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Biological Sources of Wastewater Treatment

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Abstract: This article presents methods of biological wastewater treatment, bioecology and cleaning mechanisms of wastewater treatment plants in the biosphere.

Keywords: Ecology, water resources, waste, chemicals, biological treatment, pistia (Pistia stratiotes L., Araceae), eichhornia (Eichhorpia crassipes Solms., Poptederiaceae).

In today's developing world, harmful substances have a constant impact on the development of human beings, as well as all living organisms and the preservation of their population.

In the decree of the President of the Republic of Uzbekistan on the development strategy of the new Uzbekistan for 2022-2026 No. PF-60 of 28.01.2022, environmental protection and green the following targeted works on plant propagation are planned.

Goal 79: Elimination of existing environmental problems that harm the population's health and gene pool. Implementation of the system of automatic sampling of pollutant sources of objects with a high level of risk of impact on the environment (category I).

Goal 80: Ecology and environmental protection, improvement of the ecological situation in cities and districts, implementation of the nationwide project "Green Space". Planting at least 200 million trees every year as part of the national project "Green Space". Establishing an aerobiological monitoring system in 10 regions of the republic in accordance with the initiatives of the nationwide project "Green Space".

To increase the collection of household waste to 100% and the level of their processing from 21% to 50% by 2026.

Completion of the work of defining the sanitary-protection zones and coastal regions of 51 surface natural water bodies (rivers, small rivers and natural lakes) across the republic.

Every year, more than 3.4 million people die due to contaminated water. Diarrheal diseases, often caused by contaminated water, are one of the leading causes of death among children under the age of five, causing an estimated 525,000 deaths each year.

Creation of ecologically safe and economically inexpensive and effective methods of biological treatment of wastewater is one of the important factors of water resources protection. There are various methods of wastewater treatment. At the present time, it is recommended to use a biological method of wastewater treatment, that is, treatment with the help of high water and wetland plants. enterprises (hemp processing, production of mineral fertilizers, biochemistry, oil-oil enterprises, cocoon enterprises, textile industry) and municipal wastewater from organo-mineral substances, heavy metals, cyanides , a new effective biotechnology of biological purification from oil products and pathogenic microorganisms using high water plants - pistia, eichhornia and azolla was created.

Pistia (Pistia stratiotes L., Araceae), Eichhornia (Eichhorpia crassipes Solms., Poptederiaceae) and Azolla (Azolla carolipiapa Willd., sem. Azollaceae) are perennial plants that float on the water surface and are tropical and widespread in subtropical regions. Currently, these plants have been successfully introduced to the conditions of Uzbekistan.

Water purified by Pistia, Eichhornia, and Azolla can be used for technical purposes, such as washing barns, watering agricultural crops, thawing hemp stalks, or discharging it into fishponds and open water bodies.

Pistia is a floating plant with shortened stems and flat leaves. In the conditions of introduction, the height reaches 20-40 cm. The leaves emerging from the root neck form a thick bundle, the upper part is green, and there are linear deep marks along the length. The entire surface of the leaves is covered with thick, multicellular, transparent hairs. Due to well-developed aerenchyma tissue in plant leaves, it grows floating on the water surface. The pistachio root system is pubescent, 50-60 cm long, and covered with many hairs.

Eichhornia is a floating plant, 30-40 cm tall. Spoon-shaped; smooth, green, glossy leaves are oval in shape; the edges are straight, parallel to the symmetrical length, and the veins are clearly visible. Aerenchyma, an air-filled globular stem based on leaf bands, keeps the plant floating on the surface of the water. The hairs of the pubescent root system are well branched. From the base of the shortened stem, up to 15-20 leaf sheaths are added, and the growing first-order lateral roots are developed. The lateral roots of the second order, up to 2.5 cm long, are located horizontally in the water.

Azolla floats on the surface of the water and reaches a length of 0.7-1.8 cm. In the upper part of the sporaphyte, 2 rows of small leaves cover the branch like coins placed on top of each other, and in the lower part of the body, a 2.0-2.5 cm long root is formed. According to the leaf structure, it is highly developed, that is, each leaf consists of two segments: the upper segment is green, located on the surface of the water level; and the lower segment is located at the bottom of the water and serves to absorb substances dissolved in the water.

The optimal period of gross reproduction of Azolla is July-September, during which it produces 250-300 g/m2 of biomass per day.

1500-2000 kg of wet biomass per night from 1 hectare of water surface of Azolla grown in wastewater; and Pistia and Eichhornia can give up to 1800-2700 kg of wet or 90-135 kg of absolute dry biomass (in June-October). (AVM-0.65, AVM-1.5) can be processed to prepare vitamin flour and can be used as a protein-vitamin and mineral feed as an additional feed to farm animals and poultry. Also, Azolla can be used in rice cultivation as a result of using it as a green fertilizer, the yield of rice increased by 20-25% compared to the control option, and the economic efficiency obtained from 1 hectare of rice field was 500,000 (five hundred thousand) soums in 2008. In 2012, the economic efficiency obtained by saving electricity and chlorine and its compounds used in the disinfection of wastewater as a result of wastewater treatment using pistia, eichhornia and azolla at the Angren "Suvokova" treatment plant amounted to 306 million (three hundred and six million) soums. 'plants can also be used to decorate ponds to increase the variety of ornamental plants.

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