Influence of various factors on microbiological and enzymatic activity of alluvial soils of Bukhara oasis meadow

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Abstract. *One of the most pressing issues today is the improvement of soil properties in the country, including changes in the water and physical properties of irrigated soils of the Bukhara oasis under the influence of irrigation and their further improvement. Therefore, it is important to study the water-physical properties of the soil, and the following article deals with this problems.*

Key words. *Desert-dry soils, sandy desert, bald soils, soil salinity, irrigated land.*

Influence of various factors on microbiological and enzymatic activity of alluvial soils of Bukhara oasis meadow.Bukhara region is located in the south-west of the Republic of Uzbekistan, in the lower reaches of the Zarafshan River, in the south-western Kyzylkum desert. It is a short distance from the north-west to the Khorezm region and the Republic of Karakalpakstan. At a great distance from the north and east it is surrounded by Navoi region, and from the south-east it is adjacent to the Karnob Karshi desert of Kashkadarya. The south-western border of the region is connected with the state of Turkmenistan at a great distance. Here the border runs to the right of the Amudarya, and in the Doyakhotin-Kizilrabot distance (80 km) it runs along the river. Today, this border has a very important spiritual, socio-economic and political significance.

It is known that the lower part of the Zarafshan valley, the Karmana mountain range, stretches from the Amudarya coast. This place is naturally, historically, economically and culturally integrated land. The irrigation ditches of the three existing oases (Navoi-Konimekh, Bukhara and Karakul) are welded together to form a single chain.

The current scale of the region is not a relatively small one. It is 9-10 times larger than the area of Andijan region (4.2 thousand sq. Km) and 2.5 times larger than Tashkent region (15.6 thousand sq. Km).

However, the fact that the entire territory of the region is located in the desert zone, does not have local sources of irrigation water, and is located in the lower reaches of the river is one of the negative qualities of the nature of the region. Sewage and collector-drainage waters coming through the Zarafshan river flow into the territory of the region of dissolved salt-chemical substances, and most of them accumulate in this soil. As a result, the environmental situation is deteriorating.

At the same time, the geographical location of the region has favorable conditions for its socio-economic and cultural development. Its geographical location is directly related to the fact that this place was located on the Silk Road in ancient times, and later became the dome of Qubbat-ul-Islam in the East - the dome of Islamic teachings, science, enlightenment and the "Great Tower".

During the year, sunny days reach 2800-3000 hours (2852 hours in Tashkent, 3053 hours in

Termez). The total amount of radiation from the sun is 150-160 kcal. The annual sum of the useful temperature, the average daily positive temperature of more than 10 degrees, reaches 4800-5100 degrees. This makes it possible to grow very heat-loving crops. The coldest period in the region is January, and the hottest is July.

The average annual temperature is 14.2 degrees in Bukhara and 15.0 degrees in Karakol. Natural moisture is not enough in the region. The annual amount of atmospheric precipitation is 90-150 mm., possible evaporation from the surface is 2000 mm. reaches In this regard, the territory of Bukhara belongs to the arid zone. Precipitation is manifested in the form of mostly rain. Snow cover is chronic and not thick, does not last long. The distribution of precipitation throughout the year is extremely uneven. Spring is the most fertile season, with 45-55% of the annual harvest. Summer is very dry. The relative humidity drops sharply, with some days in July-August the figure drops to 10-20 percent. Local winds play a special role in the climate of our country. It is known that winds can be observed all over the globe, but their influence is most pronounced in the desert zone. The hot, arid climate and semi-arid arid soil surface here is a favorable opportunity for the creative power of winds [Allayorov, 2006; Ortiqova, 2006].

There is a large groundwater reserve in Bukhara region. According to their hydrogeological properties, they can be divided into two layers. The first is groundwater, which is located close to the surface, up to the first impermeable layer. The second is interlayer waters at different depths. Groundwater saturation differs in places according to its hydro chemical properties, which can be divided into oasis and desert zone groundwater. In the oases, they are formed mainly by irrigation water and are distinguished by their proximity to the surface, freshness. Within the oasis, such waters are suitable for consumption in many places. It is also used for partial irrigation in the upper parts of the Bukhara oasis. In the desert zone, groundwater has zonal properties; they are usually located at a depth of 5-10-40 meters and are saline to varying degrees. Only low-salinity (up to 5 grams / liter) water can be used to irrigate livestock.

It is known that soil is one of the most important components of nature, a product that embodies both animate and inanimate natural beings. Although desert-type soils are widespread in the region, they do not form a single coherent area. Soils types of soils vary depending on factors such as the nature of the parent rock, topography, chemical composition and depth of groundwater. Soils have two groups (desert and oasis) according to the level of assimilation.

Among the desert-dry soils, brown-colored sur, sandy desert, bald, bald soils and saline soils are common.

Brown-colored sur soils are usually composed of areas that are topographically high (low mountains, plateaus, on ancient surfaces — such as the Karakul, Dengizkul plateaus, Gazli doha, Kuljuqtog foothills). Experts consider this type to be rocky desert soil. Its cross-section is rich in stone-gravel mixtures, and the bottom layer is gypsum. Low productivity, humus content is 0.21-0.56%.

The scale of sandy desert soils and sandy areas without vegetation is very large. The soil section consists of a layer of loose and porous sand. Poor in humus - 0.27–0.66%. Although they are non-saline soils, the complexity of the relief and the fact that they are composed of loose sands make them difficult to assimilate.

The weight of the mechanical composition of bare soils is characterized by the fact that they have a flat surface relief. The surface layer of the bald spot usually has a dense waterproof layer and no

vegetation cover. These soils are usually saline, rich in nutrients. The humus content is around 0.41-1.06%, which has some advantages for irrigated agriculture.

Salt marshes are relatively low-lying areas where saline groundwater is close to the surface. The rise of salts in groundwater through capillary tubes is a leading factor in the formation of salts. The amount of salts in the soil solution is 3-20% and more. There are types of salts, such as scaly, scaly, and wet.

The morphology, genesis and genetics of irrigated soils of the Bukhara oasis, many scientists have studied their geographical distribution. The water and physical properties of the irrigated soils of the Bukhara oasis have not been studied so far, especially since the beginning of irrigation through the Amu-Bukhara canal.

The soils of Bukhara region have their own water-physical properties and are distinguished by their diversity. They are multi-layered, varying degrees of salinity, sandy, heavy, medium and light sandy mechanical composition.

Newly irrigated weak, moderately saline, moderately mechanized grassland soils have satisfactory water permeability due to their relatively poor structure, density, and proximity to groundwater.

Improper organization of agro technical and irrigation works in irrigated meadow alluvial soils, violation of their granular structural state under the influence of anthropogenic factors worsens the water permeability of the soil. In such soils, the layers condense and make it difficult for water to seep into the bottom layer.

In ancient irrigated meadow alluvial soils, the formation of a dense layer under the drive and in saline soils with relatively high sodium cation in the absorption capacity, deterioration of water permeability was also observed (cross-section OX-16).

Oasis soils in irrigated lands are formed on the soils of the above-mentioned soils and differ in the degree of assimilation and agrochemical properties. The main area in Bukhara and Karakul oases is alluvial meadow soils. Their soil cross-section is usually layered and consists of irrigation ditches. Despite long-term planting and reclamation, productivity is low. This is also caused by the leaching of nutrients from the soil under the influence of irrigation water. The main part of the humus is in the driving layer (1-1.5%) and decreases sharply downwards. Irrigated soils are saline to varying degrees. The main reasons for this are the fact that the oases are located in the delta of the Zarafshan river, the slope of the relief is insufficient, the amount of evaporation is high. The area of non-saline soils is very small. They make up only 10-15% in the upper districts of the Bukhara oasis (Gijduvan, Shafirkan). In the remaining districts, 90-95% of the soils are saline to varying degrees, with a large amount of salts in their core. This figure is 35-40 tons (low salinity), 70-120 (moderately saline), 150-370 (strongly saline) and 400-800 tons in saline soils per hectare in just one-meter layer of soil section. Due to this, it is necessary to carry out saline washing in irrigated areas in the winter on a regular basis and in accordance with the rules of geotechnics. In addition, the protection of these irrigated lands from collectors and sewage, wind erosion and chemical pollution is one of the important tasks of the Golden Fund of the region.

During the research, it was found that the agro-irrigation layers of the soils, depending on the state of cultivation, and have different water permeability. In irrigated meadow alluvial soils, the state of water permeability in the soil layers also changed depending on soil moisture, plowing time and the quality of agro-technical measures used in agriculture. For example, in soils with good water

permeability, sufficient water is supplied because of precipitation and rapid movement downwards through wet soil capillaries during irrigation. In areas where soil water permeability is very high, excessive irrigation can cause groundwater levels to rise and cause soil salinization and swamping because of some of the water in the irrigation ditches being absorbed.

Under the influence of anthropogenic factors (secondary) salinization is the most common degradation process in irrigated lands, which inevitably occurs in areas where mineralized (3-50 g / l) groundwater rises due to disruption of the integrity of soil natural development, man-made and agro-pollution or changes in the direction of natural geochemical processes. Secondary salinity is associated with high natural salinity of soil-forming rocks, expansion of saline soils under the influence of irrigation, as well as exposure (protrusion) in the leveling of saline soils in preparation for development and irrigation. Such areas are common in newly developed lands. Much of the automorphic soils, even in the 50-100 or 100-200 cm layers of the fertile gray soil cross-section, have large salt reserves, and such newly developed weakly saline or even non-saline soils have become strongly saline soils as a result of leveling works in protected lands.

Another reason for the increase in secondary saline land areas is the irrigation of crops from mineralized ditches due to lack of water. The use of such saline waters further intensifies soil salinization in both old and newly irrigated lands. The formation of secondary salinization processes depends on various factors, regardless of the genesis of its origin, secondary salinity adversely affects the growth and development of plants and soil properties, disrupts soil structure, and worsens water-physical and physicochemical properties, microbiological activity and soil-melorative state, and at the same time causes soil degradation.

Excessive wetting (flooding) of crop areas is the second major degradation process and is common among irrigated soils. As a result of uncontrolled and high-level irrigation, groundwater levels have risen, hydro morphism has increased, especially in low-lying areas, around canals and large irrigation networks, natural and artificial weak drainage, regular flooding and groundwater levels are stable (1-2m). The process of excessive wetting is usually formed in conjunction with the process of salinization; the properties of irrigated soils have a negative impact on their water, air and salt regimes. Excessive wetting, flooding of low-lying areas as a result of irrigation of soils in areas where ditches have accumulated, in areas other than irrigated areas, as well as in areas with hypsometric elevations.

Desertification is one of the most dangerous degradation processes, which is associated with the drying up of the area due to lack of water (moisture) and a sharp violation of soil-water order. In most cases, the desertification process is formed because of improper management (distribution) of water flows, which is intensified by a sharp decrease in groundwater levels because of a decrease in groundwater and surface water flows.

It is known that the composition of aggregates formed under natural conditions is determined by their mechanical composition, particle size, and specific gravity, formation of soil porosity, maximum molecular and field moisture capacity, and useful moisture reserve. Scientific research conducted in Jondor, Romitan, Peshku, Karakul districts of Bukhara region shows that the subsoil of all soils in key areas is strongly compacted.

The specific gravity of the soil is observed because of the formation of secondary heavy minerals. The decomposition of primary minerals in the soil are under the influence of constant irrigation. Processes of formation of heavy minerals such as magnetite, hematite are formed in the soil. As a result

of such processes as cultivation of irrigated meadow alluvial soils, year-round operation of heavy machinery, irrigation, soil aggregates are crushed. The structural condition is disturbed, the soil particles condense, the porosity decreases and the volume mass increases (1.63-1.74 g / cm3), although some scientists acknowledge that [3] the volume mass of the soil averages 1.30-1.35 g / cm3 and the subsoil 1.35-1.40 g / cm3 should be formed.

In these soils, an indicator that depends on the specific gravity and volume is its porosity. Porosity in soils is one of the factors that positively affect their aeration and water movement. The porosity of irrigated meadow-alluvial soils was 34.9-46.7%, which was observed in the soils of Jondor, Peshku district. However, it should be noted that the porosity in the soils is extremely variable, especially in the upper layer of irrigated meadow-alluvial soils, which is cultured according to the level of porosity is 47.9%, in meadow swamps and saline soils - 46.1%. In the lower layers of soils, the porosity decreases sharply and the soil air properties deteriorate.

In order to improve the general physical conditions in the irrigated lands of the Bukhara oasis described above, it is necessary to use the current (capital) leveling of soils, organic fertilizers and crops that enrich the soil with organic matter. Implementing land leveling with modern laser tools provides an opportunity to achieve the intended results. Along with the increase in agricultural production on the current leveled lands, the amount of water and fertilizers used for them will decrease, because of the even distribution over the area, productivity will increase and soil fertility will improve.

Physical characteristics of the soil serve as a scientific basis for the practical implementation of all agro-technical measures aimed at increasing soil fertility, including tillage, fertilization, irrigation, saline leaching, measures to prevent erosion or salinization, and others. It should be noted that mineral or organic fertilizers, irrigation, saline washing, and even basic plowing (plowing) applied without taking into account the physical characteristics of the soil are not effective. At the same time, the sowing of agricultural crops, the timing of irrigation will be based on the physical properties of the soil. Its physical properties play an important role in increasing the fertility, management and protection of irrigated soils.

In summary, it is advisable to alternate planting, fertilizing, and soil enrichment with organic matter, deep plowing and loosening, lightening of heavy mechanical soils, aggravation of light alluvial soils of the examined meadow alluvial soils, measures to improve porosity.

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