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THE SIGNIFICANCE OF OPEN DITCHES IN THE MANAGEMENT OF THE SALT-WATER REGIME AND ITS EFFECT ON SOIL RECLAMATION

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Annotation
The article describes the results of scientific research on effective use of irrigated soils of Boyovut district of Sirdarya region. The results of the statistical analysis of salinity in the irrigated gray-meadow soils of the Navbahor farm of Boyovut district, data on the accumulation of existing salts in open ditches and changes in it are presented.

Keywords: Syrdarya region, salinity, open and closed ditch, secondary salinity, seepage water, mineralization of its waters, environmental and reclamation condition, monitoring wells.

Relevance and necessity of the topic

Development of technologies for prevention of soil salinization or ecological restoration of arable land lost to use due to salinity in agriculture around the world is an important issue. This will allow us to avoid the economic crisis[1] caused by food shortages based on meeting the food needs of the growing population. It is known that 30% of the 1.5 billion hectares of arable land used in agriculture in the world today has been exposed to varying degrees of salinity due to natural and anthropogenic factors, which has a negative impact on the production of food products based on agricultural plants and the ecological environment. Accordingly, it is important to improve the ecology and land reclamation of irrigated croplands degraded by salinity and to increase the possibilities of their use in production.

Research is being conducted worldwide to restore irrigated lands that have been degraded or abandoned due to salinity, to improve soil fertility, and to improve the ecological status based on expanding the area of agricultural plants. With the help of plant resources that are resistant to salt and have the property of accumulating water-soluble salt ions in the body, special attention is paid to the directions of ecological restoration based on reducing the level and salinity of seepage waters and increasing soil fertility.

In our republic, special attention is paid to effective use of land and water resources, maintenance of soil fertility, improvement of ecological and land reclamation conditions. In particular, in the studies carried out on improving the ecology and reclamation of the irrigated lands of the Syrdarya region, first of all, providing detailed information on the process of soil salinization, evaluating them through clearly defined modern methods and determining them using aerospace methods, and predicting the effective use of land and water resources in agriculture. on the basis of which certain results have been achieved.

[1] FAO of the United Nations and Earthscan, Rome, 2017. Water and Cereals in Drylands.

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In the priorities of the Strategy of Actions for the further development of the Republic of Uzbekistan, the issue of "Further improvement of the reclamation condition of irrigated lands and rational use of water resources" is highlighted. Based on this, implementation of protection and monitoring of irrigated lands from salinization and degradation processes on the basis of modern methods is of great scientific and practical importance.

of the President of the Republic of Uzbekistan on February 7, 2017

Approved by Decree No. PF-4947 "On the strategy of actions for the further development of the Republic of Uzbekistan"

In the direction of "further development and liberalization of the economy" according to the five priorities of the development of the Republic of Uzbekistan in 2017-2021, PQ-3281 dated September 15, 2017 "On measures for the rational placement of agricultural crops in 2018 and forecast volumes of agricultural production" This thesis research serves to a certain extent in the implementation of the tasks defined in the Resolution, Decree No. PF-5742 of June 17, 2019 "On measures for the effective use of land and water resources in agriculture" and other regulatory legal documents related to this activity.[2]

The purpose of the research is to create an agrotechnology based on bio-ameliorative approaches to improve the ecological and meliorative condition of irrigated lands (in the example of Syrdarya region).

Tasks of the research: analysis of factors affecting the ecological and meliorative condition of the soil of irrigated lands; studying the possibilities of collecting harmful salts in open closed ditches;

Scientific and practical significance of research results. The scientific significance of the research results is that a set of territorial, legal and organizational documents has been developed on the experimental system of assessment of the ecological and reclamation status of irrigated lands and the influence of the salinity level, modern aerospace methods, GAT technologies and laboratory analysis, with the development of the fundamental principles of the mechanism of changes in soil ecology. explained.

The practical significance of the results of the research is that the impact of salinity on soil ecology was determined on the basis of aerospace and spectral data, plant indicators, empirical data, and the fact that the use of plant resources in improving the land reclamation conditions of the experimented lands served to increase soil productivity.

In order to fulfill the specified tasks, research and development work was carried out in two components: regulation of the level and mineralization of underground water and monitoring of ecological improvement of saline soils with the help of sorghum.

[2] Decree of the President of the Republic of Uzbekistan dated February 7, 2017 No. PF-4947 "On the strategy of actions for the further development of the Republic of Uzbekistan"

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The research was conducted in the territory of the Navbahor water user association, Boyovut district, Sirdarya region. The necessary experimental area for conducting scientific research work was determined based on the lowest credit score.

Soil analyzes were conducted before the reclamation activities.

Water-physical properties of the soil (water permeability, limiting moisture capacity) were studied in three replicate locations. Soil samples were taken from 0-15, 15-50, 50-100 cm layers, and samples were taken in three repetitions to study their moisture and chemical composition.

All samples were analyzed by the method of aqueous absorption, and complete data were collected on the samples in the specified periods. The analyzes were conducted on the basis of SoyuzNIXI (1973), UzPITI methodology.

The marginal moisture capacity of the soil was studied by the method of determination in field conditions, soil moisture was determined 6 times. Water permeability and soil infiltration coefficient were determined using frames in field conditions. Soil density was determined using the method of drying the samples obtained using a metal cylinder in a thermostat.

In order to determine the level, salinity and chemical composition of groundwater, monitoring wells were installed in designated areas.

According to the FAO classification, the soil of the experimental area is moderately to strongly saline.

The soil salt-water balance was studied to determine the effectiveness of the agromelioration measures implemented in the places. For this, salt reserves, the occurrence of underground water and their mineralization were determined.

The chosen experimental area is the outskirts of the Syrdarya river, located on the III-terrace, in the "Navbahor" farm, Boyovut district, Syrdarya region.

Underground seepage water in the agricultural area is located at a depth of 1.5-2.5 m, and rises to 1-1.2 m during the irrigation period during the vegetation period. In this case, the source of irrigation is Syrdarya water supplied through the JMK canal. Irrigation water filtered from irrigation fountains and irrigated fields is the main source of groundwater elevation. The mineralization of groundwater varies in the range of 5-6 g/l, mainly characteristic of sulfate salinity type. The level of mineralization of underground water varies according to the seasons. At the end of the autumn period, it rises, during the growing season it decreases under the influence of intensive irrigation. Slow groundwater flow in this area causes an increase in mineralization.

The local population is mainly engaged in growing wheat, cotton and rearing livestock. An increase in soil salinity causes a relatively decrease in the productivity of agricultural crops.

From the point of view of climate, the agricultural area belongs to the subtropical highland-semiarid desert zone of the Central Asian region.

The climate of the region is sharply continental, and the amplitude of temperature varies during the day and during the seasons, especially this situation is manifested by a sharp change in dry air during the change of seasons.

The average annual air temperature is +12.90C, the average monthly temperature in January is the coldest month -18-100C, and the warmest July is +26.7-330C. The non-cold period is 205-230 days.

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The sum of the effective temperature (+100C) is equal to 3368. Precipitation occurs mainly in winter and spring months. Annual rainfall is 324 mm. Average annual relative humidity is 52%, evaporation rate is 1600 mm per year.

Land resources. The total irrigated area of the farm is 7578 ha. According to the information obtained from cartograms, the area of saline land in agriculture is 1003 hectares, the area of average saline land is 2744 hectares, the area of highly saline land is 2131 hectares, and the abandoned land is 2100 hectares. Annual water intake, irrigation source, water supply, ditch and ditch water salinity were determined.

The project of irrigation and development of these lands showed that the level of underground water will rise by 0.5-0.6 m per year. However, practice shows that the current rates of watering and irrigation exceed the calculated rates, especially in the first years of development. At the same time, the flooding of the existing collector-drainage network affected the rise of the underground water level. The mineralization of syzot waters increased proportionally, and the secondary salinity of the land reached its maximum level.

A 30-hectare area belonging to Gulistan State University, selected for research and innovation-experimental works at the "Navbahor" farm, was photographed from space. Of this, the area selected for field research was 29 hectares. Crop rotation in these areas is cotton and wheat. Water for crop irrigation is provided through specific irrigation networks in the southwestern part of the experimental area.

It is known that the secondary salinization of the soil surface is associated with the rise of the groundwater level. Although there are some methods for reducing seepage water levels, the development of low-cost technologies for reducing seepage water levels is of particular importance. Therefore, in order to control the level of seepage water and the level of mineralization through evaporation, a closed ditch with a depth of 3.8 m, a width of 10 m, and a length of 465 m was prepared in the center of the field and closed on both sides (Fig. 1). Sizot water is collected in a closed ditch and evaporates through it. Then a total of 18 observation wells, 9 each on both sides of the closed ditch, were installed.

Figure 1. An open pit dug in the experimental area.

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The main purpose of digging this ditch was to study the influence of seepage water on the growth and development of plants..

Figure 2. Monitoring of the water level of an open and closed well

The mineralization level of seepage water (SS) in the open closed ditch and the water level in the closed ditch in the experimental area were monitored and its status was shown in the graph (Fig. 2). After the start of irrigation, on September 27, 2013, the water level in the closed ditch reached its maximum level.

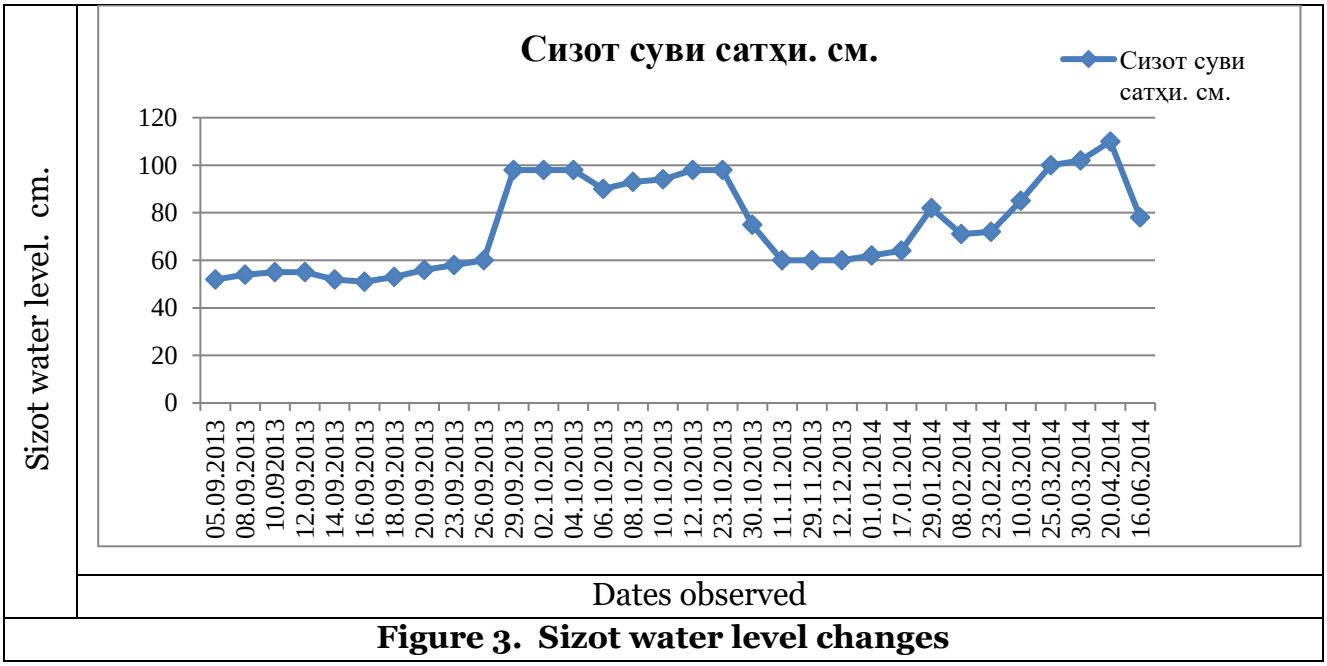

Figure 3. Sizot water level changes

Gauges were installed in the closed ditch to measure the collected seepage water and its evaporation volume. A water meter was installed at the beginning of the field to measure the volume of irrigation water. After heavy rains and irrigation, the seepage water level rose (Figure 3).

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Due to the possibility of accumulation of harmful salts in open and closed ditches, it is reasonable to consider that it is more effective to reduce the accumulation of these salts in closed ditches, rather than transporting these salts to long distances using water.

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