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AGROCHEMICAL PROPERTIES AND HUMUS RESERVES OF IRRIGATED SOILS OF GIJDUVAN DISTRICT

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Abstract
This article presents data on the evolution of irrigated meadow and meadow takyr soils, humus reserves in Gijduvan district of Bukhara region. In 1984, the humus content in the arable layer of irrigated meadow soils was 1.14% with a reserve of 38.8 t/ha. In 2022, the humus content was 1.12% with a reserve of 43.5 t/ha. In 1984, the humus content in meadow takyr soils was 0.85%, reserves-23.6 t/ha, in 2022 the humus content was 0.82%, reserves-27.9 t/ha. Over 38 years, humus reserves in meadow soils increased by 4.7 t/ha, and in meadow-barren soils - by 4.3 t/ha.

Keywords Desert zone, irrigated soils, meadows, meadow takyr soils, evolution, humus, reserve, agrochemical properties, gross nutrients, mobile nutrients, anthropogenic factors.

INTRODUCTION

70% of the total land area of our republic is located in the desert zone, which includes Ustyurt, Kyzylkum, Malikchul, Sherabad, deserts of Karshi and other areas. Currently, the largest share of the areas occupied in agriculture falls on natural pastures, about 83% of which fall on arid regions (desert, hill) [5, 9].

The soil cover of the desert zone is extremely complex and is characterized by its complexity, the complexity of the relief, high temperatures, low humus content, high carbonate content, salinity, as well as saline sands and gypsum.

The soils of the desert zone have been poorly studied in comparison with other soils of our republic. Despite the fact that data on the soils of our republic have been provided for a long time, their study was not given importance due to the fact that sandy accumulations are common in combination with aeolian sediments, alluvial deposits.

Currently, sandy desert soils are used in irrigated agriculture in some areas of Kashkadarya, Surkhandarya, Bukhara, Khorezm and other regions. Various agricultural crops (cotton, grain, alfalfa and other crops) are grown in a number of districts of the Bukhara region. The study of the evolution, genesis and properties of these soils used in agriculture for the preservation and restoration of their fertility, effective use of soils is relevant.

The main purpose of the study is to study the influence of various anthropogenic factors on the evolution, properties and properties of irrigated soils common in the Giduvan district of Bukhara region, increasing their fertility and effective use.

Literature Analysis

Agriculture is gaining momentum all over the world, and in recent years extensive work has been carried out to meet the needs of the population for safe food products, including soil conservation, conservation, restoration and improvement of soil fertility, efficient use of land resources,

improvement of soil mechanical composition, water-physical properties, soil reclamation, environmental protection, etc. scientific research is being carried out to study the influence of anthropogenic factors [21, 22, 23, 24, 25].

The evolution (development) of soils is a fundamental and relevant theoretical problem of soil science. The solution to this problem determines the origin of soil properties, the state of soil classification and its improvement, the correct assessment of the influence of anthropogenic factors on soils, changes in the state, properties and properties of soils, as well as the development of medium- and long-term analyses [6].

The evolution of soils is the doctrine of changes occurring in the soil, which has both theoretical and practical significance. Time and age of soils play an important role in the factors of soil formation, and V.V.Dokuchaev paid great attention to the evolution of soils in his proposed natural-history method. Soil evolution is a fundamental theoretical problem, the result of which is the assessment of soil properties, the state of soil classification and its solutions, the study of climate change, the influence of human activity (anthropogenic factors) [7, 9, 20].

Through the effective use of the republic's soils, the introduction of innovative resource-saving technologies, a number of scientific research works are carried out to preserve and increase soil fertility, improve their reclamation condition, mechanical composition, water-physical properties, and certain results are achieved [1, 5, 12, 15, 16, 20].

On the earth's surface, the evolution of soils does not develop by chance, but naturally. This development is related to the history of the landscape. Also, a special place in the evolution of soils in irrigated regions is occupied by the anthropogenic factor [11, 13, 14.].

Having studied the modern agrophysical state of the soils of irrigated meadows of the Bukhara oasis, scientific substantiations of the reclamation state, changes in agrochemical, agrophysical properties of soils of irrigated meadows of the Bukhara oasis under the influence of irrigation and anthropogenic factor are given, the importance of agrophysical properties in increasing soil fertility is scientifically substantiated [19].

Having studied the evolution and fertility of the soils of the Bukhara region, assessing the ecological state of the territory, the interaction of natural and anthropogenic factors in the evolution of oasis soils was studied, the content and reserves of humus, salt composition and migration were determined, as well as changes in biological and agrochemical properties of soils in the context of oasis soils of the desert region under the influence of irrigation waters, the conditions for the formation of oasis soils were determined, the intensity and nature of the manifestation of the processes of evolution, depending on their differences from the elementary processes of natural soils, as well as the degree of soil change under the influence of irrigation, the stages of formation of oasis soils were studied [2, 3, 4].

The study of the evolution, properties and characteristics of irrigated soils of the Gijduvan district of the Bukhara region and the influence of anthropogenic factors on them is of scientific and practical importance.

METHODOLOGY

Irrigated meadow, desert meadow, takyrno meadow, light gray-earth meadow soils of Gijduvan district of Bukhara region were selected as the object of research. In particular, the farm “Omad”, located in the Hamid Olimjon (Sarmijon) district of Gijduvan district of Bukhara region, the farm “Shukur Tuxta", located in Gulistan (Gulistanobod) district, and irrigated meadow soils of the farm “Xasan Rajabiy", located in S.Jabborov (Ok gul) district, meadow takyr soils of the farm “Fayz" which is located in Gulistan (Gulistanobod) district, grey-brown soils of the farm “Usmon Nor Omad” which is located in Hamid Olimjon (Sarmijon) district were selected as the object for our research.

While the research methods were carried out in preparatory, field, laboratory and chamber conditions according to standard methods [8, 10] generally accepted in soil science, geographical, genetic, natural-historical, comparative,

lithological-geomorphological, chemical-analytical and profile methods were used in the research, and laboratory analyses were carried out using methods that are given in such literature as "Methods of agrochemical analyses of soils and plants of Central Asia" [17], "Methods of agrochemical, agrophysical and microbiological studies in irrigated cotton areas" [18]. The mathematical and statistical analysis of the obtained data was calculated using the variance method using the Microsoft Excel program.

RESULTS

The territory of the Bukhara region is located mainly in the Kyzylkum desert with a total area of 39.4 thousand km2. It borders on the south-east with the Zarafshan valley, on the north-west with the Khorezm region and the Republic of Karakalpakstan, on the north-east with the Navoi region, on the south-east with the Kashkadarya region and on the south-west with the Republic of Turkmenistan. Agricultural irrigated lands amount to 226.6 thousand hectares.

Gijduvan district is located in the northeastern part of the region, its total area is 384,068 thousand hectares. It borders in the northeast and southeast with Konimex, Karmana districts of Navoi region, in the south with Vobkent district, and in the west with Shafirkan district. The territory of Gijduvan district, the total area of agricultural land is 27,007 thousand hectares, of which irrigated and cultivated land is 19,994 thousand hectares. Of these, meadow soils make up 52.8%, desert - meadow - 27.4%, meadow-takyr -13.7%, grey-brown soils - 3.3%, and grey-brown meadow soils - 2.8%.

There are a number of factors that control the soil, such as the conditions of humus formation in the soil, agrochemical properties, mechanical composition of soil layers, physical properties, water properties, irrigation cycle, crop, thickness of the agroirrigation layer, type and degree of salinity. Therefore, the agrochemical properties of irrigated meadow soils of Gijduvan district were studied in 1984 (I.N.Felisiant) and 2022 (H.X.Salimova) (Table 1).

According to I.N.Felisiant data from 1984, the humus content in the 0-25 cm layer was 1.14, and the total nutrient content (TNC) was 0.075; 0.25; 2.0%, respectively, in the 25-45 cm layer the humus content was 0.81%, and TNC was 0.68; 0.17; 1.86%. It was found that as the layer deepens, the content of humus and gross nutrients decreases.

In our studies (2022), the humus content in the arable (0-29 cm) layer was 1.12; the gross nutrient content was 0.11; 0.14 and 2.0%, and in the under-arable (29-52 cm) humus layer was 0.71 and the gross nutrient content was 0.09; 0.12; 1.7%, respectively.

It was found that the arable layer belongs to a group of soils with a moderate humus content, very low nitrogen content in the form of nitrates and ammonium (N-NH4 + N-NO3), low content of mobile phosphorus (P2O5) and low content of exchangeable potassium (K2O). (1st table)

1st table

Agrochemical characteristics of irrigated meadow soils

Layer depth, cm	Humus, %	Gross, %			Mobile, mg/kg			
		N	P	K	$N\text{-}NH_4$	$N\text{-}NO_3$	P_2O_5	K_2O
7 incision. Irrigated meadow soils (I.N.Felisiant, 1984)								
0-25	1,14	0,075	0,25	2,0	-	-	-	-

25-45	0,81	0,068	0,17	1,86	-	-	-	-
50-60	0,71	0,056	0,17	1,91	-	-	-	-
80-90	0,62	0,051	0,14	1,87	-	-	-	-
1 incision. Irrigated meadow soils (H.X.Salimova, 2022)								
0-29	1,12	0,11	0,14	2,0	12,4	11,1	15,7	182,1
29-52	0,71	0,09	0,12	1,7	9,7	6,4	11,8	164,5
52-79	0,52	0,08	0,09	1,5	5,2	3,5	8,4	142,3
79-103	0,31	0,05	0,06	1,3	3,0	2,1	4,1	128,4
103-115	0,12	0,02	0,03	1,1	1,0	0,8	1,3	106,4

The agrochemical properties of irrigated meadow takyr soils of Gijduvan district were also analyzed. According to I.N.Felisiant data from 1984, in the arable (0-20 cm) layer, humus was 0.85%, and the gross nutrient content was 0.068%; 0.207% and 1.72%, respectively, while the 2022 study showed that in the arable (0-25 cm) layer, humus was 0.82%, and the gross nutrient content 0.07%; 0.11% and 1.81%. It was found that as the layer deepens, the amount of humus, mobile and gross nutrients also decreases.

It was found that if the humus content in the upper layer is low, and the nitrogen content in the form of nitrates and ammonium (N-NH4 + N-NO3), as well as mobile phosphorus (P2O5), is very low, then this soil belongs to the group of soils with a low content of exchangeable potassium (K2O). (2nd table)

2nd table

Agrochemical characteristics of irrigated meadow-takyr soils

Layer depth, cm	Humus, %	Gross, %			Mobile, mg/kg			
		N	P	K	$N\text{-}NH_4$	$N\text{-}NO_3$	P_2O_5	K_2O
14th incision. Irrigated meadow soils (I.N.Felisiant, 1984)								
0-20	0,85	0,068	0,207	1,72	-	-	150,0	-
20-50	0,52	0,048	0,195	1,72	-	-	56,25	-
65-75	0,39	0,034	0,212	0,65	-	-	12,50	-

4th incision. Irrigated meadow soils (H.X.Salimova, 2022)								
0-25	0,82	0,07	0,11	1,81	8,9	9,5	12,5	188
25-57	0,46	0,06	0,09	1,69	7,1	7,8	10,6	171
57-98	0,23	0,05	0,08	1,43	5,8	5,7	8,5	152
98-122	0,14	0,03	0,05	1,36	4,2	4,6	5,3	1,39
122-178	0,11	0,02	0,03	1,48	2,5	2,7	3,3	1,49

It has been established that irrigated meadow and meadow-takyr soils are humus reserves. According to I.N.Feliciant's data for 1984, humus reserves in the arable layer of meadow soils amount to 38.8 t/ha, in our study conducted in 2022, humus reserves amounted to 43.5 t/ha.

According to 1984 data, humus reserves in the arable layer of meadow–takyr soils amounted to 23.6 t/ha, and according to our data for 2022 - 27.9 t/ha. It was found that these soils increased in humus reserves, while the humus content decreased due to an increase in the arable layer over 38 years.

CONCLUSION

The evolution of irrigated meadow and meadow-takyr soils of Gijduvan district of Bukhara region has been studied. At the same time, the humus content in the arable layer of irrigated meadow soils in 1984 was 1.14%; with a reserve of 38.8 t/ha, the humus content in 2022 was 1.12%; with a reserve of 43.5 t/ha. In meadow-takyr soils, the humus content in 1984 was 0.85%; reserves-23.6 t/ha, in 2022 the humus content was 0.82%; reserves were revealed-27.9 t/ha. Over 38 years, humus reserves in meadow soils increased by 4.7 t/ha, and in meadow-takyr soils-by 4.3 t/ha. It was found that the amount of gross and mobile nutrients varied.

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