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Physical Properties of Hydromorphic Soils Irrigating Khanka District of Khorazm Oasis

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Abstract

This article presents information on the mechanical composition, volume mass, and specific gravity of old irrigated meadow alluvial soils developed on the alluvial deposits of the Khanka District "Galaba" massif. In the mechanical composition of these soils, the amount of sand is 22.9% in the driving layer and 39.25% in the lower layers, while dust particles are 59.2-72.2% and silt particles are 4.9% in the upper layer and 1.6% in the bottom layer. is %. In the lower part (110–150 cm) of the layer, the amount of fine sand and large dust particles is highly accumulated, and in the genetic layers of the old irrigated meadow soils of the massif, the specific mass varies from 2.42 g/cm3 to 2.66 g/cm3, which is characteristic for this area. It was 2.42 g/cm3 and 2.60 g/cm3 in the plowed layer of the studied soils, and the volume mass was 1.21–1.41 g/cm3 in the plowed layer of the soils, increasing downwards to 1.52–1, It is explained that it is densified over the entire section, making 53 g/cm3.

Keywords: *mechanical composition, sandy, sandy loam, loam, grassland soil, porosity, volume mass, specific mass.*

1. Introduction

The amount of agricultural products in our republic has increased, but at the same time, the hydrogeological and land reclamation conditions of the irrigated area have changed. Evolutionary change is taking place in irrigated soils, which often leads to a decrease in their productivity and deterioration of their ecological status. In this regard, it is necessary to carry out a comprehensive study of the soils distributed in the Khorezm oasis, especially from the point of view of their effective use and protection, including the evaluation of agrophysical, agrochemical, agroecological properties and the level of salinity [1; 188 p., 2; 117 p. 3; 21–30 p., 4; 68–71 r.]. The main purpose of this was to determine, diagnose and positively control the agroecological, meliorative condition, agrochemical, agrophysical, agrobiological properties, erosion processes of the soils scattered in the irrigated area of the oasis.

2. The Main Results and Findings

Research object and methods. "Ghalaba" massif in Khanka district of Khorezm oasis was selected as the object of research as a base economy. Volumetric mass of soil, mechanical composition of soil samples, specific mass were determined. Soil volume mass in cross-sections at the reference point by the cylinder method. In the samples taken from the reference points, the mechanical composition of the soil was determined by the pipette method of N.A. Kachinsky with sodium hexametaphosphate, and the density of the solid part of the soil was measured by the pycnometer method. Total porosity was determined by calculation. [5; 245 pp.].

The obtained results and their analysis. The selected basic agricultural soil groups are irrigated hydromorphic soils that are widely distributed in the ancient and modern deltas of Amudarya and are actively used in agricultural production.

According to external signs and mechanical composition of the soil cross section located in the geomorphological regions of the “Galaba” massif “Galaba” massif of the Daudon (residual) river and the modern deposits of the Amudarya, according to the mechanical composition, the alluvial soils of the old irrigated meadows are medium and light sand, and heavy sand in the layer under plowing and up to one meter. , clay and sometimes sandy layers, from the second meter often sand layers are found. In addition, the amount of sand in the mechanical composition of meadow alluvial soils is 22.9% in the driving layer and 39.25% in the lower layers, dust particles are 59.2-72.2% and silt particles are 4.9% in the upper layer and 1.6% in the bottom. constitutes In the lower part (110–150 cm) of the layer, it was found that the amount of fine sand and large dust particles is high. In this case, it was noted that the environment is sufficient for the internal weathering process in the soil layers, but this process is taking place slowly.

Table 1- Mechanical and microaggregate composition of hydromorphic soils of the "Galaba" massif, Khorezm oasis, Khanka district, %

Incision №	The incision deep league, cm	Register of particles, mm									
		>0,25	0,25-0,1	0,1-0,05	0,05-0,01	0,01-0,005	0,005-0,001	< 0,001	physical clay	Total right. Aggregate	Spreading factor
Khanka district "Galaba" massif											
12	0-40	3,2	0,8	18,9	49,9	9,6	12,7	4,9	27,2	32,6	98,0
		2,4	0,6	49,5	19,9	11,5	11,1	5,0			
		+0,8	+0,2	-30,6	+30,0	-1,9	+1,6	-0,1			
	40-60	2,0	0,5	17,1	35,3	13,3	22,0	9,8	45,1	11,7	20,0
		2,4	0,6	26,7	36,9	12,1	16,4	4,9			
		-0,4	-0,1	-9,6	-1,6	+1,2	+5,6	+4,9			
	60-90	2,0	0,5	19,0	60,0	6,1	8,1	4,3	18,5	21,3	17,2
		2,7	0,8	24,2	40,5	16,2	13,1	2,5			
		-0,7	-0,3	-5,2	+19,5	-10,1	-5,0	+1,8			
	90-110	1,2	0,3	19,7	66,8	5,0	4,7	2,3	12,0	6,4	57,5

		2,0	0,5	18,5	70,4	6,8	1,4	0,4			
		-0,8	-0,2	+1,2	-3,6	-1,8	+3,3	+1,9			
	110-150	9,2	2,3	27,7	54,6	1,7	2,9	1,6	6,2	17,8	17,7
		12,4	3,1	40,2	38,4	3,0	2,0	0,9			
		-3,2	-0,8	-12,5	+16,2	-1,3	+0,9	+0,7			
17	0-30	3,2	0,8	18,9	49,9	9,6	12,7	4,9	6,2	24,0	61,2
		0,4	0,6	29,4	63,4	3,5	1,9	0,8			
		+2,8	+0,2	-10,5	-13,5	+6,1	+10,8	+4,1			
	30-45	3,6	0,9	9,9	74,4	3,6	5,4	2,2	11,2	48,0	73,3
		3,6	0,9	56,7	32,4	4,8	1,3	0,3			
		0	0	-46,8	+42,0	-1,2	+4,1	+1,9			
	45-72	0,4	0,1	6,8	79,6	3,5	6,3	3,3	13,1	34,1	25,3
		4,4	1,1	32,5	50,0	6,9	3,8	1,3			
		-4,0	-1,0	-25,7	+29,6	-3,4	+2,5	+2,0			
	72-105	2,0	0,5	25,2	67,2	3,0	1,4	0,7	5,1	21,9	35,0
		5,2	1,3	34,4	45,8	10,7	2,4	0,2			
		-3,2	-0,8	-9,2	+21,4	-7,7	-1,0	+0,5			
	105-150	6,4	1,6	47,2	41,4	2,4	0,6	0,4	3,4	15,6	20,0
		17,2	4,3	42,5	30,8	4,5	0,5	0,2			
		-10,8	-2,7	+4,7	+10,6	-2,1	+0,1	+0,2			

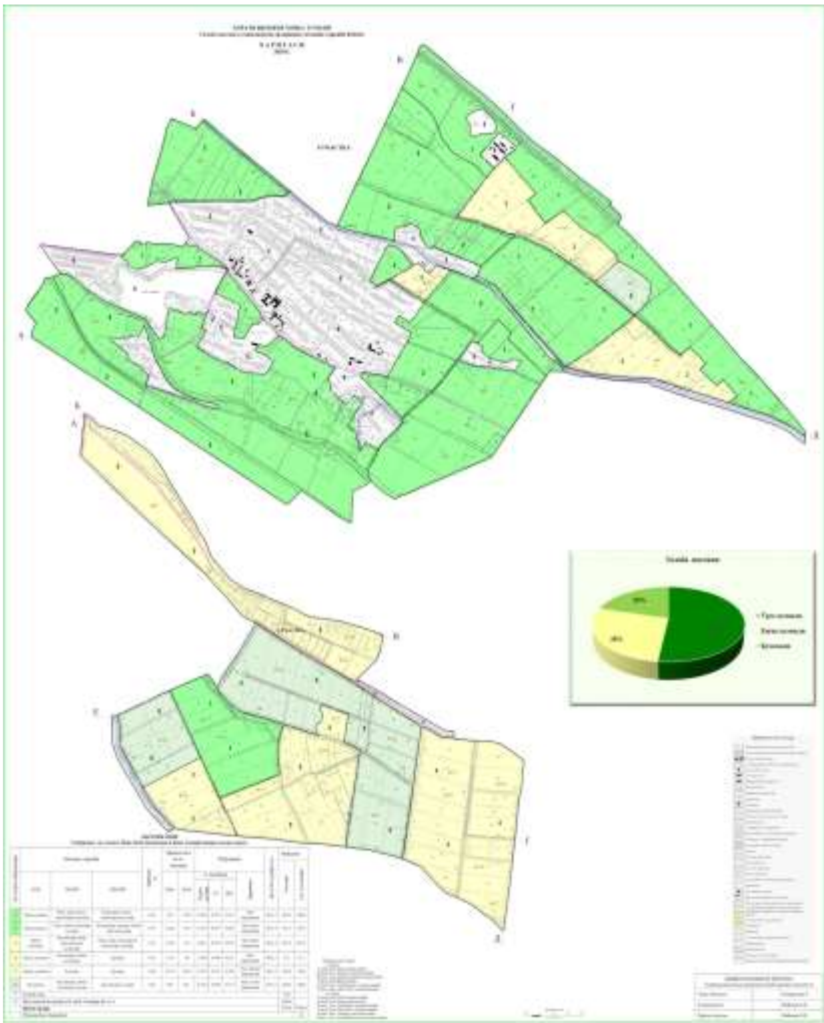
*Appendix: the first row shows the mechanical composition of the soil, the second row shows the microaggregate composition of the soil in the denominator, and the third row shows their difference (+;-).

Our data fully confirms the opinions of the above-mentioned scientists, and it is observed that aggregates are broken down to a certain extent as a result of watering and processing. For example, in old irrigated meadow soils, the total real aggregates in the tillage layer is 24-44%, and in the soils of the "Galaba" massif of Khanka district, it is 24-32% (Table 1).

The change of the surface layer of the irrigated soils, in turn, depends on the irrigated deposits and the composition of these deposits, which were formed as a result of irrigation through the Shavot, Polvon Ghazavot, canals. As a result of irrigation with turbid waters and human activities, an agro-irrigation layer was formed in a short time. It differs from the lower layers not only by its chemical properties, but also by its physical properties.

The mechanical composition of soils has the following description:

a) incompleteness of particles larger than 1 millimeter with a coarse skeleton (stone);
b) abundance of 0.1–0.01 mm particles;
c) excessive abundance of large dust (0.05–0.01) particles in most soils, their amount in some cases
It goes up to 50-70%;
g) very little (0.4-17%) of silt particles in sandy soils.



Picture. Cartogram of mechanical composition of irrigated soils of Ghalaba massif, Khanka district

Microaggregate composition of irrigated grassland soils plays an important role in determining soil fertility.

Relative mass (RM) is a somewhat stable unit, which depends on the chemical and mineralogical composition of soils and the level of humus supply. In the genetic layers of the old irrigated grassland soils of the "Galaba" massif, Khorezm oasis, Khanka district, the specific mass varies from 2.42 to 2.66 g/cm^3 (Table 2), which is characteristic for this area.

Table 2- General physical properties of irrigated hydromorphic soils of Khorezm oasis

Incision №	The incision is deep league, cm	Solisht Irma weight, g/cm3	volume weight, g/cm^3	Porosity, %	Incision №	The incision is deep league cm	Put harrow weight, g/cm^3	volume weight, g/cm^3	Porosity, %
	"Galaba" massif, Khanka district								
1	0-32	2,59	1,41	46	17	0-30	2,42	1,38	43
	32-53	2,66	1,52	43		30-45	2,45	1,44	42
	53-80	2,66	1,44	46		45-72	2,47	1,38	45
	80-103	2,64	1,43	46		72-105	2,42	1,26	48
	103-145	2,63	1,41	47		105-150	2,42	1,36	44
2	0-40	2,53	1,33	48	26	0-27	2,60	1,21	54
	40-60	2,57	1,39	46		27-43	2,62	1,53	42
	60-90	2,52	1,53	40		43-80	2,64	1,32	50
	90-110	2,48	1,42	43		80-116	2,62	1,42	46
	110-150	2,50	1,35	46		116-149	2,63	1,45	45

It was 2.42 g/cm^3 and 2.60 g/cm^3 in the plowed layer of the studied soils, and it increases towards the lower layer. This is because soils are similar in mechanical composition, but slightly different in mineralogical composition.

Volumetric mass (HM) is different in the tested soils. According to the obtained data, the volume mass close to the optimal indicator was 1.21–1.41 g/cm^3 in the plow layer of irrigated meadow soils, and it increased downwards to 1.52–1.53 It is observed that it is densified throughout the cross-section, making g/cm^3. The main reason for this is the large amount of small sand particles and their good location, as well as their washing and soaking.

It was found that the compaction is strong in soils with heavy mechanical composition, regardless of the periodicity of irrigation and the composition of different layers. In some cases, this density can be higher than the "critical density" indicators. At the same time, strong compaction occurs not only in the upper layers of soil sections, but also in their lower layers.

According to the obtained data, if the soil aggregates of the irrigated soils are broken down as a result of irrigation carried out over the years, continuous tillage in the driving layer is aimed at preventing its compaction. These two factors determine the volume mass of the upper and middle parts of the soil section. The driving layer is relatively soft, and the sub-driving layer is characterized by a dense structure. The densification of the lower layers is strongly influenced by the physical and chemical properties of the soil (formation of iron, manganese and magnesium compounds) and hydromorphism. In addition, the pressure of the upper layers has an effect on soils with close seepage.

General porosity (GP) is the function of soil porosity to raise dissolved substances in water, retain moisture, and provide air to the root area. The total porosity of the tested soils was a little higher at 46-54% in the plowed layers, and it was found that the cross-section decreased towards the lower layers and varied between 40-50%. The total porosity is highly dependent on the mechanical structure of the soil and is the largest porosity in sandy, loamy and light sandy soils and such layers. The total porosity of all types of old irrigated soils is large in the upper layer and decreases downwards, especially in the lower layer of the driving layer. The downward decrease of the total porosity occurs due to the weighting of the mechanical composition, the decrease in the amount of water-resistant aggregates, and the influence of soil-working mechanisms. High total porosity in surface layers is due to soil tillage and formation of aggregates.

3. Conclusion

The mechanical composition of the hydromorphic soils of the "Ghalaba" massif of Khanka district is distinguished by the composition of sand, sand, light and medium sand formed in alluvial deposits. The volume and specific mass of soils and soils are 1.21–1.53 g/cm^3 and 2.42–2.60 g/cm^3, regardless of their types. There is no significant difference in their amount by layer. The total porosity is 40-50 percent in the irrigated hydromorphic soils of the “Galaba” massif of Khanka district.

The mechanical composition of alluvial soils of the old irrigated grasslands of Khorezm oasis Khanka district “Galaba” determines their formation and is the main factor for agrotechnical measures designed for agricultural use and must be taken into account.

Knowledge of the mechanical composition of soils allows to determine the optimal periods of agricultural work, fertilization norms and periods, the most rational use of soil and the whole range of work on protection. Land planners, agronomists and other specialists need to consider the diversity of soil cover in terms of mechanical composition shown on soil mechanical composition maps.

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