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APPLICATION OF BIOTECHNOLOGICAL TREATMENT METHODS WHEN USING COLLECTOR-DRAINAGE WATER

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Abstract:

The article examines the analysis of the reclamation state of irrigated lands in the Kashkadarya region, the level of soil salinity and methods of biological treatment of drainage waters.

Keywords: Soil, salinity, groundwater, mineralization, pistia, eichornia, azolla.

INTRODUCTION:

Water resources are one of the key factors in the socio-economic well-being and environmental protection of Central Asian countries. The shortage of water resources, as observed in all Central Asian countries, has a significant impact on our country. After all, Uzbekistan has a high demand for water among the countries of the region to meet the growing socio-economic and environmental needs of its population and natural ecosystems, to ensure sustainable development. Today, one of the most important factors negatively affecting the agriculture and environmental protection of our country is soil salinity. 2.1 million hectares of irrigated lands in the country. hectares, or about 50%, are saline and saline soils of varying degrees, with the drying up of the Aral Sea, irregular use of land and water resources, global climate change, and other factors. Another major cause of soil salinity is the persistent evaporation of groundwater near the surface throughout the year as a result of the large absorption of agricultural water resources from irrigation networks during the growing season, the use of excessive water resources for irrigation, and rising groundwater levels. One of the most pressing issues facing our country is the shortage of water in the country, their prevention and the creation of new water sources for irrigation. A lot of scientific research is being done to prevent these negative consequences, improve the reclamation of lands and get high yields from them.

The problem of water supply is exacerbated by the rapid development of industry and agriculture, the expansion of cities, the increase in irrigated land, the improvement of living conditions and other factors. The demand for water is growing year by year. Therefore, the protection and rational use of water resources is a very important issue. Extensive measures are being taken in Uzbekistan to protect nature, including the rational use of water resources. Important areas of water resources protection are the introduction of cost-effective new technologies, a closed cycle of water use and the creation of environmentally safe and cost-effective and efficient methods of biological treatment of various wastewaters.

55-56 billion soums a year in the country. m^3 of water resources are consumed, of which 92% are used in irrigated agriculture. About 50% of this river water is discharged from the region through collector-drains.

Research is being carried out in our country and abroad to improve biological treatment methods, develop new technologies and their widespread introduction into practice. One of the important measures to protect the biosphere is to reduce the mineralization of collector and ditch water and use it for irrigation of agricultural crops, as well as to effectively treat wastewater and ensure that it does not damage natural biocenoses, rivers and water basins.

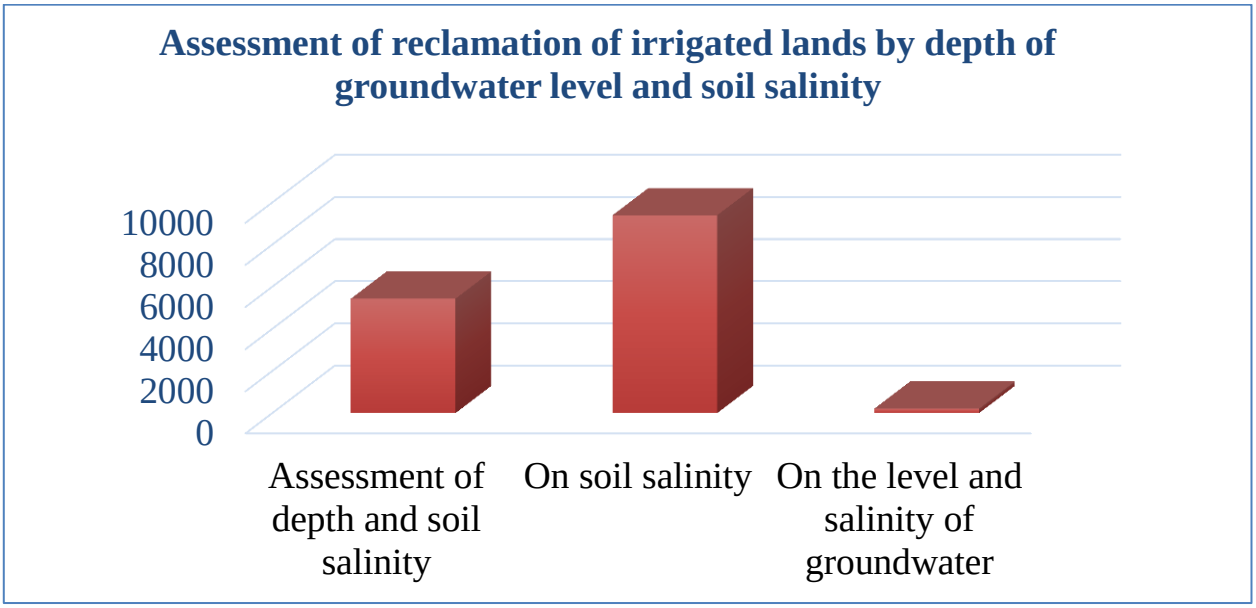

Figure 1. Assessment of reclamation status of irrigated lands in terms of groundwater level depth and soil salinity.

During the analysis of the reclamation of 514,114 hectares of irrigated land in Kashkadarya region, the depth of groundwater level was measured from 3703 observation wells and salinity cases were identified. At the same time, soil samples were taken and analyzed from 19806 points on an area of 480,190 hectares, and a total of 14,746.48 km of which: 8,679 km of open collectors and 6,067.48 km of closed-drainage drains were assessed.

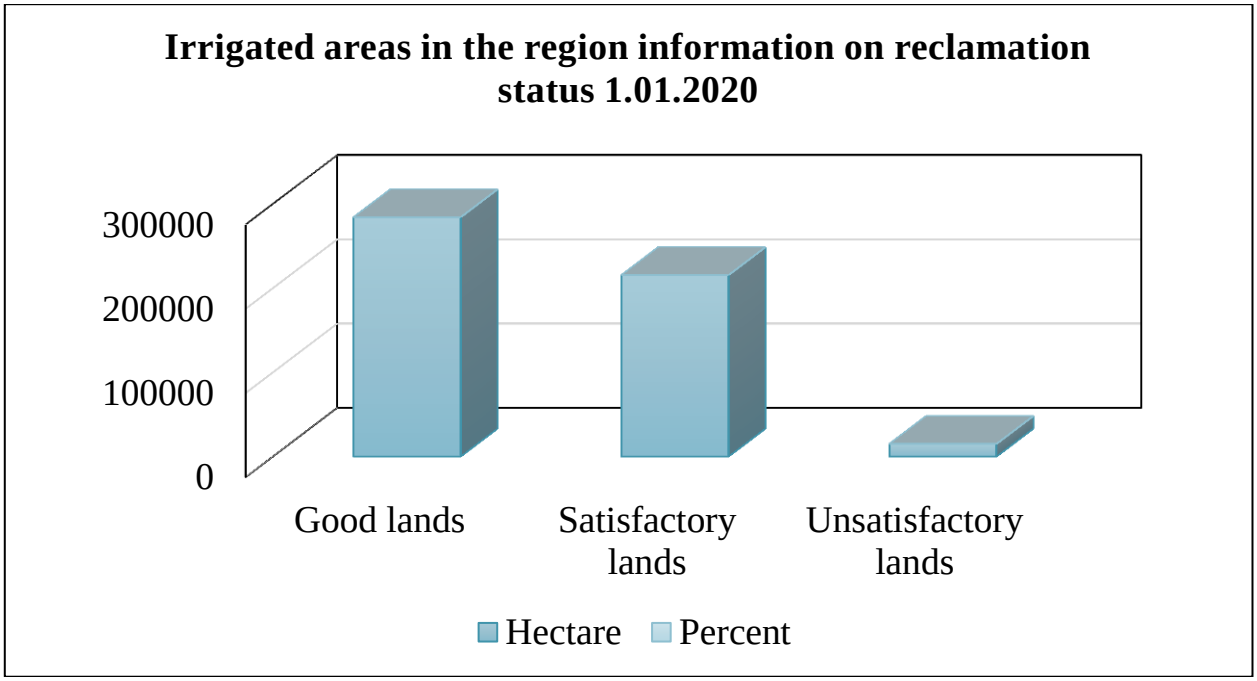

Figure 2. Reclamation of irrigated lands of the region status information

Table 1
Depth of groundwater level and distribution of soil salinity determine the reclamation status of irrigated lands.

Years	Irrigated lands, ha	Assessment of reclamation of irrigated lands by depth of groundwater level and soil salinity					
		Good lands	Bloody lands	Bloodless lands	That's it		
					On the depth of the groundwater table	On salinity	On the level and salinity of groundwater
2010	515840	269940	220800	25100	12110	12350	640
2015	515440	276340	221550	17550	6680	10570	300
2020	513970	283850	215250	14870	5640	9100	130

When the soil sample taken from 513970 hectares, 20078 points was analyzed in the laboratory, the salinity of the irrigated areas was as follows: 286320 hectares of non-saline area is 56 percent. 182030 hectares of weakly saline area is 35 per cent. The average salinity area of 36,400 hectares is 7 percent. 9220 acres of strong and very strongly saline area is 2 percent.

Table 2
Distribution of irrigated lands according to soil salinity.

Years	Irrigated areas, ha	Distribution of irrigated lands by soil salinity (thickness 0-100 cm)			
		No saline	Weak salinity	Medium salinity	Strong and very strong salinity
2010	515840	272920	181530	48400	12990
2015	515440	279660	182460	42450	10870
2020	513970	286320	182030	36400	9220

THE MAIN PURPOSE OF SCIENTIFIC RESEARCH WORK.

Our goal is to grow small ryaska (*Lemna minor* L.), pistachio (*Pistia stratiotes* L.), azolla (*Azolla carolipiapa* Willd.) And eichhornia (*Eichhorpia crassipes* Solms.) In collector-drainage waters with high mineralization, and their collector-drainage waters. to determine the effect on the amount of salts in it.

OBJECT AND METHODS OF RESEARCH.

One of the important factors in the protection of water resources is the creation of environmentally safe and cost-effective and efficient methods of treatment using biological methods in the reuse of collector and drainage water. The problem of water supply is exacerbated by the rapid development of industry and agriculture, the expansion of cities, the increase in irrigated land, the improvement of living conditions and other factors. The demand for water is growing year by year. Therefore, the protection and rational use of water resources is a very important issue. Extensive measures are being taken in Uzbekistan to protect nature, including the rational use of water resources. Important areas of protection of water resources are the creation of new water-saving irrigation technologies, environmentally safe and economically cheap and effective methods of biological treatment of various wastewaters.

RESEARCH RESULTS AND THEIR DISCUSSION.

Of the higher aquatic plants, Pistia (*Pistia stratiotes* L., Araceae), Eichhorpia (*Eichhorpia crassipes* Solms., Pontederiaceae), and azolla (*Azolla carolipiapa* Willd., Sem.) at present, these plants have been successfully introduced into the conditions of Uzbekistan [1], [3], [4]. As a result of our many years of research, agricultural enterprises (cattle fattening complexes, poultry, pig breeding) and industrial enterprises (hemp processing, mineral fertilizer production, biochemistry, vodka and wine, oil and gas enterprises, silkworm enterprises, textile industry) and utilities - A new effective biotechnology of biological treatment of domestic wastewater from organo-minerals, heavy

metals, cyanides, petroleum products and pathogenic microorganisms with the help of higher aquatic plants - Pistia, eucalyptus and azolla.

According to the results of our hydrochemical and microbiological studies, with the help of higher aquatic plants can completely biologically purify various wastewater in 12-15 days. During this time, the number of saprophytic microorganisms is up to a thousand times, and the bacteria of the group of intestinal rods do not appear at all after three to four days. The amount of microflora in the water is drastically reduced, and microscopic fungi that are pathogenic to plants and animals disappear. The physical and chemical properties of water are improved, i.e. the oxidation rate of water is reduced, nitrogen and phosphorus ions in water are almost completely assimilated by plants, the amount of dissolved oxygen in water is increased, wastewater is clarified and odor is lost when applied.

Pistachio is a plant that grows on the surface of the water, reaches 20-40 cm in height under the conditions of introduction, the stems are shortened, the leaves are flat oar-shaped. The leaves protruding from the root collar form a thick bundle, the upper part is green, there are deep streaks along the length. The entire surface of the leaves is covered with thick, multicellular, transparent hairs. As the aerenchyma tissue is well developed in the leaves of the plant, it floats on the surface of the water. The root system of the pistachio is poppy-like, 50-60 cm long, covered with many hairs (Fig. 3).

Figure 3. Pistia (Pistia stratiotes L.).

Eichhorpia is a plant that grows on the surface of the water and grows up to 30-40 cm in height. Spoon-shaped, smooth, green, glossy leaves are oval in shape, the edges are straight, parallel to the symmetrical longitudinal, and the veins are clearly visible. At the base of the leaf bands, the air-filled spherical part of the aerenchyma - the plant - floats on the surface of the water. The hairs of the poplar root system are well branched. From the base of the shortened stem joined by 15–20 leaf sheaths, the first order of growth developed lateral roots. The lateral roots of the second order, up to 2.5 cm in length, are placed horizontally in the water (Fig. 4).

Figure 4. Eichhorpia (*Eichhorpia crassipes* Solms.)

Azolla grows on the surface of the water and reaches a length of 0.7-1.8 cm. In the upper part of the sporaphyte covers 2 rows of small leaves, branching like a coin on top, and in the lower part of the body is formed a root 2.0-2.5 cm long. According to the leaf structure, it is highly developed, i.e. each leaf consists of two segments, the upper segment is green, located at the surface of the water surface, and the lower segment is located at the bottom of the water and serves to attract water-soluble substances. (Figure 5).

Figure 5. Azolla (Azolla carolipiapa Willd.)

The optimal period of gross growth of Azolla is July-September, during which it produces 250-300 g / m2 of biomass per day. Wet biomass of 1500-2000 kg per day on 1 hectare of water with Azolla grown in sewage; Pistia and eucalyptus can produce 1800-2700 kg of wet or 90-135 kg of absolute dry biomass (June-October).

Lemna minor is a perennial high aquatic plant that grows floating on the surface of the water. It is a common plant in the flora of Uzbekistan. Lemna minor is a cold and hot weather-resistant medicinal plant that grows in any pond water rich in organic matter [2]. Lemna minor has leaves and roots and is propagated mainly vegetatively. The size of the plant is 5-6 mm. Ryaska releases large amounts of oxygen during photosynthesis, and its role in cleaning water bodies is also high (Fig. 6).

Figure 6. Lemna minor L.

In addition, when Pistia and Eichhorpia were propagated under laboratory conditions and in open water basins, their height ranged from 20–40 cm (pistachio) to 0.5–1 m (Eykhornia).

Pistia and Eichornia bloom outdoors from the second half of April to November, and in greenhouse conditions throughout the year. These plants are vegetatively propagated by seeds. But they are dominated by vegetative reproduction. Vegetative propagation occurs mainly through branches (stolons) growing from the leaf axils. New plants develop at the ends of the branches. This condition lasts throughout the summer and is repeated several times until late autumn.

As a result of studying the bioecological properties of Carolina Azolla in the conditions of introduction, a nutrient medium was created for its mass reproduction (nutrient medium for the cultivation of Azolla. The first patent of the Republic of Uzbekistan. № 5033. 1994). Local fertilizers (cattle, sheep, poultry manure) and sewage can also be used to grow it. Azolla can be grown in the greenhouse in winter in concrete ponds with a depth of 20-30 cm or in various containers (glass trays, duralumin containers, aquariums), and in summer in the open air (depth 0.3-0.5 m) in pools, ditches and ditches. Juices made from the manure of farm animals and poultry (3-5 g / l), water from crops and sewage can be used as a nutrient medium. Determining the initial seedling density of plants growing on the water surface is of great scientific and practical importance. If the initial seedling density is higher than normal, the seedlings will not be able to take full advantage of sunlight, and if it is low, foreign organisms (e.g., various algae, microscopic fungi, etc.) may multiply in the nutrient medium. The initial seedling density of Carolina Azolla is 300-400 g / m2. However, if the density of seedlings is more or less, its yield will be significantly reduced. Azolla biomass can be harvested every 3-5 days. This leaves its first planted biomass. The nutrient medium planted with Azolla should be provided with fresh juices every 10-15 days. Under introduction, Azolla can produce biomass of 50–150 g / m^2 or more overnight, depending on growing conditions and nutrient medium composition.

CONCLUSIONS, SUGGESTIONS AND RECOMMENDATIONS.

From the above data, it is clear that the study of the effectiveness of the use of biological methods in the safe use of collector-drainage water in the region, ie the reduction of mineralization, is relevant today. With this in mind, we conducted our next experiments on the cultivation of aquatic plants in the above-mentioned aquifers in Pistia (*Pistia stratiotes* L., Araceae), Eichhorpia (*Eichhorpia crassipes* Solms., Pontederiaceae) and Azolla (*Azolla carolipiapa* Willd., Sem. Azollaceae). we continue our experiments. We think that this method will definitely give its positive effect.

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