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THE SIGNIFICANCE OF AQUATIC PLANTS IN THE BIOLOGICAL TREATMENT OF WASTEWATER (IN THE EXAMPLE OF THE BREAD PRODUCTION INDUSTRY).

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ABSTRACT

In the article, the role of aquatic plants in the biological treatment of wastewater from the Dangara bread production industry in the Dangara district of the Fergana region is studied. The physical and chemical composition of wastewater from the production plant, the growth, development, productivity and level of water purification of pistachio aquatic plants at different concentrations of the plant waste water were studied. The effectiveness of cleaning high-water plants (pistachio) in semi-production conditions was determined. By growing Pistia aquatic plant in wastewater from the enterprise, organic substances and impurities in the water are absorbed by the aquatic plant and lead to improvement of water quality. The physical properties and chemical composition of the water are greatly improved when a higher aquatic plant is grown in the wastewater. The amount of dissolved oxygen decreased from 3.67 to 9.14 mg O2/l, KBBT5 decreased three times (from 15.88 to 4.58 mg O2/l) and KBKT from 29.41 to 9.58 mg O2/l. Other indicators of wastewater have also improved

Introduction: It is known that protection of nature, including water and reservoirs, is one of the main problems in human life. Water and reservoirs are polluted mainly as a result of untreated or incompletely treated waste water from enterprises, cities and farms. The year-by-year increase in the world's population is creating new, never-before-seen problems [1]. Another such urgent problem is the issue of wastewater treatment and ways to use it for various purposes. Contaminated water contains various organic and toxic substances, as well as disease-causing bacteria. Currently, it is very important to develop methods of cleaning wastewater from Fergana region and using it in agriculture [2].

Level of study of the problem: As a result of many years of scientific research, agricultural enterprises (cattle feeding complexes, poultry factories, piggery complexes), industrial enterprises (production of mineral fertilizers, biochemical, wine and oil enterprises, silk spinning and textile enterprises) and municipal, domestic wastewater from organic and mineral substances, heavy metals, cyanides, pesticides, oil products and pathogenic microorganisms from various algae and higher plants - pistia (Pistia stratiotes L., Araceae family), effective methods of biological treatment were created and put into practice (Shoyakubov R.Sh. 2009; Egamberdiyev N.B. 2012; Muminova R.N. 2011.) and others.

Textile enterprises in Turkey have studied the possibility of using some aquatic plants in wastewater treatment. Turkey is one of the leading producers of textile products in the world. Therefore, wastewater treatment is important. Their daily growth rate was taken as a measure of resistance of macrophytes to toxic effects of wastewater[3-5]. As a result of the experiments, the biomass of macrophytes grown in undiluted wastewater was on average: 109 g/m2 of azolla, 97 g/m2 of eichhornia, and 88 g/m2 of pistia. Dilution of wastewater accelerated daily growth. When the wastewater was diluted 2 times, the growth of Azolla increased by 1.25 times, that of Eichhornia by 1.32 times, and that of Pistia by 1.48 times[6-8].

In the wastewater of "Navoiazot" OJSC containing 0.6-2.5 mg/l cyanides, 12-60 mg/l rhodanites, 30-60 mg/l ammonia, 0.012 mg/l copper, hydrogen sulfite, sulfuric acid researches were carried out on the cultivation of pistia and eichhornia plants. Waste water was diluted 2 times. As a result of the experiments (10 days), it was noted that the biomass of both macrophytes slightly increased, and both groups of microorganisms decreased by two levels, and the water became clear and odorless [9-13]. According to the data of the World Health Organization, 450 billion, containing more than 13,000 different substances and elements, are consumed every year. m3 of domestic and industrial waste water is discharged into different water bodies. The effectiveness of nature protection activities is primarily determined by the widespread introduction of resource-saving, low-cost and waste-free technological processes, reducing water and air pollution.

Eichhornia is also used in China to remove silver from waste water of film factories. Eichhornia has been found to remove 100% of silver, 53.9% and 92.9% of suspended particulate matter, phosphorus and nitrogen compounds in wastewater, and 98.6% and 91% reduction of BOD and BOD, respectively [14-17].

Research objects: industrial wastewater of Dangara bread factory, high water plant - pistia (Pistia stratiotes L, Araceae family).

Research methods: The experiments were carried out at the Tashkent Institute of Irrigation and Meloration, the Institute of Botany of the RFA, and the cleaning facility of the Dangara bread production industry. Experiments were carried out in laboratory conditions in aquariums (water volume 20 l), field conditions in duralumin trays (water volume 500 l) and treatment plant ponds. Effluent samples were taken from specific areas of the biological pond in accordance with the calendar plan of research in 2021-2022. Temperature, color, smell of wastewater at a depth of 10-15 cm based on Stroganov, Buzinova methods; Ph, dissolved oxygen content, KBBT5, oxidation, KBKT, nitrates, chlorides were determined according to the methods of Y.Y. Lure.

In order to treat the wastewater of the grain bread industry, seedlings of aquatic plants are initially grown in specially created artificial nutrient media in laboratory conditions, in concrete ponds in the greenhouse in the winter, spherical aquariums, and then in the spring in crystallizers, duralumin containers. and a large amount of concrete pools were used.

Figure 1. Breeding of aquatic plants in greenhouse conditions in winter.

For sampling of wastewater, different locations are determined from biological ponds and one monitoring station is established in the places where wastewater is organized: one monitoring station is installed at the point of discharge of streams, at the points of water discharge.

The samples are sent to the laboratory in plastic containers for analysis. Sample delivery time should not exceed 24 hours.

- Changes in the physico-chemical composition of wastewater, i.e., before and after planting tall plants Y.Y. Lure, Strogonova N.S. determined based on methods.

Water temperature (in laboratory and biological ponds) was determined using a mercury thermometer.

- The activity and acidity of water was determined by the concentration of hydrogen ions using a rNmeter. The number of hydrogen ions in wastewater is mainly determined by the electrometric method using a glass electrode.
- The smell of water was determined by smelling.

In order to determine the smell, it is necessary to determine the vapor number, that is, to find the point where the smell of the water to be detected does not disappear when diluted with clean water.

- Determination of dry residue of water.

The method for determining the dry residue is mainly based on weighing the residue decomposed in water at a temperature of 103-105 degrees.

- Determination of total nitrogen. The amount of total nitrogen in wastewater is determined by the Keldali method. In this method, organic substances in water are formed by ammonium sulfate acid, and the ammonia formed by alkalizing it is determined by driving it in the Keldali apparatus. (Yarmakov, 1987.)
- Nitrites were determined using the Griess reagent.
- Nitrates were determined using Salicylate.

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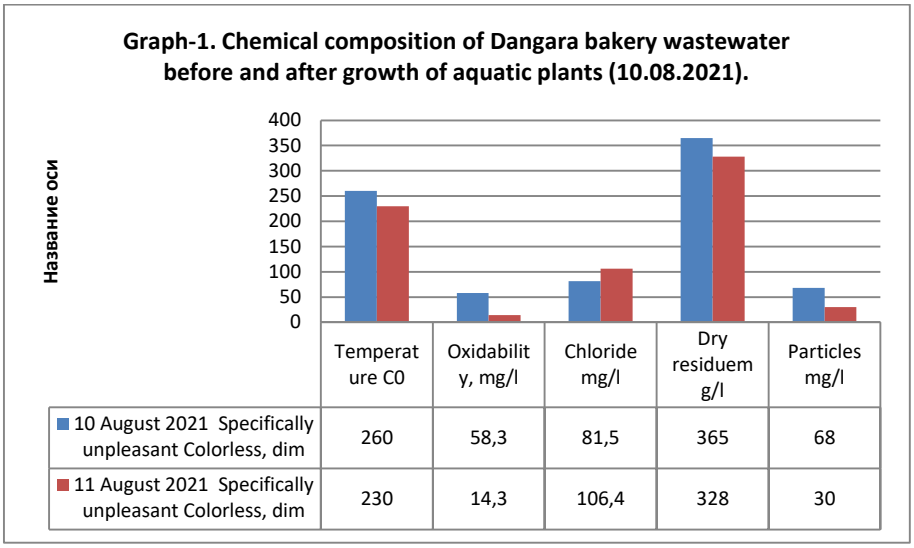
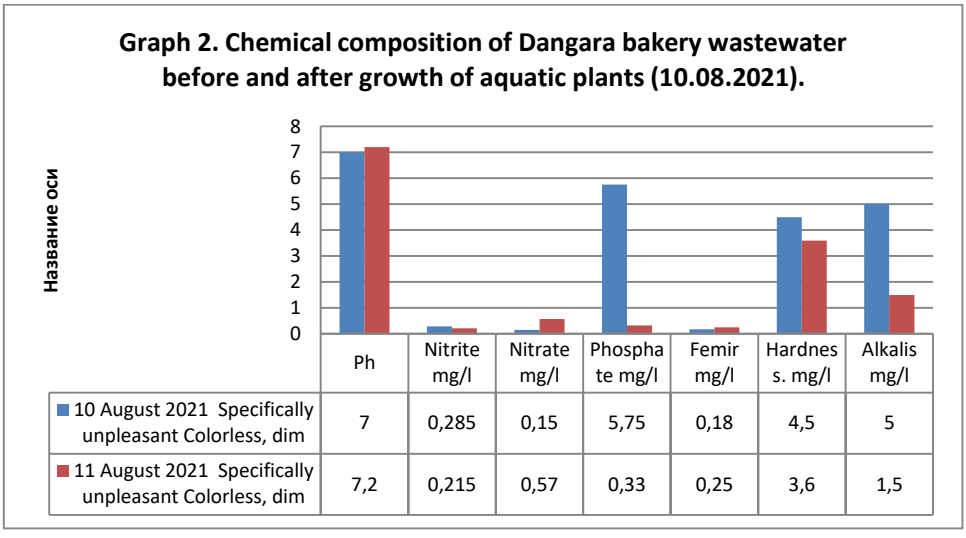
Detection phase. Take 100 ml of the water to be analyzed (or less but make up to 100 ml by adding distilled water) to the flask, add 5 ml of sulfuric acid (1:3) using several capillaries, glass beads or pieces of pumice stone and add 10 ml 0.01 potassium permanganate is added. The mixture should be boiled at such a temperature that it should boil in 5 minutes and boil for exactly 10 minutes, the mouth of which should be closed with a small conical funnel to reduce evaporation. 10 ml of 0.01 normal Shavelic acid is added to the boiling mixture. The colorless boiling mixture (80-90 C) is titrated in 0.01 normal potassium permanganate until it becomes faintly pink.

Results and discussions.

The physical properties and chemical composition of wastewater from industrial enterprises are diverse. They are related to the technological regime of the production process and the natural and climatic features of the region where the enterprise is located. Table 3.1 shows the chemical parameters of the wastewater of the Dangara bread production industry. The color of wastewater is dull, pH changes from 7.0 to 7.5, and it has an unpleasant smell.



Graph 2. Chemical composition of Dangara bakery wastewater before and after growth of aquatic plants (10.08.2021).



When receiving wastewater for biological treatment, it is necessary to have a pH between 6.5 and 8.5, since a neutral environment is necessary for the satisfactory operation of activated sludge. A decrease in the pH of wastewater reduces the rate of metabolism of bacteria and prevents the sedimentation of activated sludge, and if the pH drops below 5.0, fungi take the place of bacteria. An increase in the pH value above 8.5 leads to the destruction of microorganisms.

For purposeful use of aquatic plants as bioagents in wastewater treatment facilities, it is necessary to take into account their biological properties and physicochemical properties of wastewater [18]. Chirchik "Elektrokhimprom" ICHB found that biological treatment of wastewater using eichhornia is more effective than pistachio.

Tables 1 and 2 show the results of wastewater treatment of the Dangara bread production industry. According to the data in Table 3, it was observed that when high water plants (pistia) were grown in wastewater, their chemical composition was significantly improved. Among them, KBBT5 decreased to 1.90 mg O2/l, oxidizability increased almost 4 times (pistia) and other indicators were also improved. Similar results were observed in other laboratory experiments [9].

When we studied the effect of (undiluted) wastewater from the Dangara bakery on the productivity of the pistachio plant, it was found that its biomass increased significantly within 10 days. Based on the obtained results, it can be said that the wastewater of the Dangara bakery can be used as a feed for aquatic plants. At the same time, wastewater is biologically purified.

Table 1. Chemical parameters of wastewater of Dangara bakery before and after cultivation of aquatic plants (laboratory and field experiments, (August, 2021)

Date of sampling	Ph	Color	The smell	Oxidability, mg /l	Temperature C^0	Sulfatem g /l	Dry residue mg /l
Wastewater before treatment							
10 august 2021 j.	7, 0	Colorless, dim	unpleasant smell	58.3	26^0	120.6	365
Waste water after pistachio cultivation							
Sample 1 20 august 2021y.	7, 0	colorless	colorless	14.3	23^0	110.7	328
Sample 2 30 august 2021 y.	7. 1	colorless	colorless	10.1	22^0	101.1	312

Table 2. Chemical parameters of Dangara bakery wastewater before and after cultivation of aquatic plants (laboratory and field experiments (April 2022).

Date of sampling	Ph	Color	The smell	Oxidability, mg /l	Temperature C^0	Sulfate mg /l	Dry residue mg /l

Wastewater before treatment							
1 aprel 2022 j.	6,9	rangsiz, xira	yoqimsiz hidli	60	25^0	130.2	374
Waste water after pistachio cultivation							
Namuna 1 11 aprel 2022j.	7,0	colorless	colorless	56.7	23^0	122.6	362.1
Namuna 2 21 aprel 2022j	7.2	colorless	colorless	52.6	22^0	120.3	358.6

Experiments carried out in laboratory conditions show that the pistachio aquatic plant has the ability to significantly (90%) purify wastewater from the bakery industry. Taking this into account, we conducted experiments to study the cleaning properties of these aquatic plants in the biological ponds of the cleaning equipment of the Dangara bread industry under semi-production conditions. Experiments were conducted from August 10 to August 30, 2021 and from April 1 to April 21, 2022. Pistia in bioponds (volume 25 tons) into which aquatic plants are poured after mechanical treatment of wastewater. Planted plants are planted at a density of 1m2-250 g pistachios. Every 3 days, their appearance condition (pigment color), size of leaves, development of roots were observed.

Observational analysis showed that in the first 3 days, plants showed slight yellowing and underdeveloped leaves, probably because the plants were not fully adapted to this condition, since from the next 4-5 days, the plants slowly it slowly began to recover and at the end of the next 3 days, leaves and roots began to develop. In 10 days, their active growth productivity averaged 50-60 g per day (in dry biomass).

The results of the conducted researches showed that the physico-chemical composition of the wastewater significantly changes and it is cleaned of various toxic substances by growing pistachios in the biological ponds of the wastewater treatment plant of the Dangara bread industry. When pistachio floating on the surface of water is planted in the wastewater of the bread industry, its growth (wet biomass) is 0.5 kg/m3 and more for one day. This means that in summer, 900-1300 tons of molasses or 45-65 tons of dried biomass are present on 1 hectare of water surface.

Conclusions According to the results of studies on the productivity of the aquatic plant Pistia, when they were grown for 10 days, the wet biomass was 1512 g/m2 (originally 800 g/m2), the growth rate was 1296 and 496, respectively. It was 880 g and 80 g. A selective microbiocenosis (consisting of bacteria, algae and simple animals) is formed on the surface of the roots of aquatic plants, which enables the destruction (decomposition) of pollutants in wastewater and the absorption of organic and inorganic substances. Also, pistachio's strong root systems help in adsorption absorption of nutrients. The physical properties and chemical composition of the water are greatly improved when a higher aquatic plant is grown in the wastewater. The amount of dissolved oxygen decreased from 3.67 to 9.14 mg O2/l, KBBT5

decreased three times (from 15.88 to 4.58 mg O2/l) and KBKT from 29.41 to 9.58 mg O2/l. Other indicators of wastewater have also improved.

The presence of small molecular organic substances in the wastewater of the grain bread industry increases the productivity of pistachios by 30% and allows them to accumulate a large amount of biomass.

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