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THE FERTILITY OF THE MEADOW SOILS OF THE SHAHRIKHONSOY SPREAD AND ITS CHANGES UNDER THE INFLUENCE OF HUMAN FACTORS

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Abstract
This work is devoted to the assessment of the fertility of meadow saz soils in the upper part of the Shahrikhonsoy plain of East Fergana and its changes under the influence of the human factor. The study scientifically substantiates the fact that under irrigated farming conditions, agro-ameliorative measures such as land leveling, plowing, irrigation and salt leaching, drainage and fertilization significantly change the structure and main agrochemical properties of the soil, resulting in the formation of a new (different from natural) regime of soil formation processes. Field research was conducted on the basis of placing soil sections along a geochemical-geographical section and comparing them with analytical indicators. The results show that at the initial stage of irrigation and development, the mineralization of organic matter increases, and at subsequent stages, the amount of humus and nutrients can stabilize or increase due to agrotechnical measures and crop residues. The mechanical composition of the soils of the region is mainly medium and light loam, and the reclamation condition is satisfactory; due to the limited absorption of phosphorus, it is noted that it accumulates in the soil in various forms, and potassium has a relatively stable supply level. The results of the work are of practical importance for managing the fertility of irrigated lands, optimizing agrochemical supply, and planning reclamation measures in accordance with regional conditions.

Keywords: Meadow music soils; irrigation impact; soil fertility; humus; organic substance mineralization; fertilization; phosphorus fastening.

Introduction

In irrigated agriculture, the natural course and direction of soil formation are disrupted. Anthropogenic agrotechnical and land reclamation measures, such as land leveling, plowing, irrigation and salt leaching, drainage, and fertilizer application, have a very strong impact on the structure and properties of the soil. As a result, new conditions for soil formation arise that are sharply different from the conditions of its natural course. The fate of soils in new conditions

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depends on the correctness, quality, and agricultural culture of the complex of measures applied , which ultimately affects its productivity.

Fertility of soils varies according to natural conditions in different soil-climatic conditions due to extensive human influence. Based on this, the results obtained on the basis of the study of the productivity of the developing soils in each soil-climate conditions serve as an important scientific basis for their preservation and improvement.

Research object and methods

The object of the study is the meadow saz soils formed in the upper parts of the Shahrikhansoy plain of eastern Fergana. The method of placing the soil sections along the geochemical-geographic section was used in the field research. "Methodological recommendations" of the Institute of Soil Science named after V.V. Dokuchaev were also used.

Research results

Many researchers have shown that irrigation has a very strong effect on soil fertility, and in the process, human economic activity, on the one hand, leads to the accumulation of organic matter, which is associated with the systematic application of fertilizers to soils and the planting of crops that leave a large amount of root residues in the soil. However, on the other hand, soil cultivation accelerates the processes of biological decomposition, especially the decomposition of organic matter.

In the conditions of Central Asia, in the first years of development of reserve soils, irrigation and tillage sometimes lead to a decrease in the amount of humus and other organic elements [1]. However, later, under the influence of agricultural measures used to increase the productivity of irrigated soils, they begin to increase. According to M.M. Kononova and F. Penman [6], plowing and irrigation of reserve gray soils accelerate the processes of decomposition and mineralization of organic matter. During the first three to four years of development, 40-50% of the total organic matter in newly irrigated gray soils decomposes, then the process stabilizes.

The soil cover of the region has been studied in detail. In early studies [2], both the pasture soils of the region and their irrigated counterparts are characterized by a thick humus layer. This is due to the fact that in most cases they contain deep-colored buried layers rich in plant residues and a high humus content. It was also noted that the arable layer of pasture peat soils does not differ in humus content from the irrigated pasture and irrigated peat soils developing in the region in a similar way.

Our studies also confirmed the above situation. The studied soils are characterized by a medium and light loamy mechanical composition, and buried humus layers (section 1) are also observed. The soils have a satisfactory meliorative state, and are classified as weakly saline in terms of hydrocarbonate ions and non-saline in terms of total salt content.

According to the results, humus and nutrients are high in the soils of Shahrikhansoy settlement. Their content reaches high values (3.3%) in buried humus soils. This situation was also noted in the studies of B.V. Gorbunov (1949) (Table 1). Even in the cross-section of normal soils, their content is high in plowed and under-plowed layers, and the amount of humus increases by 2%.

Amount of nutrients in meadow saz soils

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Table 1

Cut	Depth, cm	Quantity, %		
		Humus	Nitrogen	P_2O_5
Section 414 , B.V. Gorbunov . Spring head district , Bulogboshi 1 km north-west of the village , Ghoza area	0-10	1.80	0.148	0.186
	20-28	1.77	0.117	0.187
	35-45	3.89	0.177	0.165
Section 407 , A.Z. Genusov . Thank you district , Shukur Mergan village , cotton area	0-10	0.60	0.062	0.272
	20-30	1.83	0.140	0.282
Section 309. N.I. Zimina . Khojaabad village around , cotton area	0-20	2.16	0.122	
	20-40	2.52	0.129	
Section 310. N.I. Zimina . Khojaabad village around , cotton area	0-20	1.83	0.144	
	20-40	1.80	0.134	
	84-95	0.80	-	

As the above researchers have shown, humus and nutrients decrease in the first years of irrigation and then increase under the influence of applied measures, leading to their movement along the soil surface. However, in the soils of our study area, this process has already been completed and the nutrient changes in the soils have reached equilibrium, with values around the current values (Fig. 1).

According to the analysis, the soil nutrients of the region have lower indicators than in the past (B. Gorbunov. 1949., “Land Cadastre” SHK data, 1967., Sh. Mansurov, 2010., M. Kuldasheva., 2024) . These changes are about 0.2-0.3% for humus, and are even more pronounced in the buried layers. In general, the amount of humus in a one-meter layer is about 2.6-0.4%, and in the buried layer it has values of more than 3%. The main humus reserve is accumulated in the arable and sub-arable layers of the soil, and is distributed in a gradually decreasing order towards the lower layers. Soils with buried layers are an exception.

The total nitrogen content in soils is related to the amount of humus in them, which in the soils of the study area fluctuates around 0.15-0.03% and is distributed to the lower layers in direct proportion to the amount of humus. Compared to previous results, the decrease is also similar to the amount of humus (1.8-0.8%), which is an average of 0.03-0.05%. Usually, the increase in the amount of nitrogen is directly related to measures to enrich the soil with organic matter (crop rotation, application of organic fertilizers, etc.).

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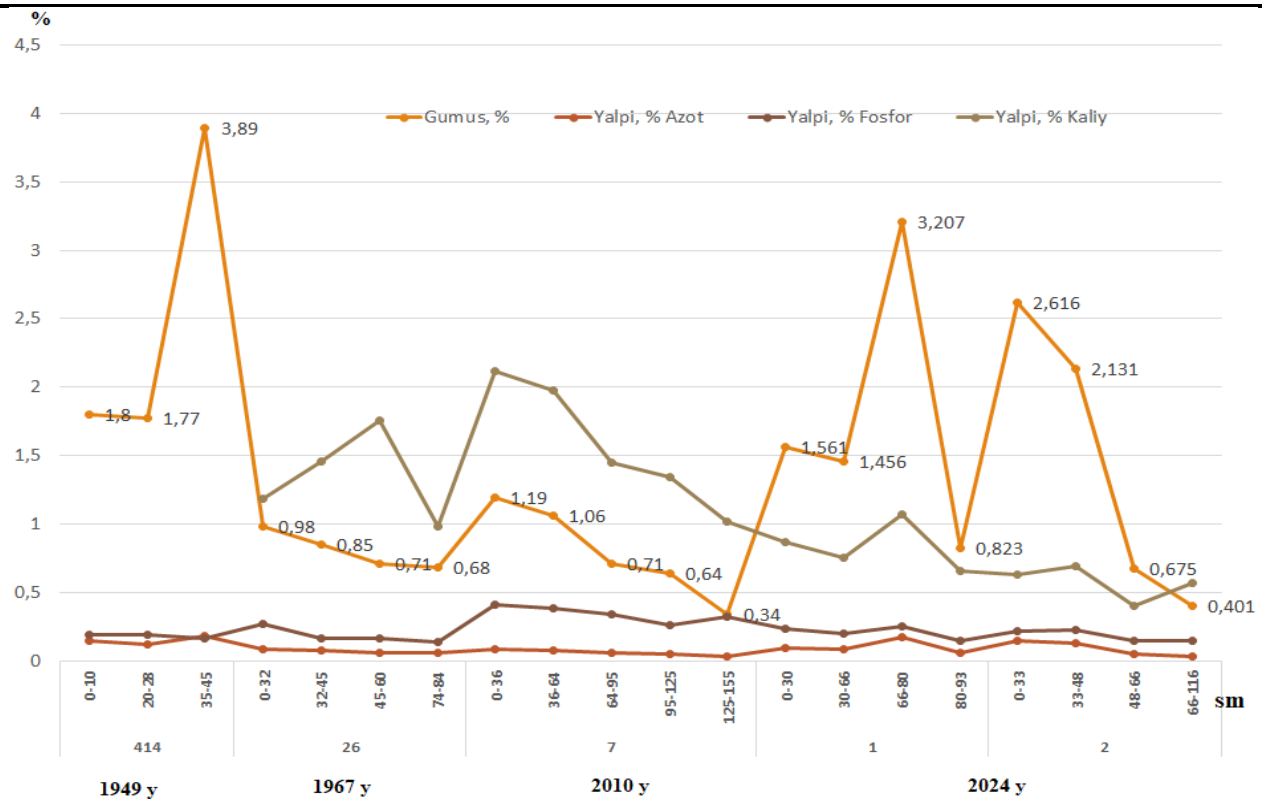

Figure 1. Changes in the amount of nutrients in the soils of the study area.

According to researchers, the accumulation and transformation of phosphorus in soils under irrigated agriculture differs from that in soils under natural conditions. Only 15-20% of the large amount of phosphorus applied annually as fertilizers is used by plants, while the rest remains in the soil and undergoes complex processes of transformation from monocalcium phosphate to water-insoluble dicalcium and tricalcium phosphates [3., 4., 8., 9., 11]. Phosphorus absorbed by plants is protected from fixation in the soil, leaching, and other losses. The transformation of phosphorus into poorly soluble forms and its fixation in the soil depends mainly on the amount of calcium and, to some extent, magnesium, as well as aluminum and iron oxides in the soil [3., 4]. The main part of phosphorus applied to the soil as fertilizers is converted into a form that cannot be absorbed by plants within almost a day [8., 9].

In gray and meadow soils, the accumulation of phosphorus in water-insoluble forms depends on the amount of colloidal-silt fractions and the abundance or deficiency of calcium and magnesium carbonates. The conversion of water-soluble phosphorus from fertilizers applied to the soil to calcium di- and triphosphate increases as the hydromorphism of the soil increases.

Studies of phosphorus forms in the meadow-marsh soils of the Oyim-Khojaabad-Marhamat deposit in the Fergana Valley have led to the conclusion that the amount of phosphorus in the soils and the thickness of the layer enriched with it increase with increasing assimilation period.

According to E. Khoshimov [10], the constant use of phosphorus fertilizers in meadow peat soils increases the total amount of phosphorus, mainly in the form of phosphates of groups I and II, and less in the form of phosphates of groups III and IV. However, the content of phosphates of group V decreases.

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Similar phenomena were also described in the works of U. Mirzaev, who conducted research on the peat soils of the Central Fergana grassland. It was noted that in the section of highly carbonated and gypsum soils in the region, the total phosphorus content increased compared to other soils, and this was mainly due to the presence of group 2 phosphates in them.

This phenomenon was also observed in the soils of our study area. The phosphorus content of meadow peat soils increased by about 0.04-0.07% over the past period compared to the reserve analogues (0.18-0.16% in 1949), reaching even higher values in the lower layers (0.25-0.14%). This phenomenon can be explained by the fact that phosphorus contained in phosphorus fertilizers applied to the soil over the years, under the influence of carbonates in the soil, is bound and fixed by the soil.

Unlike phosphorus compounds, the low content of potassium in soils, about 0.7-1%, can be attributed to the composition of soil-forming rocks during soil formation. However, it is known from the literature that potassium in mineral fertilizers is usually higher, and it is more bound in the soil due to moisture deficiency. In our studies, it is difficult to attribute the low content of potassium to this, since the effect of constant irrigation and leachate regime is high, and therefore the potassium introduced into the soil is relatively well absorbed by plants, as well as insufficient use of potassium fertilizers. The potassium content exceeding 1% may fall into these buried horizons, due to its organic forms or residual forms.

The results showed a lack of mobile forms of nutrients. Typically, these amounts are variable and not as stable as the total forms (except nitrogen), with nitrogen and phosphorus being low and potassium relatively high, and generally moderately supplied.

Studies conducted in neighboring regions [5., 7] present somewhat different results. According to them, the humus content of the region's soils is enriched with humus and nutrients over a 40-year period, and researchers attribute this to the long-term use of irrigated agriculture, irrigation of the soil, and agrotechnical measures taken to use it in agriculture.

Conclusion

Thus, the soils of our research area Shahrikhansoy plain have undergone significant changes compared to their past state. These changes are due to the fact that the process of desalination is increasing according to the amount of total salts, the total alkalinity is relatively increasing, the cross-section does not form rich layers, it is becoming richer in carbonates towards the lower layers, the mechanical composition of the soil is relatively lighter, and this process is taking place at the expense of large dust and fine sand at the expense of rocks, this process is decreasing towards the lower layers, the balance of nutrients is slightly less than the analogues of the reserve. finds its expression in such things as the increase of gross forms of phosphorus. Also, compared to the grassland soils formed in neighboring areas, the soil profile is characterized by a lack of pronounced nutrient uptake, a low content of total salts that cause salinization, and a lack of nutrient layers.

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