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CHANGES IN THE MELIORATIVE STATUS OF MEADOW-ALLUVIAL SOILS IN THE MIDDLE COURSE OF THE ZARAFSHON RIVER DEPENDING ON THE GRANULAMETRIC COMPOSITION

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Abstract
The article discusses the relationship between the soil's granulometric composition and humus on changes in the physical and meliorative state of the soil. It was found that soils with a heavy mechanical composition have low water carrying capacity and water permeability, and the opposite is true for light mechanical soils. Increasing the amount of humus improves the physical, general-physical, and water-physical properties of both soils with a light mechanical composition and soils with a heavy mechanical composition. Also, the improvement of the land reclamation condition in a positive direction depends on the granulometric composition and the amount of humus, which makes its condition alternative.

Keywords: Zrafshan river, soil, irrigation, salinization, suvli surim, och tusli boz, mechanical composition, analysis.

Introduction

Today, according to FAO-UNESCO data, the world's population has increased by 3 billion during the last half century. from 6.4 billion It is not difficult to understand how much value these lands have in front of humanity, the fact that the land cultivated in agriculture has increased by only 8%. Therefore, it is important to organize rational and effective use of land and water resources, especially agricultural land, to protect them, to improve their ecological and meliorational condition, to maintain and increase their productivity.

More than half of the irrigated lands in Uzbekistan have varying degrees of salinity. If it is not prevented in time, the yield can be reduced to 70-80% in highly saline lands. December 5 was declared by the UN as World Soil Day. 4.3 million hectares of land are being meliorated by the Ministry of Water Resources. The Ministry has a concept of water management development for 2020-2030. In this concept, saline land is indicated as 44.7%. Meanwhile, the Senate of the Oliy Majlis approved the draft law "On soil protection and increasing its productivity". The level of salinity is 53 percent compared to irrigated lands. But according to research, salinity levels are decreasing as a result of the activities we are doing. Salinity has a significant impact on the economy through agriculture. It has been reported in many sources that if we do not carry out salt washing measures, 15% of the crop can be lost in weakly saline land, 30% in medium salinity land, and 70-80% in strong saline land.

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Changes in the granulometric composition of the light-colored gray soils of the middle course of the Zarafshon River under the influence of irrigation, determining the dynamics of changes in the level of salt accumulation in the soil layers, improving the ecological and meliorational conditions, and conducting scientific research aimed at increasing soil productivity are considered one of the urgent issues.

Analysis of literature on the topic

Soil fertility plays an important role in obtaining high yields from agricultural crops. It is a difficult issue to increase crop yield to optimal indicators even at the expense of high agrotechnologies in low soil fertility. Therefore, it is an urgent issue to alter soil properties, regimes and indicators and to implement this before planting crops. The agrophysical properties of the soil also play a role in this [1; 2; 3; 4; 5]. One of the factors determining soil fertility is its water properties. Conducting irrigation works on a scientific basis allows determining agrotechnical measures such as irrigation rate, irrigation technique, duration of irrigation in optimal parameters. These properties have a significant impact on the granulometric composition of the soil and its meliorative condition [1; 2]. Changes in soil granulometric composition have different effects on soil water properties. A high level of humus in the soil has a positive effect on water properties. Therefore, it is important to study the meliorative condition of the soil in connection with its granulometric composition and humus condition.

In the newly irrigated desert-sandy soils of the Zarafshan river delta, the carbonates and silt particles contained in the irrigated water created favorable conditions for good wetting and aeration processes, and agro-irrigation emphasizes the acceleration of soil formation. Under the influence of irrigation, the xerothermic water-salt regime of desert-sandy soils turns into an irrigation-washed regime. In some areas, the level of groundwater approaches the surface of the earth (1-3 m), and as a result of the change of the soil in the process of automorphic soil formation to hydromorphic soil formation, the soil undergoes strong salinization [9, 10]. According to the information of Krosnodar, the ecological condition of the soil around the reservoir was studied, in which the salinity of the soil, changes in heavy metals and acidity under the influence of the reservoir were studied, and it was also determined that the population's health was high in the vicinity of this reservoir. Soils contain some harmful salts: sodium carbonate (Na_2CO_3), chlorides (NaCl, $MgCl_2$, $CaCl_2$) and sodium sulfate (Na_2SO_4), as well as other easily soluble salts. The increase in salt ion concentration in the soil solution affected the deterioration of soil fertility and ecological condition. As a result of the rise in the level of underground water, the risk to the health of the population in the surrounding area is increasing [11].

In order to preserve and increase soil fertility, irrigation and salt washing norms are determined taking into account its agrophysical properties, based on the scientific data of the agrochemical, agrophysical and meliorative conditions of the irrigated soils of the Jizzakh desert. Mechanical composition of soil cover and salinity maps were created [12; 13; 14; 15].

Summarizing the above, the Zarafshan river basin can be divided into two parts that are sharply different from each other in terms of flow formation. The first of them, that is, the

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main part of the Zarafshan river flow, is formed in the upper part of the mountain. The flow of rivers and streams in the second, lower part of the basin is formed on the slopes of low mountains. The soils of the middle course of the Zarafshon river develop on the river beds, the water regime is related to the water level of the river, and the river flow is of decisive importance in the change of their properties [16;17], therefore, the salinity conditions of the light gray soils of the middle course of the Zarafshon river under the influence of irrigation is one of the determining factors, and its study is one of the urgent issues of today. Based on the analysis presented in the literature, it can be concluded that the changes of the soils of Uzbekistan, including the irrigated soils formed in the middle reaches of the Zarafshan River, in recent years under the influence of irrigation, the decrease in soil fertility and its increase, and the decrease in crop productivity have not been sufficiently studied.

Research Methodology

Researches are carried out according to the standard methods of field, laboratory and chamber works generally accepted in soil science, "Methods of agrochemical, agrophysical and microbiological researches in irrigated soils of cotton areas" and "Methods of field experiments" developed at UzPITI and "Manuals for conducting chemical and agrophysical experiments" developed at TAHITI "Analysis of soils under soil monitoring" and R. Kuziev et al. were carried out on the basis of methodological manuals entitled "Manual for carrying out soil surveys and drawing up soil maps for the state land cadastre".

At each physical point of observation, soil sections were lowered to a depth of 1.5-2.0 m to seeps, and field research was carried out. The morphological details of the genetic layers of the soil were recorded, and soil samples were taken for analysis in laboratory conditions, including soil samples taken from the research facility according to *the granulometric composition of the soil* - based on N.A. Kachinsky's pipette, N.I. Savvinov's methods [8];

According to ameliorative analysis : the amount of salts was analyzed according to the water absorption analysis, the salinity level was analyzed according to S.V. Astapov's classification; the amount of easily soluble salts in the soil and water by preparing aqueous surim (HCO_3^- - total alkalinity, Cl^- and SO_4^{--} ion, Sa^{++}, Mg^{++}, and $K^+ + Na^+$ cations) were determined [6;7].

Analysis and experimental results

Irrigated meadow-alluvial soils *Jomboy district, Beshkapa village, Samarkand region, Jomboy massif, "Mirsaid fields" farm, contour #-1171 The land* is formed on alluvial deposits, heavy sand has a mechanical composition, it is not saline. It is developed on the upper terraces I and II of Zarafshan. The morphological structure and main features of formerly irrigated meadow-alluvial soils are presented in the example of the following section.

Section 1. A_x 0 - 23 cm - light gray color, soft, heavy sand, powdery structure with small grains, a large amount of remains of plant roots and their semi-rotted remains. It goes to

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the next layer with color and moisture.

A $_{x.\ white}$ 23 - 38 cm - light gray, wet, heavy sand, with a fine powdery structure, in some cases there are small roots of plants, it passes to the next layer with its color and mechanical composition.

A $_{1-2}$ 38 – 87 cm – dark gray, light sand, small particles, pores not compacted. It goes to the next layer with color and gravel output.

V 87 – 130 cm – the same light sand as the layer above.

Including Samarkand region, Kattakurgan district Payshanba town, Pakhtakor massif "Kurgan white vultures" farm #-503 contour the land is meadow-alluvial soil, the soil is formed on alluvial deposits, has a heavy sand content, and is not saline. It is developed on the upper terraces I and II of Zarafshan. The morphological structure and main features of formerly irrigated meadow-alluvial soils are presented in the example of the following section.

Section 6. A $_{x}$ 0 - 22 cm - light gray, unconsolidated, heavy sand, lumpy and fine powdery texture, small plant roots are found together with straw residues, it passes to the next layer with color and moisture.

A $_{x.o}$ 22 - 32 cm - dark gray, heavy sand, wet with sandy mixtures, dusty fine structure, small plant roots are found, there are traces of carbonate compounds. It goes to the next layer with color and moisture.

A $_{1-2}$ 32 – 63 cm – dark gray, moderately wet, heavy sand, sandy mixture with small lumps, carbonate compounds are found (nodule), small pebbles with a diameter of 0.5 – 0.3 are mixed. It goes to the next layer with color and moisture.

V 63-95 cm - dark gray, wet, medium sand, with a fine lumpy structure mixed with sand, small plant roots are found, dusty crimney oxides and carbonate compounds are found, the transition to the next layer is by color and hardness.

V $_{2}$ 95 – 110 cm – light gray color, strong and fine stone layer of 0.5 – 0.1 cm in diameter, medium sand, bound sand, structureless, strongly moistened layer, different in color from the next layer.

S 110 - 130 cm - dark gray, wet with clay marks, light sand, hard to the upper horizon, structureless, wet.

S $_{1}$ 130-150 cm - consists of a mixture of sand and polished gravel, which is explained by the slightly higher amount of moisture in this layer compared to the upper layer.

As for the comparative analysis of the changes of the old irrigated meadow-alluvial soils distributed in the middle course of the Zarafshan river under the influence of irrigation and cultivation. According to the mechanical composition of all soil types (typical, light gray, gray-meadow and meadow-alluvial) located on terraces I - II - III of the Zarafshan oasis, they are mainly medium and heavy loam, physical clay (less than 0.01 mm) large dust (0.05 – 0.01 mm), medium dust (0.01 – 0.005 mm), fine dust (0.005 – 0.001 mm) and silt particles have been reduced by irrigation for many years (60 years), dust and silt The amount of particles increased in all layers of the soil. It is explained by the accumulation of dust and silt particles in the upper layers of the soil under the influence of irrigation, and certain parts are washed to the lower layers of the soil. According to the mechanical composition of these soils *in Jomboy district* , they are mainly heavy loam, the amount of physical clay

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particles in the driving layer is 52.37-51.57%, large dust particles are 23.09-22.19%, and average dust particles are 12.69-12 is 19%. Also *Kattakorgan district* According to the mechanical composition of the soil, this district is heavy sand, the amount of physical clay particles in the driving layer is 44.0-44.4%, large dust particles are 32.8-31.5%, and average dust particles are 13.2-12.6 is % (Table 1).

Table 1. Old irrigated meadow-alluvial soils change in mechanical composition, %

Kes-ma	Layer, cm	Amount of fraction, % and particles size , mm							physical mud , < 0.01	the mechanical composition according to soils names
		sand			war			year		
		>0.25	0.25-0.1	0.1-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001		
meadow-alluvial soil (2020, data from A.B. Tursunkulova)										
1	0 – 23	5.39	5.69	13.39	23.09	12.69	25.09	14.59	52.37	Heavy corn
	23-38	5.49	6.29	14.39	22.19	12,19	25.09	14.29	51.57	Heavy sand
	38-87	8.89	21.09	21.69	19,29	10.59	9.09	9.29	28.97	Easy sand
	87-130	9.19	21,29	21.49	18.99	10.49	9.09	9.39	28.97	Light corn
meadow-alluvial soil (2020, data of A.B. Tursunkulova) , %										
6	0 – 22	2.3	3.4	17.5	32.8	10.7	13.2	20.1	44.0	Heavy corn
	22-32	2.8	5.3	16.5	31.2	10.5	13.5	20.2	44.2	Heavy sand
	32-63	3.5	4.7	15.9	31.5	9.9	12.6	21.9	44.4	Heavy sand
	63-95	3,4	3.8	15.8	32.5	9.2	13.2	22.1	44.5	Average sand
	95-110	3.2	3.6	14.4	32.2	9.4	14.9	22.3	46.6	Average sand
	110-130	5.2	16.1	16	32.8	7.2	10.2	12.5	29.9	Easy sand
	130-150	5.2	21.1	24.1	31.8	4.4	6.8	6.6	17.8	sand

Depending on the mechanics of the soil, it was found that the volume mass of the soil is somewhat higher in the driving layers, its amount decreases as it goes to the lower layers, and the porosity of the soil increases (Table 1). Depending on the mechanical composition of the soil, the amount of humus, total nitrogen, phosphorus and potassium, mobile phosphorus and exchangeable potassium decreased.

of the change in the granulometric composition of the formerly irrigated meadow-alluvial soil on the change in the salinity level of the soil was studied and analyzed in the section of layers based on the classification. According to the results of water absorption analysis, dry residue in these soils, Cl^- and SO_4^{2-} amounts were studied based on the classification of the salinity level in the cross-section of the layers, no salinity was observed in the cross-section of the soil (Table 2).

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Table 2. meadow-alluvial soils that were previously irrigated absorption content (in % of abs. dry soil weight)

Don't cut	Depth cm	Dry residue	Alkalinity		Cl	SO_4	Ca	Mg	No	Anion	Cation	Salinity level (<0.3 relative to dry residue)
			$SO_{3\%}$	Total $NSO_{3\%}$								
	meadow-alluvial soil (2020, data of A.B. Tursunkulova)											
1	0 – 23	0.154	no	0.031	0.007	0.032	0.075	0.009	0.014	0.07	0.084	unsalted
	23-38	0.154	no	0.032	0.005	0.032	0.075	0.009	0.015	0.069	0.084	unsalted
	38-87	0.117	no	0.03	0.002	0.033	0.046	0.005	0.014	0.065	0.051	unsalted
	87-130	0.100	no	0.03	0.002	0.022	0.04	0.005	0.009	0.054	0.045	unsalted
	meadow-alluvial gray soil (2020, data of A.B. Tursunkulova)											
6	0 – 22	0.122	no	0.029	0.008	0.033	0.045	0.004	0.021	0.07	0.049	unsalted
	22-32	0.116	no	0.025	0.005	0.032	0.042	0.004	0.016	0.062	0.046	unsalted
	32-63	0.109	no	0.029	0.004	0.028	0.044	0.004	0.013	0.061	0.048	unsalted
	63-95	0.13	no	0.034	0.007	0.033	0.052	0.003	0.019	0.074	0.055	unsalted
	95-110	0.113	no	0.027	0.005	0.03	0.043	0.003	0.016	0.062	0.046	unsalted
	110-130	0.105	no	0.029	0.006	0.021	0.043	0.003	0.01	0.056	0.046	unsalted
	130-150	0.098	no	0.027	0.004	0.022	0.035	0.003	0.015	0.053	0.038	unsalted

$^{++}$ gradually decreased in section 1 and prevailed over Mg^{++}, and in section 6, it was found that the amount of Ca^{++} fluctuated in the section of layers, and the amount of Na^{+} prevailed over the amount of
Mg^{++} (Table 2).

Conclusions and Suggestions

1. According to the mechanical composition of all soil types (light-colored) located on terraces I - II - III of the Zarafshan oasis, they are mainly medium and heavy loam, physical clay (less than 0.01 mm) and large dust (0.05 - 0.01 mm), medium dust (0.01 - 0.005 mm), fine dust (0.005 - 0.001 mm) and silt particles due to irrigation for many years (60 years) sand particles decreased and the amount of dust and silt particles increased in all layers of the soil. It is explained by the accumulation of dust and silt particles in the upper layers of the soil under the influence of irrigation, and certain parts are washed to the lower layers of the soil.

2. For many years (60 years) under the influence of irrigation, sand particles decreased and the amount of dust and silt particles increased in all layers of the soil, but the amount of humus increased by 0.37-0.55% in the plow layer and 0.18-0.18% in the lower layers. By 32%, and the humus stock increased by 38.9 t/ha in the cross-section of the layers caused the formation of structural aggregates due to the interconnection of small dust particles. As

a result, in all soil types, dry residue, Cl^- and SO_4^{2-} amounts were analyzed in the section of layers based on the classification of soil salinity, and no signs of salinity were observed. Also, Ca^{++} prevails over Mg^{++} in the upper and lower layers of the soil, and the amount of Na^+ increases compared to Mg^{++} in the section of the layers.

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