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Propagation of Eichhornia Crassipes and its Water Purification Properties in Poultry Farm Waters

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Annotation. This article describes the results of scientific research conducted in Khorezm region to study the reproduction of Eichhornia crassipes and its water purification properties in the wastewater of poultry enterprises.

Keywords: eichornia, wastewater, biofilter, biological method, pistachio, azolle, duckweed, developmental dynamics.

Introduction

The name of the Committee on Ecology and Environmental Protection has been updated and a program for the development of ecological concepts in the country has been developed to guide the protection and use of ecology and the environment at the policy level. All work in this direction is being carried out on the basis of the Actions' Strategy of the President of the Republic of Uzbekistan for 2017-2021. [1]

One of the most important environmental factors is clean water. Water conservation, storage and purification have always been a pressing issue. First of all, water is one of the most important things in a person's life, in addition to consuming it, he also spends water for the food that he needs with water, and water is the most important thing in cleaning. In addition, water plays a key role in the growth and development of plants, which are the source of life. [5] In some areas, freshwater is still discharged into natural and artificial freshwater basins from industrial enterprises, utilities, livestock complexes, irrigation systems, and settlements, and the water is polluted and turned into wastewater. Such waters contain a lot of harmful substances to human health, which makes it difficult to use for human consumption, while polluting the environment. Plants such as eichhornia, azole, pistachio and duckweed, which belong to the group of higher aquatic plants, can be used in the treatment of wastewater in environmentally safe biological methods.

Materials And Methods

Eichhornia, which belongs to the group of high aquatic plants, is a plant with high biofiltration properties.

Eichhornia crassipes is native to the tropics of South America and is a semi-submersible floating plant. It is acclimatized to Uzbekistan. The main part of the body of the eichhornia consists of leaves located on the surface of the water. The leaves are large, green, shield-like, shiny, floating on the surface of the water. Thick glossy leaves can reach 12-15 cm in width and 30 -50 cm in length. It is a plant with a rootstock and a stolon that has long changed roots. Small long roots hang under water. The length of the roots can be 50-60 cm and more. [2] For the purpose of biological treatment of wastewater and its reuse in the national economy, Eichhornia crassipes was planted in the wastewater from the poultry farm called Tursunboy oglu Jamolbek in Qipchoq neighbourhood, Bagat district, Khorezm region and several experiments were performed under laboratory conditions.

The experiments were carried out in the research laboratory of the Khorezm Mamun Academy in rectangular plastic aquariums and artificial biological ponds. In phenological observation of the productivity of the plant, T.T. Taubaev, V.M. Katanskaya and I.N. Beydeman's recommendations were used. The growth and

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development of eichhornia in wastewater was determined by measuring the weight of the resulting biomass. [5] Physicochemical composition of wastewater, pre-sowing and post-sowing general hydrochemical compositions were determined on the basis of Yu.Yu. Lure and N.S. Strogonov's methods [3] [4].

Research Results

In order to analyze the reproduction of high aquatic plants and water purification in the wastewater of agricultural enterprises, experiments were conducted at poultry farms in Bagat district of Khorezm region in 2019-2020.

After determining the composition of the wastewater from the poultry farm, 150 grams of eichhornia (Giasint) was planted on 1 m2 of water in each aquarium, and its growth, development and reproduction were observed for 8 days. During this time, due to the absorption of minerals in wastewater, its biomass per 1m2 of water surface was 800 g / m2 in the first variant, 715 g / m2 in the second variant, and 565 g / m2 in the third variant.

The daily growth dynamics of the plant was respectively 82.3, 70.7 and - 51.5 g.at the beginning of the experiment; The daily growth dynamics of Eichornia (Giasint) plant at the end of the experiment, respectively - was 658.4; - 565.6 and - 412.0 grams. Their rapid growth was noted due to the rapid uptake of degraded minerals by plants (Table 1).

Table 1

Dynamics of growth and development of eichhornia (Giasint) in laboratory conditions in poultry wastewater

№	**Experiment options**	Ўсимлигик биомассаси, г/м^2					
		Planted eichhorna mass, g	Daily growth (average)		Eight-day biomass		Total biomass amountg/ m^2
			g	%	g	%	
1	100% wastewater+ eichhornia	150	82, 3	54, 8	658, 4	438, 6	808
2	75% wastewater+ 25% tap water	150	70, 7	47, 1	565, 6	377, 1	715,6
3	50% wastewater + 50% tap water	150	51, 5	34, 3	412, 0	274, 6	562

Changes in the chemical composition of wastewater were analyzed. The composition of the water was determined before planting eichhornia.

The temperature of the wastewater was 27 0C, ambient was pH 6.5, it had yellow color, odour 5 points, no dissolved oxygen. Biochemical consumption of oxygen was 150.0 mg O2 / l, oxidation rate was 125.0 O2 / l, ammonia was 6.5. mg / l, nitrites were 0.08 mg / l, nitrates were 6.5 mg / l, chlorides were 68.5 mg / l, sulfates 71.0 mg / l, phosphates were 7.5 mg / l and suspended solids were 55.4 mg / l.

Eight days after sowing eichhornia, it was found that there was a change in the composition of the wastewater. At the end of the 8th day of the experiment, the composition of the wastewater planted with eichhornia was analyzed.

In option 1 (wastewater 100%, eichhornia planted) the temperature of the wastewater was 28.0 0C, ambient was pH 7.0, it had clear colour and odour, dissolved oxygen 5.7 mg / l. Biochemical consumption of oxygen was 16, 4 mg O2 / l, oxidation state was 12.4 mg O2 / l, it had no ammonia, no nitrites, no nitrates, chlorides were 45.4 mg / l, sulfates 50.0 mg / l, phosphates were 1.8 mg / l and suspended solids decreased to 12,5 mg / l.

In variant 2 of the experiment (wastewater 75% tap water 25%, eichhornia planted) water temperature was 28 0C, ambient was pH 7.5, it had clear colour and no odour, dissolved oxygen was 6.1mg / l, biochemical oxygen consumption was 15, 3 mg O2 / l, oxidation state was 12.0 mg O2 / l, it had no ammonia, no nitrites, no nitrates, chlorides were 28.5 mg / l, sulfates were 31.5 mg / l, phosphates were 3.0 mg / l and suspended solids decreased to 10,4 mg / l.
In the 3rd variant of the experiment (wastewater 50% tap water 50%, eichhornia planted) water temperature was 28 0C, ambient was pH 7.5, it had clear colour and no odour, dissolved oxygen was 6.5 mg / l, biochemical consumption of oxygen was 10 , 5 mg / l O2 / l, oxidation state was 11.8 mg O2 / l, it had no ammonia, no nitrites, no nitrates, chlorides were 18.5 mg / l, sulfates were 12.3 mg / l, phosphates were 0.5 mg / l and suspended solids decreased to 10 mg / l.

Table 2

Physicochemical composition before sowing of eichhornia in the wastewater of a poultry farm

(in the laboratory)

№	Experiment types	Indicators													
		Temperature, ^0C	pH	Colour	Smell, mark	Dissolved oxygen mg/l	OBC5, mg O_2/l	Oxidation mg O_2/л	Ammonia mg/l	Nitrites mg/l	Nitrates mg/l	Chlorides, mg/l	Sulfates mg/l	Phosphates mg/l	Suspended solids , mg/l
1	Wastewater 100%, eichhornia	27±0,18	6,5±0,06	Yellow	5,0±0,03	No	150,0±2,6	125,0±3,2	6,5±0,25	0,08±0,003	6,5±0,18	68,5±2,4	71,0±3,0	7,5±0,08	55,4±1,6
2	Control without eichhornia	27±0,18	6,5±0,06	Yellow	5,0±0,03	No	150,0±2,6	125,0±3,2	6,5±0,25	0,08±0,003	6,5±0,18	68,5±2,4	71,0±3,0	7,5±0,08	55,4±1,6
3	Wastewater 75%, tap water 25%, eichhornia	27±0,22	7,5±0,05	Yellowing	4,0±0,04	0,5±0,04	84,5±2,4	75,5±2,2	4,0±0,22	0,06±0,002	5,0±0,15	58,0±2,1	63.3±2,2	6,0±0,04	41,5±1,3
4	Control without eichhornia	27±0,22	7,0±0,05	Yellowing	4,0±0,04	0,5±0,06	84,5±2,4	75,5±2,2	4,0±0,22	0,06±0,002	5,0±0,15	58,0±2,1	63.3±2,2	6,0±0,04	41,5±1,3
5	Wastewater %, tap water 50%, eichhornia	27±0,23	7,0±0,04	Yellowing	3,0±0,02	1,5±0,14	72,0±2,2	64,2±2,4	2,0±0,12	0,04±0,006	3.0±0,14	34,5±1,4	38,4±1,6	4,0±0,05	26,0±0,8
6	Control without eichhornia	27±0,23	7,0±0,04	Yellowing	3,0±0,02	1,5±0,14	72,0±2,2	64,2±2,4	2,0±0,12	0,04±0,006	3.0±0,14	34,5±1,4	38,4±1,6	4,0±0,05	26,0±0,8

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Table 3

Changes in the physicochemical composition of poultry after sowing eichhornia in sewage (8 days)

(in the laboratory)

№	Experiment types	Indicators													
		Temperature, ^{0}C	pH	Colour	Smell, mark	Dissolved oxygen mg/l	OBC5, mg O_2/l	Oxidation mg O_2/л	Ammonia, mg/l	Nitrites mg/l	Nitrates mg/l	Chlorides, mg/l	Sulfates, mg/l	Phosphates, mg/l	Suspendedsolids, mg/l
1	Waste water 100%, eichhornia	28,0±0, 18	7,6 ± 0,06	Colourless	No	6,7 ±0,24	16,4 ±0,64	12,4 ±0,62	No	No	No	45,4 ±1,1	31,6±2,1	1,8± 0,03	12,5±0,6
2	Control without eichhornia	28,0±0, 18	7,0 ± 0,06	Yellow	5,0 ±0,02	No	101,0±3,1	97.1 ±3,3	5,8± 0,14	0,05 ±0,006	5,0 ±0,08	60,5 ±1,8	64,5±2,6	6,8± 0,08	36,4±1,3
3	Waste water %, tap water 25%, eichhornia	28,0±0, 18	7,5 ± 0,06	Colourless	No	6,1 ±0,28	15,3 ±0,65	12,0 ±0,62	No	No	No	28,5 ±1,3	31.5±1,8	3,0± 0,02	10,4±0,7
4	Control without eichhornia	28,0 ±0,18	7,0 ± 0,06	Yellowing	4,0 ±0,03	0,6 ±0,10	65,4 ±2,6	65,3 ±1,8	4,0± 0,1	0,06 ±0,004	4,0 ±0,12	52,2 ±1,9	55,2±2,1	5,5± 0,08	35,0±1,3
5	Wastewater 50%, tap water 50%, eichhornia	28,0 ±0,18	7,5 ± 0,06	Yellowing	No	6,5 ±0,28	10,5 ±0,62	11,8 ±0,24	No	No	No	18,5 ±0,8	12,3±1,1	0,5± 0,02	10,0±0,4
6	Control without eichhornia	28,0 ±0, 18	7,0 ± 0,06	Сар ғиш	3,0 ±0,02	2,0 ±0,22	59,4 ±2,1	45,0 ±1,5	1,5± 0,08	0,02 ±0,002	2,0 ±0.09	30,5 ±1,4	32,8±1,6	3,0± 0,06	22,4±0,8

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Conclusion

The analysis of the results showed that the accumulation of biomass on the surface of 1 m2 of water from 150-200 to 562-808 g per 1m2 of water and the degree of purification of wastewater from organic and mineral substances reached 90-92%.

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