Granulometric composition irrigated soils of Bukhara region

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Abstract. The article describes the characteristics of common soil types and their particle size distribution in the Bukhara oasis. In the Bukhara oasis, various types of automorphic, hydromorphic, and semihydromorphic soils, which differ in grading composition, are mainly distributed. In the old irrigated zone of the oasis, old-irrigated meadow heavier and medium loamy soil varieties are common.

1 Introduction

Bukhara and Karakul oases in the south of the Zarafshan valley in the north and west border the Kyzyl Kum desert, and in the south and southeast the Karshi steppe. The Zarafshan Valley, located in contact with the Pamir-Alai ridges and the KyzylKum desert, has a very diverse surface structure. Irrigation zone The Zarafshan valley is a part of the subtropical desert zone, the Central Asian desert province, Zarafshan district. Features of the surface of the valley are determined by the geological structure, development history, and the diversity of the relief-forming factors in the territory [1-25].

2 Materials and Methods

Soil formation according to V.V. Dokuchaev [2; 595 p.], The result of the interaction of living and dead nature, from this doctrine of the regular relationship between organisms and inanimate nature. The doctrine of the zones of nature flows, that is, the environment in which the process of interaction between living and dead nature takes place.

N.N. Rozov [12; pp. 201-219] writes that the term “soil development” means the gradual formation of a soil profile from a parent rock with an unchanged set of soil formation factors. At the same time, underdeveloped and well developed soils stand out, which differ from each other in the thickness of the profile and the presence of the main genetic horizons characteristic of this soil.

At different time periods, the soil cover of the Bukhara region was studied by various scientists, despite the recent periods published by them in scientific works on the inputs of the Amu-Bukhara canal and, in connection with the improvement of water supply in the

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oasis, positive and negative actions occur [1; 132 p., 3; 3-102 p., 6; 125-129 s., 7; 182-183 p., 8; 111-116 p., 9; 268-269 p.].The study of these actions is relevant issues.

3 Results and Discussion

Within the Bukhara region, hydromorphic, automorphic, and transitional soils of the desert zone stand out, which are formed on deposits of various genesis and age. Moreover, the effect of the desert affects all soils, especially in the salinization and grading composition of soils. According to many scientists [3; 3-102 s, 4; 352 p., 5; 18-19 p., 10; 1-4 p., 11; 222 p., 15; 210-216 p.], During soil research in the left-bank part of the Bukhara oasis, along the riverbed of Zarafshan, old-irrigated, meadow-takyr soils were formed on its riverbed elevation. In the right-bank part of the delta, probably also dominated by irrigated meadow-takyr soils.

The most widespread are irrigated (old irrigated, newly irrigated and newly developed) meadow soils. They are found in almost all geomorphological sections. They are formed at a depth of groundwater of 1-2.5 (3) m. According to the degree of salinization, various: from lightly salted and washed to highly saline. It is caused, first of all, by specific reclamation conditions.

As a result of land reclamation measures, takyr-meadow, old-fall meadow in combination with marsh-meadow and salt marshes, gray-brown soils were transformed into old-irrigated meadow alluvial soils. According to the grading composition of the soil, they were mainly heavy and medium loamy. The humus content in the arable horizon of these soils was 1.5-2.5%.

According to the researchers [8; 111-116 p., 13; 106 p., 14; 152 s.] The total content of phosphorus and potassium in the arable layer ranged from 0.08 to 0.20% and 1.01-2.63%, respectively. Thus, these soils were rich in potassium reserves and poor in phosphates. The content of CO2 carbonates along the profile ranged from 6.8 to 9.8%. Along with irrigated meadow-takyr soils in the left-bank part of the delta, subject to the occurrence of groundwater at a depth of 1-3 m, meadow soils were formed. They were located on weakly elevated relief elements among the surrounding surplus-hydromorphic soils and saline depressions. Meadow soils were old deposits with a medium-power agro-irrigation horizon.

The profile according to the particle size distribution was heavy and medium loamy, less often light loamy. Formed with close occurrence of fresh or weakly mineralized groundwater, meadow soils were covered with lush vegetation, contributing to the formation of thick sod (10-12 cm) with a pronounced lumpy soil structure.The humus content in the sod horizon reached 3.5%. In highly saline soils, the vegetation cover was sparse, the turf unstable and less powerful. The humus content in them was 1.0-2.2%. The content of gross phosphorus in soils ranged from 0.17-0.12%, potassium 1.8-2.4%. The amount of carbonates in the profile varied from 7 to 8%. Old-fall meadow alluvial soils were, to varying degrees, subject to salinization: slightly to medium- and highly saline. In the sod horizon, the salt content reached 1.6-4.0%, in the lower lying up to 0.3-0.6%.On the Karakul part of the Zarafshan delta, before the construction of the Amu-Karakul canal, with deep occurrence of groundwater (3-5 m), irrigated meadow-takyr (takyr-meadow) soils developed [8; 111-116 p.].

Irrigated meadow alluvial soils vary in grading composition, closer to irrigation systems it is lighter and heavier with increasing distance from the irrigator. In side-grown meadow soils, the upper layer is covered with an agro-irrigation layer, therefore their composition is uniform to a depth of 1-3 meters. According to the particle size distribution, they are medium and heavy loamy.

Among the meadow soils on the territory of the modern and ancient Zarafshan delta, as well as in its floodplain and on the first floodplain terrace, marsh-meadow soils are located

in small massifs, a significant part of which is irrigated. These soils are formed in local depressions with a depth of groundwater of 0.5-1 m, in conditions of intense saline process. According to the grading composition, these soils are mainly heavy and medium loamy, although light loamy sand is also found within the ancient Zarafshan delta.

The same local areas, on the periphery of the oases, are virgin-fallow meadow and bog-meadow soils, very highly saline, sometimes turned into salt marshes. They occupy low relief elements. By grading composition, they are various: from heavy loamy to sandy loam.

Meadow-takyr soils are distributed only in the upper part of the Bukhara delta of Zarafshan. They are formed among meadow soils on elevated elements of the relief with relatively weak moistening with groundwater occurring at a depth of 3-4 (5) m. All meadow-takyr soils of the Bukhara region are old-irrigated. The upper part of the profile of these soils to a depth of 1-2 m is composed of agro-irrigation sediments, represented mainly by medium and heavy loams.

Takyr-meadow soils in the initial period of development differ little from takyr. According to the grading composition, the described irrigated takir-meadow soils are light loamy, virgin-fallow medium and heavy loamy, crushed, with pebbles lined with 0.4-1 m.

Takir soils within the irrigation zone are found on ancient alluvial and proluvial plains. They are formed at a depth of groundwater of more than 5 m. Under natural conditions, the crust, subcortical horizon and compacted illuvial horizon stand out in the soil profile. Below are deposits that are weakly affected by soil formation. According to the grading composition, the arable horizon of takir soils is mainly medium and heavy loamy.

Desert sandy soils are formed on the sands, fixed by vegetation, primarily sand sedge, which forms a sod horizon with a powerful root system. Its thickness together under the sod horizon reaches 12-15 cm. Below is a transition horizon with carbonate neoplasms, and loose sands, which serve as parent rocks.

Gray-brown soils are distributed on the periphery of the irrigation zone. They are formed when deep groundwater (more than 10 m) occurs on the deluvial-proluvial deposits of widely wavy plains and on the eluvium of the tertiary plateaus. Gray-brown soils are also found within the ancient alluvial plains. Here they are developed, as a rule, on the outlier surfaces, whose age is much greater than the age of the ancient alluvial plains.In all cases, parent rocks have a different particle size distribution and contain coarse skeletal wood-gravel-gravel material. In some places under the finely serpentine cover, up to one meter thick,pebbles lie. The gray-brown soils are distinguished by a shortened, but well-formed profile, clearly differentiated into genetic horizons. According to the grading composition, gray-brown soils are various: from sandy-sandy to heavy loamy.

In recent years, due to a deficit in oasis land reserves development began to involve in irrigated agriculture unsuitable soils located in the north of the Bukhara region. Here, on the deluvial-proluvial deposits, gray-brown soils are formed in combination with sand. By grading composition, these soils are predominantly light loamy and sandy-sandy. Humus in these soils is small from 0.2 to 0.6%. Carbonates 3-6%. Virgin gray-brown soils from the surface are not saline, but saline. The salt content at a depth of 0.3-0.6 m reaches 1-2%.The development of these lands, accompanied by vegetative and irrigation , causes a rise in groundwater up to 3-4 m and the evolution of automorphic gray-brown soils at the first stage of development in semi-hydromorphic gray-brown-meadow. By grading composition, newly irrigated gray-brown-meadow soils are light loamy on light loamy-loamy and sandy skeletal deposits. According to the profile, gypsum crystals and rare rust spots are found in them. The humus content in the arable horizon of newly irrigated gray-brown-meadow soils varies from 0.4 to 0.8%, nitrogen 0.036-0.087%.The availability of soils with mobile forms of phosphorus and potassium in the arable horizon is low: 12-27 and 50-200 mg / kg of soil, respectively. Carbonates in the profile of 5-6%. Soils are slightly salted, washed out in

places. The type of soil salinization is chloride-sulfate. Irrigated soils in the lower river valley. Zarafshan, within the Bukhara region, it should be noted that a stable tendency of soil hydromorphization prevails here.The availability of soils with mobile forms of phosphorus and potassium in the arable horizon is low: 12-27 and 50-200 mg / kg of soil, respectively. Carbonates in the profile of 5-6%. Soils are slightly salted, washed out in places. The type of soil salinization is chloride-sulfate. Irrigated soils in the lower river valley. Zarafshan, within the Bukhara region, it should be noted that a stable tendency of soil hydromorphization prevails here.At the current level of land reclamation of the lower reaches of Zarafshan, the above trends will continue in the future and lead to desertification of soils. Hydrogeological conditions in the lower river valley. Zarafshan, where the extra arid climate dominates, and are characterized by a stable high standing in varying degrees of mineralized groundwater (1-3m), soil changes occur mainly at the generic, species, and less often under typical levels. A very tense reclamation situation is formed here. Soil salinization, as one of the factors of their desertification, is manifested to a higher degree than in the middle part of the Zarafshan valley, which requires the use of a range of land reclamation measures.

The general watering of the territory, as well as vegetation and irrigation contribute to the formation of a soil-water horizon at a depth of 1-3-5 m. In this regard, gray-brown soils eventually evolve first into gray-brown meadow soils, and then into meadow. Gray-brown-meadow soils, like gray-brown soils, have different particle size distribution and salinization.

The grading composition of the irrigated soils of the Bukhara region mainly consists of heavy loamy, medium loamy, light loamy, sandy loam and sandy ones, their area in the region is respectively heavy loamy-22,798 hectares, medium loamy-73750 hectares, light loamy-sandy sand-sandy, 115,332 hectares, 115,331 hectares, sandy loam ha (figure).

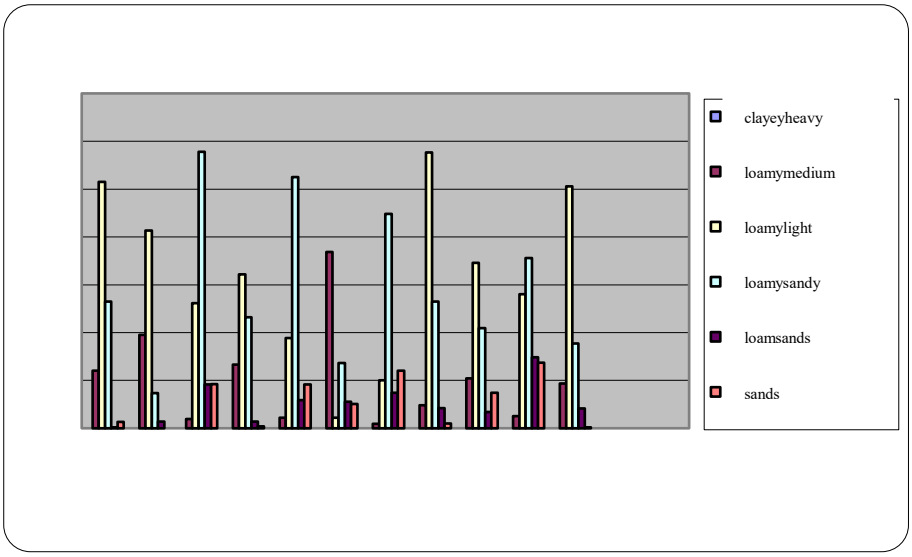

Fig. 1. Areas of mechanical composition of irrigated soils of the Bukhara oasis, ha

The variety of grading composition of soils in the Bukhara region depends on their genesis, morphology, parent rocks and cultural and irrigation activities of humans. The results obtained show that, compared with other areas, the largest areas are heavy loamy soil differences in Karavulbazar (7371 ha), Vabkent (3905 ha), Kagan (2665 ha), Bukhara (2414 ha) and Gijduvan (1879 ha) areas.The largest areas are occupied by medium- and

easy-loamy varieties and between the districts the Romitan (11535 ha), Bukhara (10300 ha), Gijduvan (10123 ha), Vabkent (8269 ha) medium loamy areas, Zhandarsky (11565 ha), and Karakul (10509 ha) are diverse.)Alat, (8963 ha), Shafirkan (7113 ha) districts of sandy and sandy varieties.

Basically, the particle size distribution consists of the following particles: coarse sand (1–0.25 mm) 0.4–17.6%, medium sand (0.25–0.1 mm) 0.1–3.6%, fine sand (0.1–0.05 mm) 10–47.2%, in some sections it makes up 30–47%. Soils of the Vabkent region according to the grading composition consist of sandy, light, medium, heavy loams. Jandar area covers sandy, sandy loam, light, medium, heavy loam. In the Kagan region, sandy, sandy, sandy, light, medium, and loamy soils are widespread.The soils of the Karakul region in terms of particle size distribution consist of sandy loamy sand, light, medium, and heavy loam. From the foregoing, it can be seen that in the farms of districts from ancient times engaged in agriculture in old soil, there was an increase in the grading composition of soils. This shows the results of the influence of anthropogenic factors. On the borders of the region, desert-sandy areas of farms are widespread in many cases of sandy and sandy soil differences, their state of cultivation is very low

4 Conclusion

In the Bukhara region, various types of irrigated meadow, bog-meadow, takyr, meadow-takyr, gray-brown, meadow-gray-brown, desert-sandy soils are widespread. particle size distribution is actively involved in soil processes, the use of soil resources in its turn, and when developing the necessary measures, is the main indicator. In the Bukhara region, various types of soils are distinguished by grading composition. Depending on the particle size distribution, it is necessary to conduct differentiated tillage, irrigation, land washing, applying mineral and organic fertilizers and placing various crops.

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