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Agrophysical Properties of Irrigated Soils of Sirdarya District

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Abstract. The current state of agrophysical properties of irrigated soils of Syrdaryo district is analyzed in the article. In irrigated farming conditions, agrophysical properties of soils are important in increasing soil fertility. According to the obtained data, the mechanical composition of the soil is medium sandy, the amount of physical clay is 46.2% in the driving layer, 36.9% in the sub-driving layer, and its amount changes to 38.2% downwards. The largest part of microaggregates is the amount of large dust fractions (58.4 to 65.8%), especially in the arable layer. The specific gravity (SO) of irrigated gray-meadow soils is 2.63 g/cm3 in the upper part, increasing downwards to 2.65-2.66 g/cm3, bulk density (1.28-1.37 g cm3), total porosity (TP) is 49-51%.

Key words: water-physical properties, specific gravity, bulk density, total porosity, field moisture capacity, capillary moisture capacity, full moisture capacity, gray-meadow, water-resistant aggregate.

Introduction. Syrdarya region is distinguished by the variety of soil covers and is located in the area of gray soils. Moist (hydromorphic) and semi-moist (poluhydromorphic) soils are distributed in the area. Due to the acceleration of the development of new type of hydromorphic soils as a result of regular irrigation, as a result of the regular application of organic and mineral fertilizers to the land, new soils with their properties different from the previous natural soils began to form. As a result, salinization processes took place, its evolution accelerated, and the soil structure changed [7].

N.A. Dimo, M.M. Bushuev, M.M. Reshetkin, V.A. Kovda, M.A. Pankov, N.F. Bespalov, N.I. Zimina, M.Umarov conducted research in Mirzachol. , conducted by O.K. Komilov, R. Kurvontoev. Since the 1950s and 1960s, employees of scientific research institutes and scientists have been conducting scientific research on a large scale in order to improve the unfavorable land reclamation conditions caused by the development of new lands and irrigation in Mirzachol [1,2,3,4,5,6,7,8]. .

Research object and methods. The irrigated gray-meadow soils scattered in Syrdaryo district were selected as the research object. Soil research was conducted on the basis of generally accepted methods in the Republic.

Results and discussion. In our study, we analyzed the current agrophysical properties of irrigated gray-meadow soils of Syrdaryo district.

Irrigated gray-meadow soils are formed in conditions where the groundwater level is at 1-2.5 m. Gray-meadow soils are widespread in II-I terraces of Syrdarya, in irrigated meadow soil sediments, in deluvial-proluvial, loess and lake-alluvial deposits of Central Mirzachol [7].

Mechanical composition is important in maintaining soil moisture and providing plants with nutrients. The mechanical composition of the soils of this region is medium sandy, and the amount of physical clay is 46.2% in the subsoil layer, 36.9% in the subsoil layer, and its amount changes to 38.2% downwards. The smallest amount of large dust particles in the driving layer compared to the lower layers is 44.8%, in the upper layer it is 52.5%, and in the lower layers its amount changes up to 51.0%. Coarse dust is the most abundant of all particles. In general, the amount of all (large, small, medium) sand particles is low, and medium dust and silt particles are relatively high (Table 1).

The largest part of gray-meadow soils consists of large dust fractions, and the least amount is in the subsoil layer, which is slightly fragmented under the influence of tillage techniques (Table 1)

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Table 1.
Mechanical composition of irrigated gray-meadow soils

Layer depth, cm	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	<0,01
0-36	0,6	0,9	7,5	44,8	11,1	19,0	16,1	46,2
36-54	0,4	0,8	9,4	52,5	10,6	16,1	10,2	36,9
54-88	1,2	2,5	4,0	54,8	13,8	10,9	12,8	37,5
88-136	1,5	2,8	6,5	51,0	13,0	15,0	10,2	38,2

The presence and characterization of microaggregates is of great importance for agronomic evaluation. The hardness of microaggregates increases their resistance to the effects of water washing, especially in the lower layers.

The amount of large dust fractions (58.4 to 65.8%) is the largest part of gray-meadow soils, especially in the arable layer. The least amount is in the subsoil layer, which is somewhat fragmented under the influence of processing techniques. In large dust fractions, the process of formation of aggregates is shown to be strong (Table 2).

Table 2.
Microaggregate composition of irrigated gray-meadow soils

Layer depth, cm	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	0,01
0-36	0,6	0,9	10,6	65,8	5,9	14,3	2,0	22,2
36-54	1,0	2,0	21,9	55,7	7,9	9,5	2,2	19,5
54-88	0,4	0,6	9,0	62,0	8,8	14,5	4,5	28,0
88-136	1,7	2,9	11,3	58,4	10,3	13,6	3,0	26,9

Consumption and mobility of soil moisture and assimilation of nutrients are determined by physical and water-physical properties, and the quality of tillage is determined by physical-mechanical properties. The density of soil solids, that is, specific gravity, depends on its mineralogical composition and the amount of organic matter. The specific gravity (SO) of irrigated gray-meadow soils is 2.63 g/cm3 in the upper part, and increases downwards to 2.65-2.66 g/cm3.

Soil porosity is of great importance in raising water and substances dissolved in water, holding water, and providing air exchange in the root layer. Volumetric weight (1.28-1.37 g cm3), total porosity (TP) of gray-meadow soils is 49-51% (Table 3).

Table 3.
Water-physical properties of irrigated gray-meadow soils

Layer depth, cm	SO, г / см^3	SDL, г / см^3	TP, %	MG, %	DNS, %	KNS, %	THC, %	Water resistant aggregates		
								>1	1-0,25	>0,25
0-36	2,63	1,28	51	5,9	20,9	36,0	40,2	0,65	2,46	3,11
36-54	2,64	1,32	51	5,2	19,8	34,1	39,5	0,68	2,52	3,24
54-88	2,65	1,36	50	4,95	20,1	30,6	35,8	0,60	2,49	3,09
88-136	2,66	1,37	49	4,60	30,9	34,0	38,5	0,79	2,56	3,35

One of the most important factors determining soil fertility is water properties (Table 3) in order to assess the level of fertility of gray-meadow soils of Syrdaryo district, to create their optimal land reclamation conditions and irrigation norms and procedures.

The maximum hygroscopic moisture content was 4.95-5.9% due to the relatively large amount of water-soluble salts.

The field moisture capacity of gray-meadow soils is closer to the capillary moisture capacity at a depth of 1 m, i.e. close to seepage water. Capillary moisture capacity and total moisture capacity are almost

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the same across the cross-section, except for the layer at a depth of 54-88 cm, where their amount is slightly less.

Water-resistant macroaggregates amount to 3.11% in the driving layer, while it varies up to 3.34% in the sub-driving layers.

In conclusion, the agrophysical properties of the irrigated soils of the region have undergone changes as a result of regular irrigation and the implementation of agrotechnical measures, and it is recommended to use resource-efficient technologies to improve their properties.

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