



THE ROLE OF DRAINAGE SYSTEM PLANTS IN DRAINAGE PURIFICATION

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Turkmenistan is located in the center of the Eurasian continent, far from the world ocean, in the desert and semi-desert zones of the temperate zone. The main part of its territory (80%) is occupied by the Karakum desert. As such, the majority of the country's population lives in oases, i.e. river valleys and foothills with underground streams. However, today the role of the Karakum desert in the development of various sectors of the national economy of Turkmenistan is indispensable. Its subsoil is rich in hydrocarbon raw materials, and the fuel and energy sector occupies an important place in the country's economy. The Karakum desert is rich in flora and fauna compared to other deserts in the world. This is of great importance in the development of animal husbandry in the desert. Also, the area of land suitable for cultivation in the Karakum desert exceeds 15 million hectares.

The President of Turkmenistan is making tireless efforts to turn our motherland and vast desert into a wonderland by effectively using the country's water reserves. "Altyn Asyr" Turkmen Lake, created in the Garashor Basin, located in the northwest of Turkmenistan, is a clear evidence of the ongoing reforms in Turkmenistan. As stated in the "Social and Economic Development Program of the President of Turkmenistan in 2019-2025", the construction of the "Altyn Asyr" Turkmen Lake made it possible to improve the ecological condition of the desert, as well as the melioration of irrigated lands [1].

"Altyn Asyr" Turkmen Lake is 103 km long, 18.6 km wide, and 132 km³ in volume. Drainage water is brought to the lake through two large aqueducts - the main saline aqueduct and the Dashoguz aqueduct. The total length of the main saline aqueduct is 720 km, and the length of the Dashoguz aqueduct is 381 km [2]. The construction of Turkmen Lake is being carried out in 3 stages. The construction of its first phase began in 2000 and was completed in 2009.

Lake Turkmen is created on the basis of the natural Karashor depression located in the northwest of the country to collect the drainage water of Turkmenistan and partly Uzbekistan. Thus, as a result of the natural purification of drainage water and the use of modern technologies in purification, a reserve fund of water is created that can be used for the needs of the agricultural industry - development of new lands, irrigation of pastures, as well as irrigation of forest zones, technical needs.

At present, scientific research and experimental work on the water purification of the Turkmen lake "Altyn Asyr" and its drainage water reservoirs is being carried out at the "Ecological Biotechnology" scientific production center of the Oguz Han Engineering and Technology University of Turkmenistan. Mainly, it is used to treat drainage water and polluted water it is intended to use biological methods of cleaning. These include absorbing organic matter from water, removing solid particles, pesticides, etc. Of greater interest is the use of aquatic plants capable of retaining water. Thus, the possibilities of using natural bioplato in drainage water aquifers for drainage water treatment in the conditions of Turkmenistan were studied.

A drain passing through the north of Ashgabat was chosen for the experiment. Reed (*Phragmites communis*) dominates the wetland. Small amounts of cattail (*Typha L.*), silver

plume (*Erianthus*) and other macrophytes are found. The density of plants is on average 50 plants per 1 m². The flow rate in the river is about 0.01 m/h. In order to investigate how well the natural bioplato in the drain cleans the drainage water, water samples were taken at 2 points of the drain at the same time, the distance between the 2 points is 100 meters. Thus, the possibility of purification was evaluated when the drainage water was passed through a bioplato with a length of 100 meters.

As a result, it can be seen that after passing through the bioplato containing the mentioned plants, the amount of chlorine ions decreases in the drainage water is almost 2 times, the amount of bicarbonate ions decreases to 25 mg/l, and the pH level decreases. The amount of calcium and magnesium ions in the water remained unchanged (Table 1).

Table 1. Drainage water test results

Tested indicators of the content of drainage water	Water content from point 1, mg/l	Water content from point 2, mg/l
HCO ₃ ⁻	518.5	494.1
Cl ⁻	1198.99	725.71
Ca ²⁺	180.36	180.36
Mg ²⁺	103.3	103.3
pH	8.5	8.1
Hardness	17.5	17.5

In recent years, large-scale works have been carried out in Turkmenistan to transform vacant lands into forests and create forest zones [3, 4]. In the afforestation of the Karakum desert, the place of the lake's drainage water reservoirs is important [5].

The results of the conducted research show that by purifying the water of drainage waterreservoirs in the Karakum desert through natural bioplato, they can be reused in some sectors of agriculture. In particular, it allows the cultivation of forage plants and the development of agriculture. Also, purified water is of great importance in creating forest zones in Karakum.

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