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SOIL OF IRRIGATED LANDS OF BUKHARA REGION

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Abstract.*The article presents data on irrigated soils of the Jondor district of the Bukhara region, intended for cotton sowing.Since many soils of the territory of Uzbekistan, including the Bukhara oasis, are highly saline, research work was carried out on the territory. Along with the other twelve regions, the irrigated soils of the Bukhara region are moderately saline, although there are some farms in which the lands are characterized by a high degree of salinity. Among the areas and cities with a high level of salinity, as an example, we can take the soils of the Karakul and Olot regions of the Bukhara oasis. Due to the fact that these areas are located in the desert zone of the region, salinity levels are high due to low rainfall. Indicators were studied the content of biogenic elements and the mineral composition of the studied soil samples, the total salt content in the soil samples. The content of soluble ions, the content and study of the main elements providing soil fertility such as humus, phosphorus, nitrogen, potassium and their mobile forms, as well as the concentration of soluble salts in the form of anions, cations and macro-elements showed that the studied soils belong to the depleted type of sulfate-chloride salinization.*

Keywords: *humus, soil, irrigated land, salinity, sown area, infertile dead soils, degradation of soil resources, Central Asia, Bukhara, Jondor, sulfate, chloride, phosphate, silicate salinization.*

Introduction

It is known that the sown areas allocated for the cultivation of agricultural crops must have appropriate indicators that provide not only high yields, but also high-quality products. Unfortunately, along with other countries such as Ukraine, Kazakhstan, China, Moldova, the territory of Uzbekistan, along with Turkmenistan, occupies the basis of a place in which 80% of the sown areas are saline fields of various types. From the data in Fig. 1 it can be seen that mainly the Central Asian countries (Uzbekistan, Turkmenistan and Kazakhstan) are characterized by high salinity. So, for example, salinity is sulfate, chloride, phosphate, and sometimes silicate. All this makes the soil infertile and dead.

When studying saline soils of natural and agrotechnogenic landscapes of the Southern Urals, R.R. Sulaymanov, rightly, noted that, throughout the history of the development of soil science, saline soils have been one of the main objects of research in many countries of the world. This is explained, firstly, by the wide distribution of saline soils in different regions of the Earth, and secondly, by the fact that salinity is one of the main genetic properties and ameliorative features of soils in arid and semiarid regions, as well as a property that limits their fertility. And finally, thirdly, salinity is one of the main signs of the unfavorable ecological state of lands (Zalonenie..., 2006).

Methods. To take timely and adequate measures to prevent salinization and solonetzization of soils and to develop environmentally acceptable and economical methods for their use and restoration, a comprehensive study of saline soils under natural and agrotechnogenic conditions of the region is necessary. (1)

Therefore, modern approaches to their bioremediation are required using microbiological preparations containing halophilic and halotolerant types of microorganisms or enzymes that convert mineral salts into digestible forms for the nutrition of cultivated crops in these soils.

Therefore, the purpose of our scientific research was to study the physicochemical and biochemical properties of the soil of the Jondor district of the Bukhara region intended for cotton sowing.

Our studies of the soils of the Jondor region gave the following results. The soil of the Jondor region belongs to merozem, it was formed at the foot of the mountain systems of the Tien-Shan, Pamir-Alay, Kopetdag, as well as on the gentle slopes of the mountains. This type of soil is distributed at an altitude of 250-300 m to 1000-1100 m above sea level in the north, and at an altitude of 1400-1500 m in the south. The content of humus in the composition of soils increases with increasing height, and the soils become more fertile. For example, if light gray soils contain 1.0–1.5% humus, typical ones contain up to 1.5–2.5%, then dark mountain gray soils contain 2.5–4.0%. The main areas of irrigated agriculture in Central Asia are located in the gray soil belt. (Soils of Central Asia, 9 358 11-03-2018, 16:00 Physical geography of Central Asia)

We carried out an agrochemical analysis of the constituent components and elements of the soil in which cotton is cultivated with a variable crop rotation of wheat (Table 1).

Table 1. Agrochemical soil analysis: Bukhara region (Zhondor district)

No. Sample numbers	Location of soil sampling	Salinity according to Ece, dS/m	Estimation of salinity according to Ece, salinity type	pH	Indicator	Norm soil pH
1	Bukhara (for cotton)	1.12	non-saline soil chloride-sulfate type	8.1	medium alkaline	7.0

From the data of table -1 it can be seen that the degree of salinity of soil samples is 1.12, the pH value is -8.1, which belongs to the type unsalted soil of the chloride-sulfate type is medium-alkaline, which exceeds the norm of -7.0.

The study of the content of salts of various macro-elements in the composition of the soil showed that the following salt complexes such as Ca (HCO3) 2-0.023%, CaSO4-0.035%, MgSO4-0.024%, Na2SO4 ---0.050%, NaCl-0.012% were relatively low concentrations and were found non-toxic salts within0.058 **%**

Further study of the fertility of soil samples showed that the humus content is0.828% normal**0.91-1.35, and the carbon content is 0.48, gross forms of nitrogen** -0.063%. The assessment of the availability of humus, carbon and nitrogen content, i.e. nutrients, turned out to be poor, which requires an increase in these criteria with the help of nutrients and bio-fertilizers. (Table 2)

Table 2. The content of biogenic elements and the mineral composition of the studied soil samples

Humus content:

No. sample	Humus, %	Humus carbon, % (Cr, %)	Security assessment	**Humus, % norm**
1	0.828	0.48	poor	**0.91-1.35**

Along with the above elements, nitrogen, phosphorus, potassium are mobile, i.e. digestible forms is of great importance in plant nutrition, to increase their productivity and reduce the incidence of crops.

The biogenic form of phosphorus from the initial total content is 0.120%, the potassium content is 1.15%, 0%, i.e. 2.5 times less than normal, the degree of availability of phosphorus and potassium is poor.

In plant nutrition, the concentration of water-soluble nutrients in any biological fluids and mineral, organic substances, which are top dressing and nutritious for both plants and other biological organisms, is of great importance. The study of water-soluble ions and macroelements contained in the studied soil samples showed that the natural content of the following substances, such as HCO3, Cl, SO4, Ca, Mg, Na + K, respectively, for the indicated elements, amounted to0.034.0.007.0.045. 0.016.0.005.0.012.0.101, while the dense soil residue was 0.112% (Table 3)

Table-3. Ion concentration (in water extract): Content of soluble ions, %

Sample No.	EU 1:5 dS/m	ECe, dS/m	Dense residue, %	HCO3	Cl	SO4	Ca	mg	Na+K	Sum ions, %
1	0.28	**1.12**	0.112	0.034	0.007	0.045	0.016	0.005	0.012	0.101

Content of soluble ions, in mg/eq

Sample No.	HCO3	Cl	SO4	Sum anions	Ca	mg	Na+K	Sum cationew
1	0.560	0.197	0.936	1.694	0.800	0.395	0.501	1.696

No. imageca	Na/Cl	Grade chemistry saline-nia	SO4 mg/eq	SO4, t %	The amount of toxic salts, %	Estimation of the degree of salinity for irrigated lands			
						∑ t.salt, %	Ece, dS/m	Cl, %	Na, mg-eq/100 g of soil
1	2.5	X-S	0.70	0.03	0.06	non-saline soil chloride-sulfate type			

The table also indicates the content of soluble ions, of which the highest content of soluble ions turned out to be HCO3, it is 0.560 mg / eq. And the sum of anions is 1.694 mg/eq. Among the cations, Ca is the highest at 0.800 mg/eq. And the sum of cations is 1.696 mg / eq.

Results and discussion. Our experiments on the study of physical and chemical properties, indicators of soil fertility showed that the irrigated soil of the Zhondor region, used annually with cotton-wheat crop rotation, belongs to the lunch types, is saline and requires remediation with the inclusion of nutrients and biofertilizers, especially of microbial origin.

Typically, the proportion of soil fertility indicators is mainly humus content at a concentration of 0.91-1.35%, while our soil samples studied by us have0.828% means 50% below normal.

It should be noted that in various regions of the Republic, as well as in the Bukhara region, studies are carried out concerning only physical and chemical properties, limited to the determination of flowability, clay parts, metal-magnetic impurities, moisture capacity and electrical conductivity. And work with the study of a whole complex of parameters that have an important impact on their fertility, biological activity, unfortunately, there is very scarce work.

Conclusions. The research carried out by us in this way allows the correct selection of soil remediation, the application of biological fertilizers, the regulation of the concentration of applied fertilizers, etc., which allows not only to increase the yield of cultivated crops, but also to improve the quality properties of the expected harvest.

Research continues to study the microbial landscape of soils and the biological activity of these soils to increase the biological activity of the soil, biogenic elements and, most importantly, to organize bio-farming in the Bukhara region.

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