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The Level of Salinity and the Dynamics of Change in the Irrigated Soils of Dostlik Massif, Furqat District, Fergana Region

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Abstract: This article discusses the impact of various factors such as an increase in the area where the groundwater level is close to the surface of the earth, global climate change, and improper irrigation on soil reclamation, which can lead to hydromorphism processes and salt accumulation in the soil. The article also provides information about the increasing activity of these issues. Additionally, the article presents an analysis of the irrigated soils of the Dostlik massif, including their current state, salinity level, and dynamics of change over the years.

Keywords: Soil ground water, improper irrigation, salinity, dry residue.

Salinity is the most significant issue affecting irrigated soils in our republic. While other problems such as chemical pollution, erosion, drought, nutrient depletion, and human impact can also lead to soil degradation, their impact is usually less severe than that caused by salinity. Factors such as improper irrigation, non-compliance with agricultural practices, periodic rise of seepage waters, and failure to maintain the collector-drainage system at a high level of operation can contribute to the increasing problem of salinity [1,2,4,7].

Water-soluble salts accumulate in irrigated soils, and the intensity of secondary salinization processes depends on several factors, including the depth and level of mineralization of groundwater, the concentration of soil solution, and the quality of irrigation water. The state of groundwater is the leading factor in this process. The closer the groundwater is to the surface and the higher the level of mineralization and evaporation, the faster the salt accumulation and secondary salinization processes occur in the soil [3,6].

The condition of groundwater varies significantly throughout the year, particularly during the vegetation period, depending on the topography of the area, lithological-geomorphological structure, hydrogeological conditions, irrigation regime and standards, the level of drainage, and the type of irrigated crops [5,8].

Groundwater plays a crucial role in the formation of irrigated soils, particularly in the valley's conditions, where achieving an optimal groundwater regime and balance is critical. Groundwater has a comprehensive impact on the formation of saline soils, acting as the primary source of salt in the soil in some instances and as a means of collecting dissolved salts and expelling them from the irrigated and desalinated areas in others [3,4].

Analyzing the reclamation condition of the irrigated soils in the studied area and studying the chemistry of salts, it was found that the soils in the region are weakly saline. Some cross-section soils were also found to be non-saline and moderately saline. The dominant types of salinity in the soil are sulfate and chloride sulfate. In the weakly saline sulfate salinity soils, the dry residue amounts to 0.848%, with chlorine ion and sulfate ion levels of 0.007% and 0.20%, respectively, in the driving layer. In the plow layer of weakly saline chloride-sulfate salinity soils, the dry residue amount is 0.144%, with chlorine ion and sulfate ion levels of 0.011% and 0.067%, respectively.

For medium saline sulfate salinity soils, the dry residue amount is 1.206% in the plowed layer, with chlorine ion and sulfate ion levels of 0.042% and 0.740%, respectively. If we analyze the salinity status and the dynamic changes of irrigated soils in the Dostlik massif over the years, it can be observed that the salinity level in the region has increased by a significant amount from 2010 to 2023, as shown in Table 1.

1-table Dostlik massif, Furqat district, Fergana region salinity of irrigated soils change in level over the years

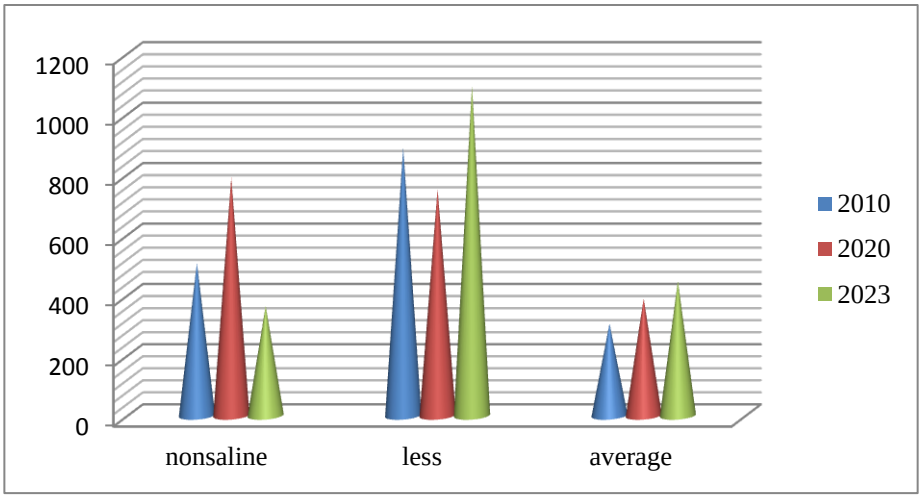
Year	Total area, hectare	The degree of salinity, hectare			
		Nonsaline	Less	Average	Strong
2010	1701,2	507,0	888,6	305,6	0,0
2020	1929,6	789,6	751,0	389,0	0,0
2023	1929,6	364,9	1094,2	447,0	0,0

In 2010, the irrigated area of the Dostlik massif was 1701.2 hectares. Of this, 888.6 hectares were classified as having low salinity, and 305.6 hectares were classified as having moderate salinity.

These results indicate that 52.2% of the total irrigated area in the region had low salinity, while 18% had moderate salinity. The non-saline areas in the region amounted to 507.0 hectares, which indicates that 29.8% of the total irrigated area was not affected by salinity. There were no areas in the region affected by strong salinity.

By 2020, the total irrigated area of the region reached 1929.6 hectares. Non-saline areas accounted for 789.6 hectares, making up 40.9% of the total irrigated area. Low-salinity soils comprised 751.0 hectares, which is 38.92% of the massif's soil. Average-salinity soils occupied 389.0 hectares, equivalent to 20.18% of the total irrigated area.

In 2023, the irrigated area of the Dostlik massif remained unchanged at 1929.6 hectares. Non-saline soils covered an area of 364.9 hectares, representing 18.9% of the total irrigated area. Low salinity soils accounted for 1094.2 hectares, or 56.7% of the region's irrigated area. Average saline soils covered an area of 447.0 hectares, representing 23.1% of the irrigated area of the massif (1 - picture).



1-picture Dostlik massif, Furqat district, Fergana region salinity of irrigated soils change in level over the years

The effective use of irrigated lands has been established in the Dostlik massif, and their melioration condition can be considered average, meaning that salinity has not completely taken over the area. Based on the results of the conducted research, the increase in salinity levels in the area can be attributed to global climate change and the deterioration of soil melioration due to improper irrigation practices.

Currently, one of the main reasons for the deterioration of the fertility of irrigated lands in our country is the increase in temperature, which leads to the rise of the groundwater level and the accumulation of salts in the soil and its layers. This affects plant life in the soil, leading to the exposure of the top layer of the soil to direct sunlight.

Improper irrigation practices, such as not determining the degree of mineralization of irrigation water or using water from collector ditches, can lead to soil salinization.

Another reason for the deterioration of soil fertility is the improper use of fertilizers, which can result in changes to the chemical properties of the soil, fluctuations in the groundwater level, and degradation of the biological properties of the soil. Due to the failure of the main part of the collector and drainage networks, as well as vertical wells in the district, the groundwater level is rising in areas close to the surface of the earth, causing a number of problems in irrigated agriculture. This has led to intensified hydromorphism processes, increased salt accumulation in the soil, and more frequent cases of secondary flooding.

Based on the information obtained, it is important to use the soil wisely, choose the appropriate crops, cultivate the land properly, and implement an irrigation system that requires a scientific approach for the effective use of irrigated lands and prevention of their degradation

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