ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE

ISSN: 2692-5206, Impact Factor: 12,23
American Academic publishers, volume 05, issue 04,2025

Journal: https://www.academicpublishers.org/journals/index.php/ijai

UDK. 626.86: 575.1

RESEARCH OF IRRIGATED SOILS AND THEIR PROPERTIES OF THE BUKHARA OASIS (on the example of OLOT district)

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Annotasiya.Из 4304,32 тыс. га орошаемых земель нашей республики большую часть (около 50%) составляют засоленные в разной степени почвы, что снижает общую продуктивность сельскохозяйственных культур на орошаемых массивах. В статье представлена подробная информация об орошаемых почвах Олотского района и их свойствах. Кроме того, были приняты меры по повышению плодородия почв.

Annotation. The main part (about 50%) of the 4304.32 thousand hectares of irrigated land of our republic is saline soils to varying degrees, which reduces the overall productivity of agricultural crops in irrigated areas. This article provides detailed information on the irrigated soils of the Olot district and their properties. In addition, measures to improve soil fertility are presented.
Ключевые слова: Олотский район, орошаемые почвы, механический состав почв, дельта реки Зарафшан, мелиорация земель, плодородие почв, нормы орошения, засоление, материнская порода, пролювиальные, аллювиальные, лессовидные пески, грунтовые воды, минерализация.

Key words: Olot district, irrigated soils, mechanical composition of soils, Zarafshan River Delta, land reclamation, soil fertility, irrigation standards, salinity, parent rock, proluvial, alluvial, loess-like sands, groundwater, mineralization.

ntroduction. Bukhara region is located in the lower reaches of the Zarafshan River. The entire oasis consists of areas formed by wide and short river beds. In the wide part of the river, in the lower part of Bukhara, the Kara Kul oases are located.[3.4.]

The Bukhara oasis enters the Tertiary deposits of the Avtobacha and Kyzyltepa plateaus of the Navoi-Konimiyek Khazar thrust. According to the natural zoning of agriculture, Bukhara region belongs to the subtropical desert zone of the southern Kyzyl-Kum and northern Kyzyl-Kum districts of the Central Asian steppe province.[11.12]

The reason for the deterioration of the ecological and reclamation situation in the irrigated dekhkan region is the result of the extensive use of existing water and land resources. In all

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projects for the development of new lands, it was planned to discharge the waters of the collector-drainage networks into the lowlands and riverbeds.

As a result of the large-scale implementation of projects that are not theoretically and practically justified, the quality of river waters is sharply deteriorating, artificial lakes and swamps are formed around the developed areas, the natural balance is disturbed, and the ecological situation is deteriorating.

The most negative aspect of salinization is that it destroys the soil structure, worsens the water-physical, physico-chemical properties, affects the microbiological activity and other properties of soils, causing soil degradation.

This requires inspection of the areas, a thorough study of the degree of salinity of the soil cover and soil subsoil, types of salinity.

Research object and method. In scientific research conducted to study the main properties and ecological and melioration state of irrigated soils of the Olot district of the Bukhara vozh, new data were obtained on the mechanical composition of irrigated soils, agrochemical properties, main parameters of groundwater, types and levels of salinity.

In the Olot district, various geomorphological, lithological, hydrogeological and climatic conditions have influenced the soil formation processes in the region in different directions. As a result of natural geographical conditions and the influence of anthropogenic factors, irrigated meadow and barren soils have been formed in the district. In the area of the district where the research was conducted, there are irrigated meadow and barren and partially meadow swamp soils.

The irrigated lands of the Olot district, including F. Aloev, O. Ubaydov, developed in the V-VI centuries BC on Quaternary alluvial deposits located at a depth of 14-20 m. Nowadays, the upper part of these alluvial deposits is covered with modern, cultural anthropogenic agroirrigation layers. The level and degree of mineralization of groundwater are distributed in these local and alluvial rocks, which periodically lead to the formation of various salinization processes under the influence of various micro- and mesoreliefs.[2.]

Soil samples taken from the Olot district were chemically analyzed in laboratory conditions, the amount of salts was determined, and the type and degree of salinity in them were determined according to the I and II methods of water absorption (Lebedev).

As a result of field research and laboratory analysis, it was found that the quantitative indicators of salts, the degree of salinity and types of salinity differ in different areas of the district.

Mapping materials based on water absorption analyses and data from other modern rapid methods for determining the degree of soil salinity (electroconductometric method) serve as the primary sources for recording, accounting and compiling cartograms of saline soils.

In order to ensure the implementation of the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated February 24, 2014 No. 39 “On additional measures to ensure the unconditional implementation of the State Program for Improving the Reclamation Condition of

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Irrigated Lands and Rational Use of Water Resources for 2013-2017", the Subsidiary Enterprise of Soil Bonitation, the Scientific Research Institute of Soil Science and Agrochemistry and the Bukhara and Andijan branches of the Uzdaverloyiha DILI carried out work to determine and map the levels of soil salinity of irrigated agricultural land in 93 districts of the republic's regions during 2014-2017. Accordingly, out of a total of 226.4 thousand hectares of irrigated land in Bukhara region (12 districts), 192.8 thousand hectares (85.1%) are saline to varying degrees, of which 119,900 hectares (52.9%) are weakly saline, 49,200 hectares (21.8%) are moderately saline, 15,200 hectares (6.7%) are severely saline, and 8,476.8 hectares (3.7%) are very severely saline. (3)

There are a total of 17,218.0 hectares of irrigated land in Olot district, of which 13,233.1 hectares (76.9%) are saline to varying degrees. The salinity level is as follows: 4,478.9 hectares (26.01%) are weakly saline, 5,012.5 hectares (29.11%) are moderately saline,

Table 1

Characteristics of irrigated soils of Olot district according to the degree of salinity

Salinity level	Total irrigated land	Unsalted	Weak	Average	Strong	Very strong
Area, in hectares	17218,0	3985,0	4478,7	5012,5	2038,7	1703,1
Area, in %	100	23,14	26,01	29,11	11,84	9,9

In the conditions of the natural and artificially drained district, as a result of irrigation at high rates for many years, large amounts of water that have been absorbed, merging with groundwater, allow them to rise sharply to the surface, which in turn leads to rapid salt accumulation in the soil and deterioration of the reclamation condition of irrigated lands. The state of groundwater is seasonal, and if the depth typical for these lands decreases to 2-3 meters after the end of the growing season, it increases to 0.5-1.5 meters during the growing season, with an amplitude of seasonal fluctuations of 1.0-1.5 meters.

The fact that the main part of the district is located much higher than the optimal depth, regardless of the geomorphological region to which they belong, in turn actively participates in the processes of soil formation and soil salinization.

The irrigated soils distributed in the Olot district are classified by their mechanical composition as heavy sandy loam and clayey, medium sandy loam, light sandy loam and sandy loam. Medium sandy loam and sandy loam are widespread.

Experiments show that with the lightening of the soil mechanical composition, the absorption capacity and the water column increase, the leaching of salts becomes easier, and vice versa, not only does it become more difficult, but also the capillary rise of saline waters

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negatively affects the saline vegetation that has appeared in the depths of the soil where the root system is located.[4]

During scientific research, it became clear that the amount of physical clay in the mechanical composition of these soils changes with distance from the canal. If in the areas located closer to the canal, the amount of physical clay is 30-32% in a thickness of 0-66 cm, then in areas located at 200 and 300 m, the amount of these fractions increases to 40%. Along with the increase in the amount of medium loam fractions in the horizons of the soil section, the formation of heavy loamy soils is observed in the areas moving away from the canal. Based on the collected data, the quantitative and qualitative changes in the mechanical composition of the studied soils, based on the above laws, depend not only on the influence of the soil-forming parent rock and relief, but also on the turbidity level of suspended sediments, the length of irrigation channels, and the composition of particles in the water flowing in the ditches located in the field.

When leaching, it is necessary to take into account the salinity level, mechanical composition, water permeability (water-physical properties) of the soil, as well as the amount and reserves of salts in the root zone (0-1m). Water standards for leaching vary depending on the mechanical composition. Depending on the mechanical composition of the soil, the average salt leaching rate is 3000-3500 m3/ha for light layered soils, 3500-5000 m3/ha for moderately saline soils by 2-3 times of flooding, 4000-5000 m3/ha for strongly saline soils by 3 times of flooding, 5000-6500 m3/ha for very saline soils of different mechanical composition by 3-4 times of flooding, and 6000-7500 m3/ha for strongly and very strongly saline soils of heavy mechanical composition by 3-4 times of flooding. The amount of salts in the soil after leaching should be reduced to 0.01% of chlorine ions and to 0.4-0.6% of dry residue. When determining the standards for salt leaching, the recommendations of the UzPITI (now PSUEMTI) (Scientific Research Institute of Cotton Breeding, Seed Breeding and Cultivation Agrotechnology) (Table 2) and available data (based on salinity cartograms according to the A.E. Nerozin formula) are used.[2]

Conclusion. In order to prevent the salinization process in the irrigated lands of the Olot district, to systematically increase soil fertility and productivity, and the yield of agricultural crops, it is necessary to fully implement hydrotechnical, agrotechnical and land reclamation measures. When salt leaching, it is necessary to take into account the degree of salinity, mechanical composition, water permeability (water-physical properties) of the soil, as well as the amount and reserves of salts in the root-spreading layer (0-1m). Water standards for salt leaching vary depending on the mechanical composition. When implementing measures aimed at improving the land reclamation condition, it is extremely important to first correctly select the reclamation objects that need improvement, and an integrated approach to this issue is necessary from both a scientific and practical perspective.

References:

1. Developed by the State Committee of the Republic of Uzbekistan for Land Resources, Geodesy, Cartography and State Cadastre and the State Research Institute of Soil Science and Agrochemistry: “Methodological Guide for Mapping, Accounting and Determining the Standards of Salting-Out Soils”. 2014. 45-46 pp.

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American Academic publishers, volume 05, issue 04,2025
Journal: https://www.academicpublishers.org/journals/index.php/ijai

2. Umarov M. Physical Properties of Soils of New and Promising Irrigation Regions of the UzSSR. -Tashkent, “Science”, 1974, -280 p.
3. Kurvontoyev R., Khalberdiyeva M.R. Methods for Preventing Soil Clogging. // Theses of the doc. res. conf., - Guliston, 1994.- 228 p.
4. Kurvontoyev R. Methods for Increasing Soil Fertility. // Current Problems of Increasing Soil Fertility, Scientific Collection. -Tashkent, 1995. - P. 30-33.
5. Kurvantoyev R., Turgunov M., Musurmonov A. Issues of soil cultivation in increasing soil fertility, taking into account their agrophysical properties. // Scientific foundations of effective use of soil resources. Collection of articles, - Tashkent, 2011. - P. 142-148.
6. J.S. Sattorov. Concept of changes in the fertility of irrigated soils of Uzbekistan, its increase and protection. Scientific and practical seminar on the topic “Issues of protection and rational use of land resources in conditions of environmental change”. Tashkent. 2016. 70 p.
7. Atlas of soil covers of the Republic of Uzbekistan. Tashkent. 2010. 18-19 p.
8. Artikova Kh.T. Evolution, ecological state and fertility of soils of the Bukhara oasis. Author's ref. doc. diss. (DSc). –Tashkent, 2019. 62 p.
9. Gafurov K., Abdullayev S. Characteristics of the soil cover of the irrigated zone of the Bukhara region.- Tashkent: Publishing house "Fan", 1982.-130 p.
10. The state of reclamation of irrigated lands of Uzbekistan and their improvement. University Publishing House. 2018. 304 p.
11. Kurvantayev R., Nazarova S.M. Agrophysical state of irrigated meadow soils of the lower reaches of the Zarafshon oasis. –Bukhara.2021.- 142 p.
12. Nazarova S.M., Kurvantayev R. Soils of the Bukhara oasis / Scientific appendix "Agriculture of Uzbekistan" journal "Agro Ilm". -Tashkent, 2012. №3 (23). - P. 54-55.
13. Tursunov L. Water-physical properties and speed of salt restoration in irrigated soils of the Karakul oasis of the Bukhara region. Abstract. candidate. diss.- Tashkent. 1968.- 30 p.
14. Yuldosheva. Kh. Namozov. Kh. Current reclamation state of soils of irrigated areas and ways to increase their fertility by biological methods."Science and Technology", publishing house, 2020- pp. 284-298