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RESEARCH OF THE AGROPHYSICAL CONDITION OF IRRIGATED GRASSLAND SOILS (on the example of Karakol district)

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Annotation. The article describes the influence of anthropogenic factors on the mechanical and micro-aggregate composition of the irrigated meadow soils of the Karakul oasis. Changes in morphology in the genetic horizons of soils, in particular, mechanical and micro aggregate compositions studied by methods of soil science.

Key words: anthropogenic factor, mechanical and micro-aggregate composition, medium, fine and coarse sand, coarse, medium and fine salty fractions.

Annotasiya. Ushbu maqolada Buxoro viloyati Qorako'l tumanida sug'oriladigan o'tloq tuproqlarining antropogen omillar ta'sirida mexanik va mikroagregat tarkibini o'zgarishi ko'rsatilgan. Tuproqlarning genetik qatlamlaridagi morfologik o'zgarishlar, xususan, mexanik va mikroagregat tarkibi, tuproqshunoslikda qabul qilingan usullar orqali ifodalangan.

Kalit so'zlar: antropogen omil, tuproq mexanik va mikroagregat tarkib, o'rta, mayda va yirik qum, yirik, o'rta va mayda chang, tuz zarrachalar.

Аннотация. В этой статье излагается влияние антропогенных факторов механического и микроагрегатного состава орошаемых луговых почв Каракульского оазиса. Изменения морфологию в генетических горизонтах почв, в частности, механические и микроагрегатные составы исследованных методами почвоведения.

Ключевые слова: антропогенный фактор, механический и микроагрегатный состав, средне-мелко и крупно песчаные, крупно-средне и мелко пылеватые и илистые фракции.

INTRODUCTION. Extensive scientific research has been carried out in foreign countries and in our republic on soil fertility, its management and other properties. The irrigated meadow soils distributed in the Karakul oasis differ from each other in their properties not only in soil regions, but also in soil climatic conditions.

The morphogenetic structure, geographical location and land reclamation status, agrophysical and agrochemical properties of the soils of the Karakul oasis and other regions have been studied by a number of Uzbek scientists: INFelisiant [15], K.Gafurov, S.Abdullayev [1, 4], R.Qo'ziyev [8, 9], L.A.Gafurova [5], Sh.M.Bobomurodov [3] R.Kurvantayev [6, 7, 10, 11], M.Umarov [13], X.T.Artikova [2]. S.M. Nazarova [12], O.Sharipov [14] , etc. However, there has been insufficient scientific research on the agrophysical properties of the irrigated meadow soils of the Karakul oasis at the present time.

Irrigated meadow soils distributed in the Karakul oasis, located in the lower reaches of the Zarafshan River, were selected as the object and methods of research.

The research was conducted in soil-field and analytical laboratory conditions, using manuals such as " Theory and Methods of Physical Soils", "Guidelines for Conducting Chemical and Agrophysical Soil Analyses in Soil Monitoring", "Methods of Conducting Field Experiments", and the reliability of the data obtained was verified using Microsoft Excel software based on the manual "Methods of Field Experiments" by B.A. Dospechov.

Analysis and results. The mechanical composition of soils significantly affects the following properties: physical, water, chemical, physico-mechanical, biological, thermal, etc. The ability of soils to retain and carry moisture, thermal regime, physico-mechanical properties, their specific resistance during soil processing, maturation periods, viscosity, compaction, subsidence, etc., directly depends on the mechanical composition. The mechanical composition of soils in which scientific research has been conducted is diverse and is mainly determined by the composition of the parent rocks that form the soil and human activity.

The mechanical composition of the soil is the main morphological indicator, and all types of soils, and therefore all the genetic layers that make it up, have their own mechanical composition. For example, sand, sandy, sandy loam, loam (light, medium, heavy) and clay (light, heavy) mechanical compositions are characteristic of one or another genetic layer and sublayer.

It is of great practical importance to map the mechanical composition of the widespread and irrigated meadow alluvial soils in the Karakul oasis. Meadow alluvial soils are not only sandy, sandy loam, loamy and clayey in cross-section , but also have a very complex mechanical composition with a layered structure. From the upper layer of the cross-section to the bottom, a gradual increase or decrease in weight is observed, as well as a rapid change of layers. In such complex lithological conditions, a specific regime of nutrients, water, air and heat is necessarily formed. In this regard, it is recommended to not only map the irrigated lands of the oasis, but also map the mechanical composition of the soils for each farm plot. This, in turn, will allow solving the problem of improving the fertility of irrigated soils, especially their reclamation, on a scientific basis. It should be noted that the chemical composition of the soil, especially its absorption capacity, humus content, etc., of course, varies greatly depending on the mechanical composition.

The obtained data indicate that the mechanical composition of the soils differs between administrative districts and geomorphological regions. The soils of the Karakul oasis are considered to be soils formed in the lower reaches of the Zarafshan River and include sandy,

loamy, light, medium, and heavy loams in terms of mechanical composition.

Analysis of the data obtained shows that medium and light loamy soils occupy the largest area (10,509 ha), while loamy and sandy loam soils occupy 1,177-1,830 ha.

The soil sections of the Karakul oasis located in the Lower Zarafshan region can be divided into 5 main groups according to their mechanical composition: uniformly light; uniformly heavy; layered, lighter from bottom to top; and soils with different mechanical compositions, heavier from bottom to top. The change in the mechanical composition of soils along the section has a strong impact on the water-physical properties of the soil and the salt regime.

In the soil the mechanical composition of irrigated meadow soils, which are widespread in the Karakul oasis, is mainly composed of the following particles: coarse sand (1-0.25 mm) up to 0.4-3.6%, medium sand (0.25-0.1 mm) 0.1-0.9%, fine sand (0.1-0.05 mm) 34.4-51.1%. The deposits of these soils also differ in the abundance of fine sand particles, in some sections their amount is 46.2-51.1%. The largest number of large dust (0.05-0.01 mm) particles is up to 34.6-69.2%, and their greatest amount is formed in clayey mechanical composition layers on farms where farming is carried out , and the least amount is formed in light soils. Large dust particles (0.05-0.01 mm) are higher than medium and fine dust in all sections, up to 32.2-35.6%. Silt particles (less than 0.001 mm) are 2.7-9.6%, and are even less abundant in layers with a heavy mechanical composition. In recent years, an increase in fine sand particles and a decrease in large dust particles have been observed in the region. This is due to the fact that dust particles are washed out under the influence of irrigation.

The mechanical composition of soils is characterized by:

a) complete absence of coarse skeletal (stony) particles larger than 1 mm;

b) a large amount of particles of 0.1-0.01 mm;

c) excessive presence of large dust particles (0.05-0.01 mm) in most soils, their amount reaching 35-69% in some cases;

g) The presence of very few clay particles in loamy soils (0.1 - 3.6 %).

The above data indicate that the mechanical composition of the old irrigated soils is somewhat heavier. This is certainly due to the influence of anthropogenic factors on the surface layers of the soil. Most of the soils distributed in the farms of the district bordering the sandy desert area belong to the sandy and sandy mechanical composition, and their level of culture is somewhat lower.

The amount of fine sand particles (0.1-0.05 mm), the amount of the above-mentioned particles in the Dargali massif of Karakul district, is not evenly distributed across the cross-section. Its amount fluctuates around 34.4-51.1%. It should be noted that the amount of particles in the above-mentioned soils is distributed to different degrees. For example, large dust particles (0.05-0.01 mm) make up 34-69%.

The Karakul oasis differs in their mechanical composition. Since the soils irrigated in the farms of the Karakul oasis are diverse in their mechanical composition, the agrotechnical (plowing, irrigation, cultivation, fertilization, etc.) and land reclamation (salt leaching, construction of a system of collector ditches, recording the depth of seepage water, etc.) measures carried out must be stratified according to their mechanical composition.

6, 7, indicating the reasons for the natural fertility of the soils of the lower reaches of the Zarafshan River, writes that the high content of dust particles with a size of 0.05-0.01 mm and a high amount of resistant microstructural elements with a size larger than 0.01 mm in these soils ensures the formation of

the best capillary porosity, high moisture capacity and high water-holding capacity.

Grassland soils are characterized by microaggregate particles consisting mainly of fine sand (0.1-0.05mm) and coarse dust (0.05-0.01 mm) particles, that is, they are microstructured, which is characterized by good capillary porosity, high moisture capacity, providing a high amount of moisture, and nutrient mobility, which determine the high fertility of the soils.

Table

Mechanical and microaggregate composition of irrigated meadow soils of the Karakul oasis

Cut No.	Layer depth, cm	Fraction size , in mm , amount in %							Physical clay (< 0.01mm)	True number of units	Dispersed k coefficient
		>0.25	0.25-0.1	0.1-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001			
9	0-35	3.6	0.9	46.2	12.3	18.1	13.7	5.2	37.0	12.5	76.9
		0.8	0.2	48.4	22.6	12.4	11.6	4 .0			
		2.8	0.7	-2.2	-10.3	5.7	2.1	1.2			
	35-6 2	0.4	0.1	43.7	26.2	10.6	9.4	9.6	29.6	11.4	43.7
		0.4	0.1	42.3	37.6	6.8	8.6	4.2			
		0	0	-1.4	11.4	-3.8	-0.8	-5.4			
	62-90	0.8	0.2	37.5	32.2	6.9	18.0	4.4	29.3	10.6	63.6
		0.5	0.1	42.4	37.9	6.7	9.6	2.8			
		0.3	0.1	-4.9	-5.7	0.2	8.4	1.6			
	90-115	0.8	0.2	34.4	25.9	9.1	23.9	5.7	38.7	22.5	59.6
		1.2	0.3	44.9	37.4	8.2	4.6	3.4			
		-0.4	-0.1	-10.5	-11.5	0.9	19.3	2.3			
	115-147	0.8	0.2	43.0	35.6	6.3	11.0	3.1	20.4	11.7	70.9
		0.4	0.1	54.7	31.2	5.3	6.1	2.2			
		0.4	0.1	-11.7	4.4	1.0	4.9	0.9			
	147-186	0.8	0.2	51 .0	29.7	8.3	6.6	3.4	18.3	16.5	70.5

***Appendix:** The numerator of the table represents the mechanical composition of soils, and the denominator represents the microaggregate composition.*

From an agronomic point of view, it is sufficient to know not only the size of the mechanical elements of the soil, but also the presence of microaggregates in the soil, which are formed from a number of mechanical elements. At the same time, it is important to study the ability of these mechanical elements to resist washing out under the influence of water. The description of sandy and clayey soils is an important aspect in assessing soil structure, especially water permeability. The microagricultural composition of the soils of the Karakul oasis is diverse, which is associated with their genesis, morphology, soil-forming parent rocks and human cultural irrigation activities. [12, 11, 14, 8].

Currently, as a result of numerous studies characterizing the composition of soil aggregates, a large body of evidence has been accumulated, and the reasons for the formation of macrostructure in irrigated soils through the use of cotton-alfalfa rotation, siderates, additional organic and structure-forming substances have been studied. The structural state of irrigated soils of Uzbekistan is influenced by alfalfa and other perennials. It has been found that herbs have a positive effect.

Our data fully confirm the opinions of the above-mentioned scientists, and as a result of irrigation and processing, some aggregates were observed to a certain extent to be broken down. These soils also differ in the amount of fine sand particles in their composition. It was

observed that the amount of the largest dust particles (0.05-0.01 mm) decreased by 22.6-39.1%. It is possible to see that the amount of fine dust and silt particles in the soils increased. For example, the “Darg'ali” massif of the Karakul district. In the soils of the Karakul region, the content of fine dust was 1.2-10.2% and 0.8-3.0%, respectively. In recent years, these indicators were 2.2-4.2%. These results show that the amount of real aggregates in the Karakul region has increased, that is, the process of structuring in the soil can be observed.

In short, the mechanical composition of the irrigated soils of the Karakul oasis is somewhat lighter, with a lower content of microaggregates and a higher decomposition coefficient.

The change in the surface layer of irrigated soils is primarily due to irrigation deposits and the composition of these deposits, which were formed as a result of irrigation through the Zarafshan River and the Amu-Karakol canals.

As a result of irrigation with turbid waters and other factors of human activity, an agroirrigation layer was formed in a short time. It differs from the lower layers not only in its chemical properties, but also in its physical properties.

Mechanical and microaggregate composition is a key factor in controlling all processes in the soils of the Karakul oasis, and in turn serves as a key indicator in developing the necessary measures for the effective use of soils. When cultivating, irrigating, fertilizing, and planting various crops, it is necessary to stratify the soils taking into account their mechanical composition. From these results, the following conclusions can be drawn:

Conclusion. The mechanical and micro-aggregate composition of the soil is the main indicator of morphological, melioration, waterphysical and physical-mechanical, as well as soil improvement, and expresses the specificity for all genetic layers of varioustypes and subtypes of soils. Geomorphological regions are distinguished by their specificity in terms of the mechanical and microaggregate composition of soils. These soils consist of loams, light, medium, and heavy loams according to their mechanical composition.

The mechanical and microaggregate composition of irrigated meadow soils is mainly determined by the following mechani-cal elements: fine sand (0.1-0.05 mm), coarse dust (0.05 0.01 mm) particles are in higher proportion than coarse, medium sand and medium, fine dust in all cross-sectional and geomorphological regions. It can be seen that the mechanical composition of the soils distributed in the district farms, where irrigated farming has been practiced for a long time, is somewhat heavier. This is certainly due to the influence of anthropogenic factors on the surface layers of the soil. Most of the soils distributed in the district farms bordering the sandy desert region belong to the sandy and sandy mechanical composition, and their level of culture is somewhat lower.

The mechanical and microaggregate composition of soils is as follows: incomplete absence of coarse skeletal (stony) particles larger than 1 mm; an abundance of particles 0.1-0.01 mm; in most soils, an excessive abundance of large dust (0.05-0.01) particles is characteristic, in some cases their amount reaches 35-50%, and a very small number of fine particles (2.7-6.6%).

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