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ABSTRACT

The article reflects the methodology for compiling soil-geological maps. Soil-geological maps are divided into 4 types: analytical, synthetic, general and particular. Taking into account the purpose of the maps, the requirements for design and the complexity of the soil and geological conditions of the area, the level of their accuracy and scale are determined. The scale of soil-geological maps was small, medium, large, and mostly large.

Keywords: soil-geological maps, scale, horizontals, heights, design, geological conditions

CALIBRATING TMS-4 SENSORS FOR CONTINUOUS MONITORING OF SOIL WATER CONTENT AND ASSESSING EFFECTS OF COMPOST AMENDMENT ON SENSOR PERFORMANCE

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ABSTRACT

Continuous monitoring of soil water content (SWC) using automated sensors is widely employed for research and practice. Promising among these sensors are the TMS-4 sensors by Tomst Inc. due to their convenience, independence, long battery life, and affordability. They measure SWC in surface layer (14 cm), soil temperature and air temperature (1 and 15 cm above the soil surface), making them suitable for monitoring microclimate changes induced e.g. by mulching.

However sensor's accuracy and precision can be affected by the sensor-to-sensor differences or by various soil conditions including installation mistakes. Aim of this study was to carry out the individual sensor calibration for soil of research locality in Velké Hostěrádky in order i) to improve the precision of the measurements compared to factory calibration; ii) to evaluate the sensor precision by using four brand new sensors; iii) to evaluate the sensor accuracy affected by organic matter (compost) added to the soil. In addition, obtained calibration equations were used to evaluate field measurement at the locality over 8 months.

Soil was repacked into calibration container to achieve a target dry bulk density of 1.37 g/cm³, matching the natural field value, in prepared SWC levels from 0 % to 35 %. Real SWC and BD were determined by gravimetric method (in 5 repetitions for each SWC).

Results showed significant differences between factory and individual calibration. While factory calibration was based on quadratic equations, we found logarithmic equations more reliable. One of the four tested sensors performed differently from the others. Finally, compost admixture (equivalent of 20 t/ha) has influence on sensor performance. TMS-4 signal has significantly lower values for the soil amended by compost, especially in the dry range.

In conclusion, TMS-4 sensors are recommended but should be used with an adequate number of repetitions and tested before field application.

Keywords: Compost, Microclimate, Soil temperature, Soil water content, Time Domain Transmissiometry, TMS-4 sensors

ASSESSING SOIL QUALITY IN THE CZECH REPUBLIC: A COMPARISON OF TRADITIONAL SOIL PROTECTION CLASSES WITH SOIL QUALITY INDEX CALCULATED BY UTILIZING THE BEST-WORST METHOD

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ABSTRACT

Soil quality is the capacity of soil to provide ecosystem services. However quantification of soil quality is not easy as there is no standard for it, as the term can vary according to purpose of that quantification. In the Czech Republic is traditionally used system of five soil protection classes of agricultural land that are assigned for the purpose of protecting fertile soils, ensuring agricultural production and protecting the environment. The classes are based on Evaluated Soil Ecological Units (ESEU), they have assigned standardized yield score and soil pricing is derived from these attributes.

As an alternative, this study developed a Soil Quality Index (SQI) for a 4290 km² area in the Central Bohemia Region, comparing it with the soil protection classes. Using data from 278 sampling points in the countrywide database Systematic Soil Survey (1961-1970) along with ESEU information, 15 standardized soil quality indicators (geographical, physical, and chemical properties) were utilized in linear combination method to calculate SQI. Best-Worst Method was used to assign weights to soil quality indicators by pairwise comparison of the best indicator to others and the worst indicator to others and in the end.

The resulting map of SQI was generated using the Radial Basis Function (Completely Regularized Spline) with the lowest root mean square error. The SQI map exhibited a high level of resemblance to the current soil protection classes. The tested Best-Worst Method proved to be a viable alternative for soil evaluation in the Czech Republic, slightly outperforming the previously published Analytical Hierarchical Process.

The findings demonstrate the applicability of the Best-Worst Method in enhancing soil evaluation practices, providing valuable insights for researchers and policymakers. This research contributes to the advancement of soil quality assessment methodologies, with implications for improved soil management and decision-making processes.

Keywords: Analytical hierarchical Process, Best-worst method, Evaluated Soil Ecological Units, GIS, Linear combination method, Multicriteria decision analysis, Systematic soil survey.

FERTILITY STUDY OF THE SOILS OF PLAIN AREAS IN THE ORDUBAD ADMINISTRATIVE REGION

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Ordubad administrative district borders Armenia to the Northeast, The Islamic Republic of Iran to the South, and Julfa administrative district to the West. The main reason for the small number of fertile and agricultural lands in the territory of the administrative region is that, most of the region consists of high and steep mountains, and at the same time, as a result of seasonal water erosion, the soil cover of the Ordubad sloping plain is covered with stones of different sizes. Thus, in general, 6.4% of the fertile lands included in the territory of the Nakhchivan Autonomous Republic belong to the mentioned administrative region. The productivity of ephemerals in the plots is in the middle and end of May, and the productivity of wormwood and soronotus coincides with the end of September and mid-October. In the plain area of the administrative district - alluvial-flooding soils on the river banks, light chesnut-brown, chestnut-brown soils from the rivers banks to the mountains, alluvial-flooding, marshy-meadow on the banks of the Araz River, and in the center of the sloping plain there are large stony areas, stony-pebble brown, gray-brown soils. As a result of the analysis of the samples taken from the soil sections placed in the research area, it was determined that the amount of humus in the upper accumulative layer of alluvial-flooding soils is 1.34%, the amount of total nitrogen is 0.09%, the amount of active phosphorus (P_2O_5) is 13.17 kg/hectares, exchange the amount of potassium (K_2O) was -223 mg/kg, pH indicator - 8.6. Accordingly, in gray-brown soils, the amount of humus in the top layer of the profile was 2.09%, the amount of total nitrogen was 0.1%, P_2O_5 - 3.44 kg/hectares, K_2O - 494 mg/kg, the reaction of the soil solution was 8.18, the amount of humus in the chesnut-brown soils is 1.39%, the amount of nitrogen is 0.04%, P_2O_5 is 74.43 kg/hectares, K_2O is 132 mg/kg, and the acidity of the environment (pH) is 8.03. Based on the stock materials of the soil cover of the study area and the results of personal field-soil and laboratory studies, the modern fertility characteristics were estimated.

Key words: Alluvial-flooding, Chestnut-brown soils, Fertility indicators, Gray-brown soils, Ordubad region

STUDY OF THE WATER-PHUSICAL CHARACTERS IN THE IRRIGATED SOILS OF MUGHAN PLAIN (COTTON, GRAIN PLANT)

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ABSTRACT

The comprehensive data about change of some water-physical characters under different plants in the anciently irrigated meadow –grey soils have been given in the article. It was determined that pH index was 7.6-8.0 in the soils of the fields where the cotton was planted; but it was 8.1-8.5 in the areas with the barley; it was 7.8-8.5 in the field with wheat.

An average value of salt was 0.250-0.769% at 0-100cm of layer in the area with the cotton plant, but it was 0.56-1.13% in the area with barley and 0.235-0.852% in the field with wheat.

The water mineralization which is used for plants irrigation was 0.84-0.98g/l; this indicator was 3.69-5.92-7.14g/l in drains and 3.24-2.78g/l in the water reservoir during the research. The fact that minerality of water used for irrigation is less than 1.0g/l indicates that it is suitable for watering plants.

A quantity of physical clay in the soils of the experimental areas was studied and their change by 32.28-63.80% along the profile shows the soils are light loamy and clayey. The soils are salinized to a weak, moderate, strong degree and they are weakly solonchified.

Key words: irrigated soils, physical clay, salinized soils, pH, water mineralization

ECOGEOGRAPHICAL CHARACTERIZATION OF LIBERATED ARAZBOYU TERRITORIES THROUGH GIS TECHNOLOGIES

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ABSTRACT

During the period of occupation of the territories of Arazboyu, agricultural land areas were not used for years, were not planted and cultivated, agricultural objects were destroyed, and thousands of hectares of arable land became unusable. Producing competitive agricultural products and forming a processing sector based on the principles of sustainable development in the liberated territories is considered one of the important issues ahead. All this makes it important to study the modern natural-soil-ecological conditions of the liberated Arazboyu territories. The territory of Zangilan, Jabrayil and Fuzuli districts included in the Arazboyu strip was taken as the research object, the total area is 3,142 km². Based on the purpose of the research, we collected and analyzed the literature and fund materials about the natural-ecological conditions and land cover of the Arazboyu territories liberated from occupation. At the next stage, using satellite data, 5 maps of the research area - height, inclination, isoline, salience and polar maps - were drawn up based on GIS technologies. According to the altitude map of the area, the altitude of the Arazboyu strip varies from 76 m to 2240 m above sea level. According to the prepared inclination map, 78.9% of the total area has an inclination indicator of less than 9 degrees. Steep slopes are a minority relative to the total area. 35% (108145 hectares) of the total area of the territories of the liberated-from-occupation Arazboyu strip has a slope of 0-2.56°, 13.4% (41206 hectares) has a slope of 9.1-17.9°, 6% (17531.7 hectares) is located at 17-30° inclination, and 1.7% (5304.6) is located at 29-65° inclination. The compiled polar map allows to obtain detailed information about the dip of slope, which affects all areas of people's economic activity in the study area.

Keywords: Evaluation scales, GIS technologies, relief, height, inclination and polar map, isolines

LAND ADMINISTRATION FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

The land administration system (LAS) provides the country with the infrastructure to implement the land policy and land management strategy. In modern administration, land contains land resources, buildings and also water environment. The land administration paradigm can be used by any organization, especially national governments, to design, conceptualize, and monitor their LAS. In order to achieve sustainable development of land administration, cadastral work, land registration and mapping should be based. These processes require a strategically integrated approach to implement or facilitate the four main functions of land management – land entrepreneurship, land valuation, land use and land use development. The land governance paradigm encourages developed countries to achieve highly organized governance, while encouraging developing countries to improve governance, often creating effective land markets, to reduce food and land insecurity. Regardless of whether countries use private property as the basis of their land rights, land security and land governance are the most important imperatives for the new role of land administration in supporting sustainable development. Regardless of whether the country is an economically developed country, it is important to improve and improve the existing systems. Thus, the Article deals with developing the ability of land administration to manage change. Jalilabad cadastral district has been selected as the research area.

Keywords: Land management systems, Land policy, Capital, Cadastre, Spatial information infrastructure.

ECOLOGICAL PARAMETERS OF MALLOW SPECIES IN PASTURES AND MEADOWS

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ABSTRACT

Describes the distribution of the mallow species in pastures and meadows of the Ganja-Gazakh geographical region and its ecological and biological characteristics. Grassland vegetation is divided into five subtypes, fourteen formation classes, forty-three formations, and fifty-two associations. At this time, Malva species were involved as a component. Malva nicaeensis along with Elitrigiacaespitosa, Cynodondactylon and other plants in the plain, low, and medium mountain meadows, and Myricariabracteata, Juncus effusus, J. compressus, Carex acutiformis, Xanthium spinosum and other species along the rivers of the area in the sub-layer along with other species it is rarely found. In the river flood meadow, according to the density of vegetation, the species are grouped into two main groups and seven subgroups, and according to the height, into two main groups and seven subgroups. A cluster analysis was carried out for the density and height of plants of grass-villous-equigranularity mesophilic meadows. According to density, the plants are grouped into 2 main and 7 subgroups; according to height, the plants are grouped into 2 main and 5 subgroups. There are relatively many mallow species in this meadow. In the second half of summer, at the end of July, and at the beginning of August, the meadow has a maximum height (40-60 cm) and the highest productivity. In August and early September, the vegetation and flowering of the variety with a long root system continue. Forest dry meadows are chosen because of their more xeromorphic floristic composition and lower density of vegetation than the meadows described above. The meadows described by us are used as pastures and mowing. Although we learned about the existence of mallow species in these meadows, now they are not found.

Key words: mallow species, soil profile, plants, mountain meadow soils

HOW CAN CIRCULAR ECONOMY AND ZERO WASTE CONCEPTS ACT AS CATALYSTS FOR BALANCED ECOSYSTEMS AND AGROECOLOGY

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ABSTRACT

The circular economy and zero waste concepts, central to sustainable resource management, offer innovative approaches that can harmoniously integrate into ecosystems and agroecology. This study explores the transformative potential of these concepts in fostering balanced ecosystems and sustainable agricultural practices, ultimately contributing to soil health and conservation. A circular economy underscores the importance of resource optimization, emphasizing waste reduction and viewing waste as a resource rather than a disposal issue. When applied to waste management, this concept results in waste to energy and biorefinery technologies, turning waste into valuable resources like biochar and digestate. These byproducts can enhance soil fertility, promote plant growth, facilitate soil reclamation, and support balanced ecosystems. Similarly, the zero-waste concept propounds eliminating waste through responsible consumption and efficient recycling and composting strategies. Applying this principle in agroecology can substantially mitigate the impact of agricultural waste on the environment. Anaerobic digestion and pyrolysis manage waste and generate bioenergy and nutrient-rich amendments that can supplement soil and improve plant nutrition. Moreover, these strategies help mitigate climate change by reducing landfill waste and associated greenhouse gas emissions, preserving soil health, and promoting carbon sequestration in agricultural soils. In conclusion, we can catalyze sustainable transformations in ecosystems and agroecology by interweaving circular economy principles and zero waste. These approaches serve as strategic levers to maintain soil health, improve resource efficiency, and combat climate change, paving the way for a sustainable future.

Keywords: Circular economy; Zero waste; Soil health and improvement; Ecosystem; Agroecology

GREY BROWN SOILS IN ABSHERON, AZERBAIJAN: CHARACTERISTICS, FORMATION PROCESSES, AND LAND MANAGEMENT IMPLICATIONS

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ABSTRACT

Grey Brown Soils are important soil resources found in the Absheron region of Azerbaijan. Understanding their characteristics, formation processes, and land management implications is crucial for sustainable land use and agricultural practices in the region. This study aimed to investigate the properties and factors influencing the development of Grey Brown Soils and provide insights for effective soil management.

The research involved comprehensive soil sampling and laboratory analyses to determine the physical, chemical, and biological properties of Grey Brown Soils. The study also examined the influence of climate, parent material, and land use practices on the formation processes of these soils. Additionally, the implications of these findings for land management and agricultural practices were explored.

The results revealed that Grey Brown Soils in the Absheron region have a loamy to clayey texture with good water retention and adequate drainage. They exhibit a well-developed granular or crumb structure, promoting root growth and aeration. The soils displayed a grayish-brown color, indicating their composition of organic matter, iron, and other minerals. The chemical analysis showed a near-neutral to slightly alkaline pH, moderate to high organic matter content, and a moderate to high cation exchange capacity (CEC). These properties contribute to soil fertility, nutrient availability, and water-holding capacity.

The formation of Grey Brown Soils is influenced by the region's semi-arid climate, characterized by low rainfall and high evaporation rates. Limited precipitation and high evapotranspiration lead to leaching processes and the accumulation of organic matter in these soils. The parent material of Grey Brown Soils consists of alluvial and marine sediments composed of clay, silt, sand, and organic materials. Human activities, such as land clearance, cultivation, and fertilizer application, affect soil development processes. Improper land management practices can result in soil degradation, erosion, and fertility loss.

In conclusion, this study provides valuable insights into the characteristics, formation processes, and land management implications of Grey Brown Soils in the Absheron region of Azerbaijan. The findings highlight the importance of adopting sustainable soil management practices, soil conservation measures, and organic amendments to optimize soil health and agricultural productivity. These findings contribute to the development of effective strategies for the sustainable use of Grey Brown Soils and ensure the long-term viability of agricultural systems in the region.

Keywords: Grey Brown Soils, Absheron, Azerbaijan, soil characteristics, formation processes, land management,.

STUDY OF THE IRRIGATED LANDS OF THE GARABAGH PLAIN

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ABSTRACT

The most important factor in the development of grain farming in the Garabagh plain is land irrigation. Part of the non-irrigated land is used for arable land, and the rest is used for pastures and hayfields. The total area of non-irrigated agricultural land is 235052.91 hectares in the Garabagh plain, which is 57.68% of agricultural land. The total area of irrigated land is 172431.08 ha, which is 42.32% of agricultural land in the study area. Of these lands, 106973 ha or 62.03% are “irrigated”, 65,458.08 ha or 37.96% are “anciently irrigated” lands. The irrigated lands of the Garabagh plain have different weight both in terms of soil subtypes and within soils. From the analysis of field indicators of the lands of the Garabagh plain, it can be seen that the largest indicator of irrigated lands falls on light chestnut (46165.96 ha), chestnut (37984.41 ha) and light meadow gray (36290.08 ha) soils.

An analysis of the distribution of irrigated lands by administrative regions shows that the largest part of them is concentrated in Aghjabadi region (57592.78 ha). For other regions, this indicator is distributed as follows: Aghdam (46121.75 ha); Barda (42726.9 ha); Tartar (25989.65 ha). The share of irrigation also differs within the soil subtypes distributed across administrative regions. 27549.01 hectares of the irrigated land in Aghdam region is light chestnut soils. Most of the irrigated lands in Aghjabadi (16747.53 ha) and Barda region (19542.55 ha) are due to light meadow-gray soils. Only 12,623.36 hectares of irrigated land in Tartar region is covered by chestnut soils.

In other lands, the specific weight of irrigated lands by administrative regions was as follows: Aghdam: dark chestnut (1504,45 ha), chestnut (15694,69 ha), meadow-chestnut (1072,9 ha). Aghjabadi: dark chestnut (506,65 ha), chestnut (8577,66 ha), light chestnut (11505,61 ha), gray-brown (683,10 ha), meadow-gray (2882,9), light meadow-gray (3972,5 ha), dark meadow-gray (3893,25 ha), ordinary meadow-gray (8823,58 ha). Barda: chestnut (1088,7 ha), light chestnut (414,5 ha), gray-brown (453,3 ha), dark meadow-gray (7561,98 ha), ordinary meadow-gray (13665,87 ha). Tartar: light chestnut (6696,84 ha), meadow-chestnut (4475,25 ha), light meadow-gray (2194,21 ha). Thus, the analysis of irrigated lands both by soil subtypes and by administrative regions shows that the Garabagh plain has sufficient area potential for the development of grain farming under irrigation.

Keywords: *Garabagh plain, irrigation, grain production, gray-brown soils*

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EVALUATION OF CLOSED DRAINAGE FROM AN ECOLOGICAL ASPECT

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ABSTRACT

This article is devoted to the drainage effect of existing closed tubular drains, their role in regulation of groundwater table, removal out of the mineralized drainage water from the area, prevention of repeated salinization of the soil by studying the effects of desalination in the active soil layer, determination of the optimal water-salt regime and the impact of drainage on the environment, environmental advantages of closed drainage compared to open drainage the territory of the Azerbaijan Republic.

It was shown that on irrigated lands, where about 80-90% of agricultural products were produced, the soils were subjected to repeated salinization as a result of the proximity of mineralized groundwater to the Earth's surface, a weak degree of natural drainage or its absence. The main means of combating soil salinization is their leaching against the background of drainage. Reclamation improvement of these lands, their return to crop rotation, restoration of their ecological balance, development of reliable methods of combating salinization in various natural and economic conditions is one of the most important tasks facing reclamation science.

It has been recognized that, unlike open drains, there is no loss of arable land on lands where covered drains are built. In order to ensure the normal operation of open drains, a lot of public funds are spent every year to remove sludge, environmental conditions are disturbed. Therefore, the gradual replacement of open drains and collectors with closed networks in the reconstruction of irrigation systems should be considered as an important component of agricultural ecology. In addition, in the article has been indicated that drainage protects the normal ecological environment of the area, and also ensures the sustainable agricultural production. Also the system of economic and technical measures for improvement of the unsuitable natural conditions for the efficient use of the land, the implemented amelioration measures by regulating the water, air, food and heat regimes of the land were discussed.

Keywords: irrigation, open drainage, closed drainage, collector-drainage system, groundwater regime, salinization, mineralization.

THE SOIL RESEARCH CONDUCTED AROUND THE MAIN MIL-MUGAN RESERVOIR

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ABSTRACT

The restoration and preservation of the fertility of every inch of soil of our country is the priority direction of the Institute of Soil Science and Agrochemistry. For this purpose, it is necessary to carry out complex research works in order to determine the causes of land reclamation affecting the fertility of the Kura-Araz plain. Failure to fully comply with agro-technical rules, unsystematic felling of forests, failure to use irrigation water sparingly and efficiently, in-farm irrigation and collector-drainage network that was in the balance of collective farms, state farms, and agricultural enterprises falling into disrepair due to neglect, etc. caused the acceleration of the erosion and salinization process.

For this purpose, in recent years, a number of local scientific research works have been carried out in the Kura-Araz plain in the direction of saline soil melioration at the Institute of Soil Science and Agrochemistry. Thus, an expedition was organized on the topic of "Study of the modern condition of the Main Mil-Karabagh, Main Mil-Mugan, Main Shirvan collectors and the lands served by them and ways to increase the efficiency of water use in Kura-Araz". The expedition was carried out on 01.11.2011-30.11.2011, and fifty employees of the institute were involved in field-camera and laboratory research. Soil and water samples taken for the purpose of assessing the suitability of collector-drainage water for irrigation were chemically analyzed. Water quality assessment based on total water minerality, sodium relative potential ratio (SAR), magnesium content, alkalinity, salt cation ratio, etc. were analyzed and relevant conclusions were drawn. At the same time, according to the results of chemical analysis of the soil samples taken from the influence zone of the Main Mil-Mugan Collector, the soils of the area were evaluated and it was concluded that these areas are mainly chloride-sulfate type weak and moderately salinized soils.

Key words: Collector-drainage, soil, salinization, meliorization, irrigation channel.

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**THE EFFECT OF EROSION ON THE NATURAL-ECOLOGICAL
CONDITIONS OF THE MOUNTAIN GRAY-BROWN (CHESTNUT)
SOILS UNDER THE PERENNIAL GRAPE PLANT IN THE
SHAMKIRCHAY RESERVOIR BASIN**

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SUMMARY

In the article, the analysis, dynamics and comparative characteristics of the current state of the erosion process in the underdeveloped mountain gray-brown (chestnut) soil under grapevines in the Shamkirchay reservoir basin on the northeastern slope of the Lesser Caucasus, the diagnostic indicators and fertility parameters of arable soils are given. the effect of the erosion process is shown. In the article, the soil samples taken from the soil sections placed in the characteristic places of the research area were analyzed by modern methods, chemical analyzes were carried out, and the obtained results were specified by mathematical and statistical methods. In order to improve soil erosion protection in the research area, the study of the amount of nitrogen, activated phosphorus and exchangeable potassium under the grape plant was also studied.

Key words: mountain gray-brown (chestnut), erosion process, soil sections, arable soils, diagnostic index, fertility parameters

ECOLOGICAL CHARACTERISTICS OF SAFARI PARK LANDS IN THE GREATER CAUCASUS PROVINCE

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ABSTRACT

Ecotourism, known for its commitment to environmental care and sustainability, is a form of tourism that prioritizes the preservation of natural resources and minimizes harm to the environment. One popular variant of ecotourism in modern times is safari tourism, and nestled in Shamakhi lies the exclusive safari park, the sole one of its kind in the Greater Caucasus. The park's elevated location significantly influences its climate, resulting in a diverse range of climatic conditions.

The park's complex ecological factors, including its mountainous relief, shifting climatic patterns with altitude, distinct vegetation, and rocky landscapes, have contributed to the formation of diverse soil types throughout its territory. Noteworthy soil types prevalent in the park include mountain-meadow (consisting of dense-grass and cultivated subtypes), mountain-meadow-forest, brown mountain-forest (typical, carbonate fossil, grassy, and gray subtypes), decayed-carbonate mountain-forest (typical, dark, and gray subtypes), brown mountain-forest (typical, carbonated, and gray subtypes), among others. Moreover, the park boasts a remarkable presence of valuable tree species such as hornbeam, oak, and yew, further enhancing its ecological richness.

The management of the park has taken significant measures to safeguard its integrity and protect its wildlife. Currently, approximately 830 hectares, out of the park's total area of 1040 hectares, have been meticulously fenced in accordance with rigorous international standards. The park is currently home to an impressive assortment of 1207 animals, including red deer, mouflons, deer, Altai deer, llamas, and alpacas. To cater to the needs of these diverse species, the park has been thoughtfully divided into 24 distinct sections, each tailored to accommodate specific breeds and population sizes.

It is worth noting that ecotourism can be practiced responsibly, without causing any harm to the local fauna and flora. By adhering to strategic guidelines and regulations, ecotourism emerges as a reliable and sustainable form of tourism.

Keywords: ecotourism, environmental care, safari tourism, sustainability.

LANDSLIDE SUSCEPTIBILITY ASSESSMENT OF SALT RANGE USING BIVARIATE STATISTICAL WEIGHT OF EVIDENCE METHOD BY USING GEOSPATIAL TECHNIQUES

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ABSTRACT

This study aimed to distinguish the landslide-inclined regions in the Jhelum and Chakwal regions of the Punjab region using the Bivariate statistical weight of evidence method. For Landslide hazard evaluation, the initial step was to set up a landslide inventory guide. Relevant criteria regarding landslide hazard i.e. slope, aspect, plan curvature, profile curvature, distance from the stream, and lithology that backs land sliding were extracted from Digital Elevation Model in GIS & Remote sensing environment. In order to assure geohazard mapping as impartial and reproducible by taking into account the moderate level resolution of some parameters, it was decided to pursue a quantitative probabilistic (statistical) approach. Accordingly, after balancing several decision criteria the bivariate-statistical Weight of Evidence (WofE) method has been materialized. The spatial division of landslides is an aftereffect of the association of numerous parameters. A solid and exact powerlessness map relies upon the incorporation and appropriate determination of the part of these parameters. All weight esteem maps were joined to deliver a last yield. different development organizations to comprehend the risk of Landslides in the concerned region.

The consequences of the whole examinations and assessment permitted to separate the study region into three zones of powerlessness, low (29.04%), medium (33.75%), and high (3.63%). The last guide delivered utilizing the bivariate measurable (WofE) technique demonstrates that the southern parts of the study range are perilous as there are uncovered slants of more than 45 degrees here. The Landslide defencelessness guide is accepted to be valuable for recognizing slant areas at risk to land sliding on a relative basis. All weight value maps were combined to produce a final output. Final values were reclassified into four classes' i.e. no hazard, low hazard, moderate hazard, and high hazard. This output shows that lithology, aspect, and slope has major contribution while other rasters have minor.

Keywords: Bivariate Analysis, Digital Elevation Model, Hazard, Landslides Disaster

APPROPRIATE AGRICULTURAL SITE SELECTION BY USING RS AND GIS TECHNOLOGY (SOIL AND HYDROLOGY PARAMETERS) FOR CHOLISTAN REGION

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ABSTRACT

This study is based on ideal agricultural land for a limited portion of Cholistan because of our growing population growth, which contributes to a shortage of resources like water, food, and money. The idea to irrigate a further portion of Cholistan with flood supplies from Panjnad Barrage through the Abbasia Link Canal developed in the middle of 1990. To obtain adequate land for agriculture, many methods are applied. A multi-criteria study was conducted to choose the best land for agriculture. Soil samples from various points were taken and tested in the laboratory. The soil samples comprise nine soil parameters, including Calcium, Nitrogen, Phosphorous, Potassium, organic matter, Iron, EC, PH, and Synthetic Absorption Ratio.

Each parameter is given a weight based on how these parameters are interpolated separately. Reclassified as suitable, moderate, and less-suitable agricultural land based on their relative weight. used the Analytical Hierarchy approach to define weighted. Consistency For the evaluation of the established criteria, ratio and index is defined. If the consistency ratio for the result is less than 0.10, the outcome is considered more dependable. Maps are produced as a result of the multi-criteria analysis used to determine if a piece of land is suitable for agriculture. The multi-criteria analysis result is more in line with the hypothesis when compared to the soil survey of Pakistan. Cholistan is a desert and it shows the variations in results due to soil nature. Based on our theory, around 70% of the results are correct. 55% of the land is appropriate for agriculture, 43% is intermediate, and the remaining 2% is unsuitable for agriculture.

Keywords: Agricultural Site Selection, Cholistan Region, Geospatial Technology, Hydrological Parameters, Soil Parameter

CURRENT STATUS AND EVALUATION OF SOILS OF THE LOWER AND MIDDLE MOUNTAIN BELT OF THE NORTH-EASTERN PART OF THE GREATER CAUCASUS

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ABSTRACT

In our republic, forest ecosystems have undergone significant changes both in mountainous and lowland areas. On the territory of the northeastern slope of the Greater Caucasus within Azerbaijan, the forest area is almost 15% of the entire territory of this zone, with most of the forests concentrated in the mountainous part. At present, due to the increased anthropogenic impact on natural complexes, it is necessary to carefully study and evaluate the current state of natural landscapes and, first of all, the soils cover. Therefore, the study of the current state and the evaluation of forest soils in the study area is an important and timely task.

The object of research is forest soils of the middle and low-mountain parts of the northeastern slope of the Greater Caucasus with a total area of 98,400 thousand hectares. Based on the methodology, we carried out a grading according to the properties and diagnostic features of soils that correlate with the productivity of forest plantations. As the main evaluation criteria, the indicators of humus reserves, gross nitrogen, phosphorus, potassium and the amount of absorbed bases were chosen. The soil with the highest average values of these factors is taken as a standard and evaluated at 100 points, and the bonitet scores of other soils are calculated accordingly. As a standard for the assessment of forest soils in the study area, mountain-forest brown typical soils (Mollic Cambisols) were taken, which are characterized by the highest content of the selected indicators, so their quality score was taken as 100 points.

A comparative assessment of soils showed which soils are primarily in need of agrotechnical and reclamation measures to increase soil fertility. To preserve and restore the vegetation and soil cover, it is necessary to carry out protective measures, restore forest areas by planting tree species suitable for given environmental conditions.

Keywords: Anthropogenic impact, Erosion processes, Evaluation scores, Forest cover, Forest reclamation measures, Mountain-forest soils, Soil evaluation.

SOIL POLLUTION, CAUSES AND EFFECTS

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ABSTRACT

The presence of toxic chemicals in soil in sufficiently high concentrations that pose a threat to human health or the ecosystem leads to soil pollution. All soils contain a variety of naturally occurring compounds (pollutants). Such contaminants include metals, salts, inorganic ions, and many organic compounds. These compounds are mostly created by soil microbial activity and decomposition of organisms. Also, various compounds enter the soil from the atmosphere. These are rainwater, wind activity, surface water bodies, etc. Pollution occurs when the amount of pollutants in the soil exceeds the natural level. There are two main factors of soil pollution: anthropogenic factor and natural factors.

Keywords: Soil Pollution, Environment, Health, Anthropogenic, Ecosystem

AN IMPACT OF CLIMATIC CHANGE ON THE WATER BALANCE IN THE SELECTED SUB-BASINS IN CENTRAL RIFT VALLEY, ETHIOPIA

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ABSTRACT

Sub-Saharan Africa is a region sensitive to and highly affected by climate change. This study is focused on the Central Rift Valley Basin (CRVB), Ethiopia and explores the impacts of climate change on the major components of the water balance. The study basin (CRVB) is a vast closed area and thus it is divided into smaller sub-basins with known outlets (sub-basins: Ketar, Meki, and Shalla). The major components of the water balance are surface runoff (Q), water yield (WY) and evapotranspiration (ET). Projected climate data from the climate emission scenarios were used for the analyses. Representative Concentration Pathway (RCP) data from the MIROC-RCA4 ensemble driving climate models were downscaled, bias corrected and applied for the impact analyses. Climate scenario analyses for near term (2031-2060) and for long-term (2070-2099) periods were used to assess the conditions of the water balance components. The endo hydrogenic CRVB (divided into three sub-basins), and their respective hydroclimatic impacts were simulated with a calibrated Arc-SWAT (ArcGIS extension program used for basin modeling) models separately. SWAT (Soil Water Assessment Tool) is widely used model for analyzing the water balances of a basin using long-term meteorological and spatial data of a location. It is a physically-based deterministic, continuous, basin-scale simulation model (USDA). The future impacts simulated on the annual average basis are varying in the maximum ranges from -65.2% to +85.8% in Q, from -42.2% to +23.9% in WY and from -4.1% to +17.3% in ET compared to the baseline data outputs in the individual sub-basin. Water management options according to the water balance sensitivities to the climate impacts were proposed for each of the sub-basin. SWAT based studies aimed at a balanced water resources management in combination with agricultural practices within the CRVB are recommended for future applications.

Keywords: Arc-SWAT, Climate change; Climate scenario; Water balance sensitivity; Water management

¹³⁷Cs REDISTRIBUTION ON ARABLE LAND UNDER THE INFLUENCE OF DEFLATION

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ABSTRACT

In Belarus one of the types of soil degradation is deflation is the separation and transfer of soil particles by the wind. Deflationary processes are most pronounced in the southern part of Belarus because of the wide distribution of sandy and loose sandy, drained peat and degraded peat soils. Recently in the southern and southeastern regions of Belarus there has been an increase in the intensity of deflation, which occurred due to an increase in the frequency of droughts and dry events, especially in the spring. According to meteorological stations, since 1966 more than 350 cases of extreme deflation – dust storms – have been registered in Palesse.

The man-made disaster at the Chernobyl nuclear power plant, which led to the pollution of 23% of the territory of Belarus, significantly worsened the environmental situation. Deflationary processes contribute to the redistribution of radionuclides, having caused the emergence of new local centers of their increased concentration.

The objects of research were sod-podzolic sandy and loose sandy, peaty and degraded peat soils.

In order to determine the features of the horizontal migration of ¹³⁷Cs in 2022, route studies were conducted on the territory of the Gomel and Brest regions.

Soil sampling was carried by means of an agrochemical drill from the arable soil horizon. The specific activity of ¹³⁷Cs was determined on a γ - β -spectrometer MKS-AT1315. Instrumental measurement does not exceed 15%.

In the course of the research it was found that on sandy, loose sandy, peaty and degraded peat soils of arable lands, ¹³⁷Cs is redistributed with deflation processes. Along natural and anthropogenic barriers, zones of accumulation of deflationary material with a high content of the radionuclide are formed. On loose sandy soils the difference in pollution density between the transfer and accumulation zones reaches 30.0%, and on sandy soils - 45.0%.

The degree of exposure to deflationary processes is closely related to the degree of degradation of peat soils. On peat and peat-mineral soils the difference in pollution density between the transfer and accumulation zones is less than 37.5%, and on residual peat and post-peat soils it is more than 75.0%.

The zones of maximum accumulation of radionuclides correspond to the southeastern parts of the fields, because the prevailing wind directions. At the same time, it should be noted that the water regime plays a key role on organogenic soils. Often in fields with peat soils there are zones of constant waterlogging, from the surface of which there is practically no transfer of soil particles.

Keywords: ¹³⁷Cs, Deflation, Horizontal migration, Peat soil, Sandy soil.

POTENTIAL RISKS OF CROP PRODUCTION IN THE REPUBLIC OF BELARUS DURING THE APPEARANCE OF DROUGHTS AND ARID PHENOMENA

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ABSTRACT

The territory of Belarus is located in the zone of sufficient moisture, however, over the past decades, the likelihood of droughts and their duration have increased both due to global climate change (warming) and anthropogenic impact on the environment (land reclamation, disturbance of natural vegetation, drainage, etc.).

The appearance of droughts and arid phenomena negatively affects the change in biochemical, physical, chemical properties, primarily of cultivated soils, and also increases the trend of aridification of the territory and the deterioration of the water regime of agricultural lands by a sharp increase in evaporation from the arable horizon, depletes humus reserves, destroys the microaggregate composition soils, etc. All of that leads to a sharp drop in the productive capacity of soils, a decrease and even death of agricultural crops.

The total area of soils of the least resistant and weakly resistant to droughts and arid events in the composition of agricultural land in Belarus is about 1.5 million hectares (18.6%). More than 30% of such soils were found in the soil cover of 41 districts, and the majority of them are located in the central and southern Belarus.

In the course of the research a scale of potential risks of crop production in the event of droughts and arid events was created for the first time. It was based on the scoring of soil (the area of soils that are the least resistant and weakly resistant to droughts and arid events) and climatic (cartograms of the sum of temperatures above 10°C and the annual sum of precipitation) conditions, carried out according to the administrative regions of Belarus. It is proposed to consider the risk of crop production during the manifestation of droughts and 10°C to be considered low with a total score of ≤ 5 , medium - 6-7, high - 8-9, and very high - ≥ 10 points. It has been found out that the Brest, Kamenetsky, Braginsky, Vetkovsky, Dobrushsky, Narovlyansky, Khoiniksky, Berestovitsky, Volkovysk, Grodno, Svislochsky, Shchuchinsky, Bykhovsky, Slavgorod regions are characterized by a very high potential risk of the negative impact of droughts and arid events on crop production. In 42 districts, located mainly in the Gomel, Brest and Grodno regions, the potential risk is high, in 45 it is medium, in 17 districts - weak.

Keywords: aridification, droughts, risk

BASICS OF EFFICIENT USE OF LANDS OF SHABRAN-KHACHMAZ CADASTRAL REGION

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ABSTRACT

The study of the ecogeographic characteristics of the land is of particular importance due to the fact that the area is highly exploited from the point of view of agriculture and is subject to man-made influences in some areas. The relief of the territory of Azerbaijan, including the territory of the Shabran-Khachmaz cadastral district, is very complex. Therefore, the ecogeographical processes taking place in the country and in the research area also attract attention due to their complexity. Studying the ecogeographical problems of cadastral district lands, ecogeographical assessment based on GIS is quite relevant both theoretically and empirically. The result of these scientific studies will be a great support for increasing the fertility and management of the soils of the research area. It is considered an important condition to implement a number of measures in the direction of agrochemical analysis of soils, creation of drought-resistant varieties, expansion of the application of advanced irrigation technologies. In Azerbaijan, as in the whole world, the use of modern technologies should be expanded in order to reduce the negative effects of climate change on the agricultural sector, to use the existing land and water resources more efficiently. Human economic activity has accelerated exogenous processes in Shabran-Khachmaz cadastral district as well as in all areas. As a result of the consistent policy implemented by the state, the sustainable development of the agricultural sector is constantly increasing. However, in order to achieve sustainable development in this field, it is important to evaluate the current trends in the world and to establish the production of agricultural products according to today's challenges. The government of Azerbaijan, in turn, supports the development of climate-friendly agricultural systems. All these are important conditions for the efficient use of land and thereby increasing the fertility of land.

Keywords: Ecogeographic characteristics, Agricultural sector, Cadastre, Efficient use of land.

PROBLEMS OF PROTECTION OF ERODED BROWN MOUNTAIN-FOREST SOILS ON THE TERRITORY OF GOYGOL DISTRICT

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ABSTRACT

Soil erosion in our republic's ecological problem is sure to attract attention. Erosion is a Latin word (erosio) which means destruction by water or wind. According to the United Nations Environment Programme, 20 million hectares of land become unproductive or less economically efficient each year as a result of erosion and erosion-related degradation. Slope length and slope shape have a great influence on the progress of severe erosion. Studies show that a decrease in slope slope from 3⁰ to 2⁰ soil seepage per hectare from 6-19 m³ to 12 m³.

The Goygol area where we surveyed consists mainly of mountainous areas, so it is necessary to carry out forest reclamation measures mainly against erosion. As you know, forests are very important in the fight against erosion, as water regulators and as soil protectors against erosion. In forests, the soil structure is improved by the influence of the root systems of trees and shrubs. Increases dehydration capacity. Surface runoff becomes subsurface runoff, reducing water flow and flow. As a result, erosion is weakened and the amount of turbidity flowing into the river channel is reduced.

However, in the areas we studied, steep slope forests were deliberately cleared, weakening the role of forests in controlling erosion. The population should be aware that deforestation on steep slopes and river basins with the formation of erosion processes will dry up springs and disrupt the water balance of rivers.

Key words. ecoetic, erosion, fertility, forested soil, research.

ENVIRONMENTAL ASSESSMENT OF SOILS UNDER THE VINEYARDS OF THE GANJA-GAZAKH REGION OF AZERBAIJAN

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ABSTRACT

Azerbaijan is one of the ancient countries involved in the cultivation of grapes and its processing. The viticulture and wine-making agrarian industry occupies a special place, is becoming important for the country's economy in terms of economic rationality and the creation of additional value. Research in the direction of soil compliance with the environmental requirements of the grape plant was carried out by us in the Ganja-Gazakh region. In accordance with the purpose of the research, a mathematical and statistical analysis of indicators of soils, climate and relief was carried out, and bonitet points were determined based on soil fertility indicators of the territory by collecting materials from the latest research. On the basis of methodological guidelines for the environmental assessment of soils, special assessment scales were prepared according to the severity of individual signs of the ecological need of a grape plant; according to these scales, an ecological assessment of several types and subtypes of soils suitable for grapes in the study area was carried out. Based on the research, it was found that the study area has a high prospect for the development of viticulture and winemaking. As a result of the research, the main limiting factors were identified: for the foothill soils of the Ganja-Gazakh massif - slope steepness, erosion processes, leaching; for the soils of the plain zone - the aridity of the climate, heavy granulometric composition and soil salinity. The most favorable conditions for growing grapes are in the low-mountain and foothill zone of the Ganja-Gazakh region of the republic, the best soils for growing wine grapes are mountain gray-brown dark (92 points) and gray-brown dark (94 points) soils.

Keywords: Evaluation scales, Fertility, Grapes, Limiting factors, Soil assessment.

INFLUENCE OF SLOPE EXPOSURE ON THE PROPERTIES OF MOUNTAIN GRAY-BROWN ORDINARY SOILS IN THE NORTH-EASTERN PART OF THE SMALL KAVKASUS

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ABSTRACT

The object of research is the low-mountain part of the northeastern territory of the Lesser Caucasus, where a significant area is occupied by mountain gray-brown ordinary soils. The relief of the surface (300-500m) is represented by splayed foothills, ridge-hilly, mainly water-erosion accumulative landforms. Soil-forming deposits are represented by carbonate deluvial clay-loam deposits. Climatically, the object of study is characterized by warm winters, dry hot summers. The average annual air temperature ranges from 12.5-13.20C and the amount of precipitation is 350-400 mm.

Vegetation cover in favorable hydrothermal conditions, in the spring-autumn period, especially on the northwestern darkened exposures with sloping slopes, where there is optimal surface moisture, a well-developed herbaceous community prevails. The total biomass here is 12.7-18.3t/ha. In the southeastern, drier, sunny exposures with steep relief slopes, sagebrush-bearded and ephemeral communities are common. The value of phytomass is extremely low, varies within 5.2-9.5 t/ha.

In morphogenetic terms, mountain gray-brown ordinary soils that form on northwestern exposures are characterized by a clear differentiation of the profile, a well-aggregated humus horizon (AU=40-50cm), the presence of a carbonate-illuvial horizon (Bca=25-30cm), which are distinguished by a dense structure and rough structure with signs of clayey. In the upper horizons (AU=0-20cm) of soils, the humus value is 3.2-3.6%, with a gradual decrease in depth. The nitrogen content is 0.25-0.28%, the C:N ratio is 6.6-7.4. The absorption capacity is quite high (30.4-35.8 mmol-ekv). According to the soil profile, the pH value increases from 7.5 to 8.2. In the upper 0-20 cm layers, carbonates are leached, and in the middle soil horizons it is 9.5-12.0%. According to the granulometric composition of the soil, clayey and the content of physical clay (<0.01 mm) ranges from 55-67%.

It was revealed that in comparison with the northwestern darkened exposures of the slopes, in soils confined to the drier sunny slopes of the southeastern exposure, the thickness of the fine-earth and humus-accumulative horizon (AU=30-35cm), as well as the content of humus (2.2 -2.5%), nitrogen (0.18-0.20%), absorption capacity (20.2-24.7 mmol-ekv) and the granulometric composition (43-48%) of these soils becomes lighter.

CONTRIBUTION TO HEALTH OF THE ENVIRONMENT AND THE USE OF ORGANIC WASTE TO INCREASE SOIL FERTILITY IN AZERBAIJAN

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The use of organic waste in the form of biofertilizers for various crops in Azerbaijan is very relevant. At the same time, the problem of maintaining soil fertility is solved, taking into account environmental protection, when waste from the source of its pollution is converted into fertilizer valuable for plants. One such biofertilizer is manure. Under natural conditions, manure decomposes into humus, water, carbon dioxide, nitrogen, methane and ammonia. Gas is released into the atmosphere, and part of the water, under the influence of gravity, goes into the soil along with helminths and pathogens. At any time, the activity of pathogenic flora may increase, which will infect nearby plants. That is why it is impossible to throw away fresh manure without processing, which will direct the chemical processes in the right direction. Use as organic fertilizers - manure, safe in hygienic and veterinary and sanitary terms. It should be free of pathogens, weed seeds, heavy metals and pesticides in excess of the norm. After 8–12 months after formation, it loses its dangerous qualities. This property is used for natural disinfection. Manure storage facilities should be organized in such a way that harmful substances do not enter the soil and rivers, so that gas emissions into the atmosphere are minimal. During storage, manure goes through several stages and, depending on this, has different properties: fresh - inhibits the growth of crops, damages the roots, since it contains weed seeds, fungal spores, helminth eggs; semi-rotted - can only be used in the form of an aqueous solution, for example, during autumn digging; well-rotted - loose and light, suitable for fertilizing the soil in spring during digging; humus is the most useful organic fertilizer, which is used as a mulch and as a component of soil mixtures. Mulch is covering the soil between plants with sawdust, straw, small stones, fallen leaves. In its functions, it resembles the forest floor, which overheats and becomes humus.

Key words: fertility, environmental protection, biofertilizers, manure, soil mix, mulch, vermicompost, earthworms.









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