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Original Article

Experimental Study On Dairy Wastewater Treatment By Phytoremediation Process

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Abstract *- Dairy industry is viewed as the biggest wellspring of food-handling wastewater in numerous nations. An enormous measure of water is utilized during preparing of milk; this outcome in the age of high volume of profluent containing disintegrated sugars, proteins, fats, and so on, which are mostly natural in nature. Consequently, dairy wastewater is portrayed by high convergence of natural matter and high BOD. Emanating with such qualities can't be utilized for land water system reasons and can't be released into the public sewer/surface water. The legitimate treatment of dairy wastewater is essential before removal. Phytoremediation is one such procedure, which is characterized as the utilization of plants as miniature living beings to eliminate innocuous toxins from polluted water. In this examination, an endeavor is made to assess the proficiency and reasonableness of sea-going plants like lotus, duckweed and sunflower to treat dairy wastewater. Oceanic plants have drawn consideration in light of fast development, high biomass creation and capacity to eliminate assortments of toxins from dairy wastewater. They can eliminate even supplements and other synthetic components from dairy wastewater.*

Keywords *- Phytoremediation, Lotus, Sunflower, Duckweed, Dissolved oxygen, Total solids.*

1. Introduction

Water is the fundamental wellspring of life on the earth as we need water for different social statuses on one side; on the opposite side, contaminated water can be deadly for existing life. Water contamination is the defilement of water bodies (for example, lakes, streams, seas, springs and groundwater). This type of natural debasement happens when contaminations are straightforwardly or in a roundabout way released into water bodies without satisfactory treatment to eliminate unsafe mixtures. Different treatment techniques have been utilized to tidy up dirtied destinations. At present, a wide scope of Phyto innovation has arisen to forestall ecological debasement. Diverse physical and compound techniques utilized for this reason experience the ill effects of genuine restrictions like a significant expense, concentrated work, change of soil properties and aggravation of soil local miniature greenery. Phytoremediation is the name of a bunch of advances that utilize plants to debase, remove, or contain pollutants from soil and water. This point has been the extraordinary arrangement of exploration throughout the most recent ten years.

1.1. Reason for Adopting Wastewater Treatment

The important goal of wastewater treatment is, for the most part, to permit civil and modern effluents to be discarded without risk to human wellbeing or unsuitable harm to the regular habitat. Water system with wastewater is both removal and usage and undoubtedly is a viable type of wastewater removal (as in lethargic rate land treatment).

1.2. Phytoremediation

Fig 1.1 Duckweed

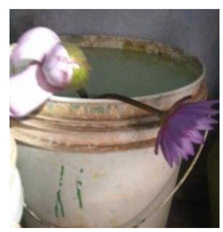

Fig 1.2 Lotus

Fig 1.3 Sunflower

Phytoremediation is one of the organic wastewater treatment strategies and is the idea of utilizing plant-based frameworks and microbiological cycles to dispose of toxins in nature. It is characterized as the designed utilization of green plants to eliminate, contain or render innocuous such natural toxins like natural metals, minor components, and natural mixtures in soil and water. It is a promising tidy-up innovation for defiled soils, groundwater and wastewater that is both low tech and minimal expense; these frameworks are by and large financially savvy, basic, naturally non-troublesome, and biologically solid with low upkeep cost and low prerequisite.

1.3. Need for the Present Study

Dairy wastewater, when released on the land or in water without appropriate treatment, prompts numerous risks like groundwater impurities, soil defilement, contamination of regular water bodies, and so forth; in this way, these wastewaters must be dealt with; for example, the water quality boundaries in these wastewaters should fulfill their

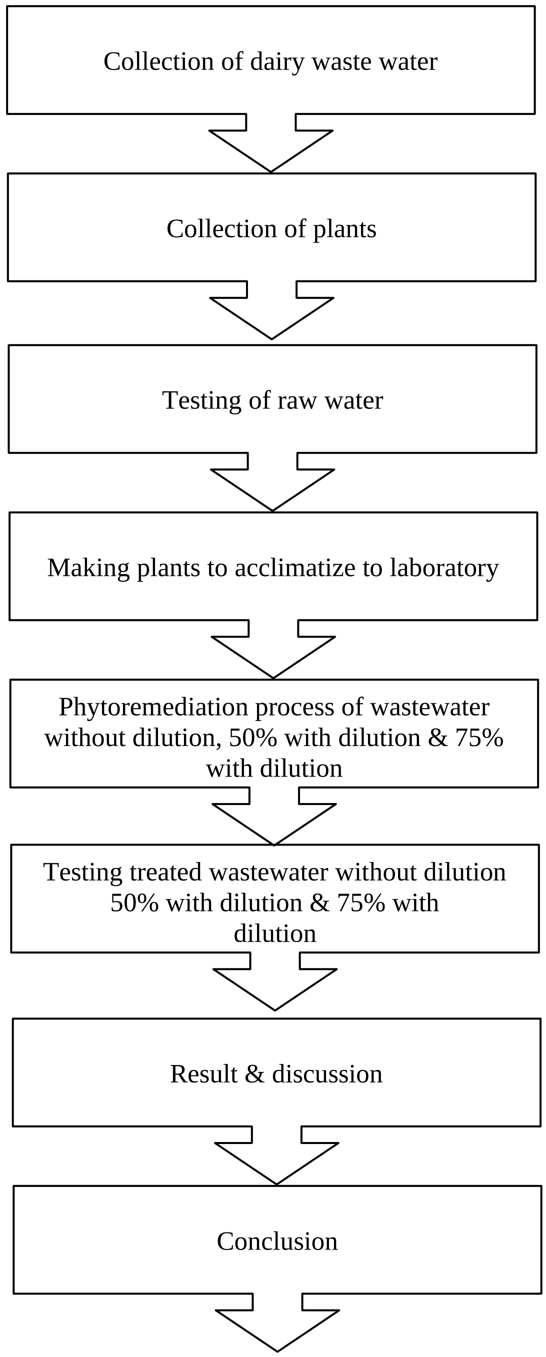

Fig 2.1 Methodology flow chart

release guidelines prior to releasing into the climate. Techniques like phytoremediation which utilizes drifting plants for the therapy of metal contamination is an issue related to the spaces of serious mechanical exercises from where untreated Dairy wastewaters are brought into the climate. Consequently, the ebb and flow study is centered around treating Dairy wastewater containing lotus, duckweed and sunflower.

1.4. Objectives of the Study

The objective of the study is:

- To find the maximum uptake and removal efficiency of contaminants of Dairy wastewater by performing batch and continuous study with the help of lotus, duckweed and sunflower.

2. Methodology

This study is to determine the potential of lotus, duckweed & sunflower to reduce the amount of pollutants discharged through industrial effluent. If found suitable, lotus, duckweed & sunflower, biological organism, and cloud reduce further pollution of the environment arising from using chemical techniques.

2.1. Selection of Plant Species

Different kinds of coasting plants like lotus, duckweed, and sunflower utilized for phytoremediation are dissected. Through the writing review, it was discovered that duckweed, lotus, and sunflower assume a prevailing part in treating wastewater. Along these lines, lotus, duckweed, and sunflower were chosen for electroplating wastewater in this investigation.

2.2. Plants Collection

We are used in three types of plants.
Following the three types of plants

- Lotus (Nelumbo Nucifera)
- Duckweed
- Sunflower (Helianthus)

2.3. Sample Collection

The dairy wastewater of sample was collected from the outlet point of Aavin milk society in Srivilliputtur in 25L plastic bottles.

2.4. Experimental Procedure

To assess the Phytoremediation capacity of Nelumbo Nucifera, Duckweed and Helianthus were conducted in the laboratory.

In these setups, three tubs of 5-liter capacity filled with dairy wastewater samples and filled with three types of plants. The aquatic plants were then transferred and spread uniformly into a plastic tub that nearly 75% of the area covered by plants. The dairy wastewater was without dilution, with a dilution of 50% and with a dilution of 75%. The experiment setup was placed near a window so that the plant received enough sunlight. The experiment was carried out 1 day after 3 days after 5 days.

Nelumbo Nucifera, Duckweed and Helianthus were inoculated in wastewater of different concentration

1. Without dilution process.
2. 50% wastewater and 50% tap water.
3. 25% wastewater and 75% tap water

These are the plants to make in the laboratory. The experiment setup was placed near a window so that the plant received enough sunlight.

Fig 2.2 Experimental setup

3. Result and Discussion

3.1. Phytoremediation Process of Without Dilution

Parameters`	Initial Value	DAY-1			DAY-3			DAY-5		
		LOTUS	DUCK WEED	SUN FLOWER	LOTUS	DUCK WEED	SUN FLOWER	LOTUS	DUCK WEED	SUN FLOWER
pH	6.83	6.54	6.41	6.45	6.76	6.51	6.375	6.87	6.64	6.53
Turbidity (NTU)	A3.8 NTU	60.8	36.9	59.8	57.6	46.2	55.8	55.7	40.4	51.9
Total Hardness (mg/l)	1015 (mg/L)	1515	1000	1485	1590	1320	1580	1580	1270	1490
Total solids in water (mg/l)	90 (mg/l)	50	70	30	40	20	40	35	20	30
TDS (mg/l)	60 (mg/l)	90	40	20	80	30	40	60	20	30
TSS (mg/l)	180 (mg/l)	360	190	210	290	170	230	210	120	140
D.O	5.4	6.2	3.5	4.2	5.8	3.2	3.9	4.9	3.13	3.8

Table -3.1:

From table 3.1, it was shown that pH, Turbidity, total hardness, total solids in water, total suspended solids, total dissolved solids, and dissolved oxygen, respectively, without dilution process.

3.2. Phyotoremediation Process of 50% with Dilution

PARAMETERS	DAY-1			DAY-3			DAY-5		
	LOTUS	DUCK WEED	SUN FLOWER	LOTUS	DUCK WEED	SUN FLOWER	LOTUS	DUCK WEED	SUN FLOWER
pH	6.89	6.98	6.73	6.93	6.80	6.85	6.9	7.01	6.98
Turbidity (NTU)	44.4	25.3	37.9	37.3	20.5	30.7	33.4	23.8	28.3
Total hardness (mg/l)	1337	930	1110	1230	950	1010	1110	780	1000
Total Solids in water (mg/l)	30	20	25	25	30	20	20	25	20
TDS (mg/l)	40	20	30	35	25	25	30	15	25
TSS(mg/l)	170	310	230	150	290	210	150	260	180
D.O	5.8	3.9	4.3	5.1	3.3	4.2	4.9	3.13	3.9

Table -3.2:

From table 3.2, it was shown that pH, Turbidity, Total hardness, Total solids in water, Total suspended solids, Total dissolved solids, and Dissolved oxygen, respectively on, with 50% dilution in Phytoremediation process using three types of plants.

3.3. Phytoremediation Process of 75% with Dilution

Parameters	DAY-1			DAY-3			DAY-5		
	LOTUS	DUCK WEED	SUN FLOWER	LOTUS	DUCK WEED	SUN FLOWER	LOTUS	DUCK WEED	SUN FLOWER
pH	6.93	7.03	6.8	6.85	6.92	6.98	7.01	7.3	7.11
Turbidity (NTU)	39.8	21.5	33.7	34.5	21.8	28.3	30.14	21.7	25.9
Total Hardness (mg/l)	1180	850	1010	1130	910	980	1070	820	930
Total solids in water (mg/l)	30	25	35	35	20	30	25	15	20
TDS (mg/l)	35	15	20	30	25	35	25	20	25
TSS (mg/l)	150	280	180	110	310	200	130	270	190
D.O	5.1	3.3	4.0	4.7	3.0	3.3	4.5	3.7	3.0

Table -3.3:

From table 3.3, it was shown that pH, Turbidity, Total Hardness, Total solids in water, Total dissolved solids, Total suspended solids, and Dissolved Oxygen, respectively on, with 75% dilution in Phytoremediation process using three types of plants.

Chart -1: Graphical Representation for Ph Values of Without Dilution, With 50% Dilution and With 75% Dilution

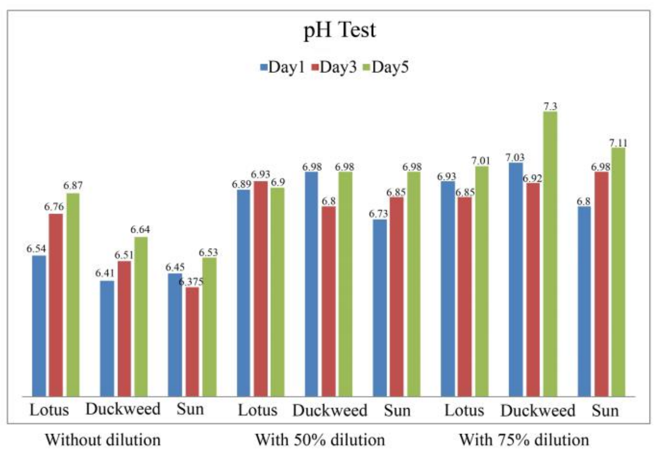

Fig 3.1

From figure 3.1 can be shown the pH value used for three types of plants and phytoremediation of dairy wastewater without process and with dilution process.

Chart -2: graphical representation for Turbidity values of without dilution, With 50% dilution and 75% dilution

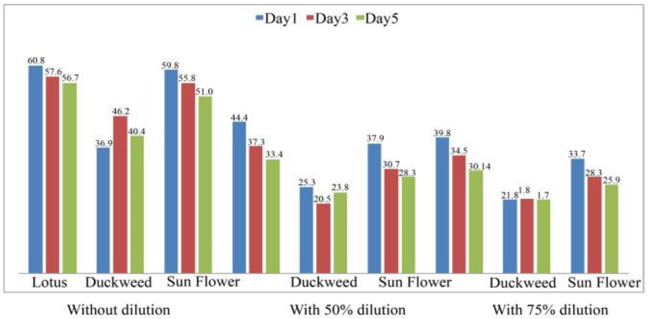

Fig. 3.2

From figure 3.2 can be shown turbidity values compared in three types of plants and the Phytoremediation process without dilution and with dilution process.

Chart -3: graphical representation for Total hardness values of without Dilution, with 50% dilution and 75% Dilution

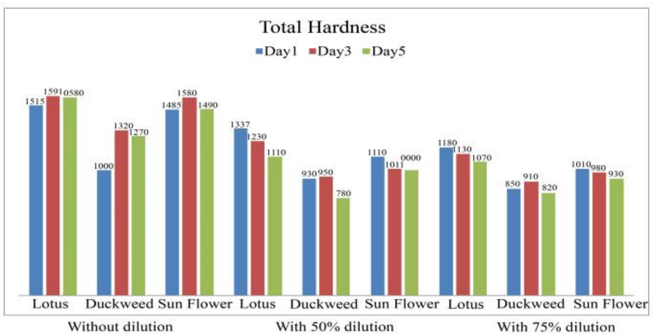

Fig 3.3

From figure 3.3 can be shown the total hardness of dairy wastewater without the dilution process and with the dilution process use of the Phytoremediation process.

Chart-4: Graphical Representation for Total Solids in Water Values of Without Dilution, with 50% Dilution and 75 % Dilution

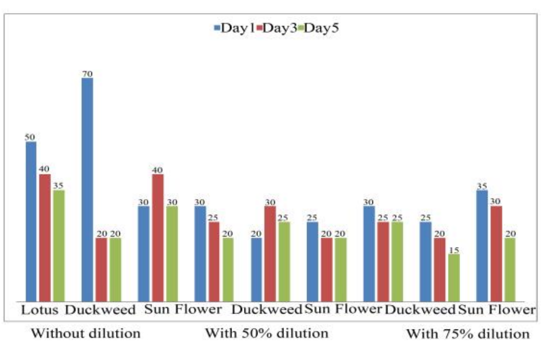

Fig 3.4

From figure 3.4 can be shown the total solids in dairy wastewater using the phytoremediation process using three types of plants. This figure shows that comparison in total solids of three types of plants.

Chart -5: Graphical Representation for Total Dissolved Solids Values of without Dilution, with 50% Dilution and 75% Dilution

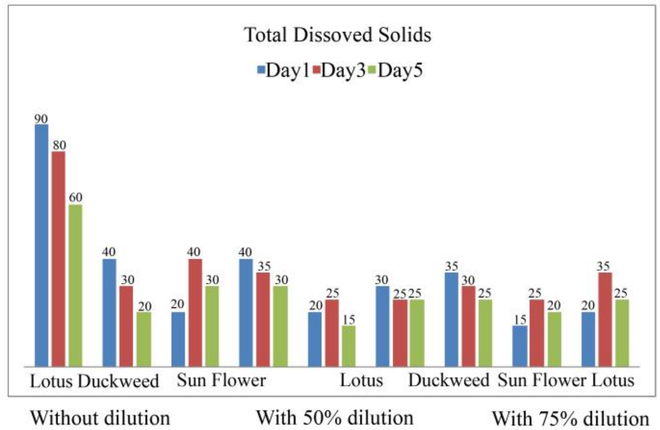

Fig. 3.5

From figure 3.5 can be shown the total dissolved solids of thephytoremediation process of dairy wastewater with dilution and without dilution.

4. Conclusion

From the above outcome and conversation to reason that the duckweed plant is more productive in treating the dairy wastewater natural foreign substances, analyze the other two plants. Over the examination, we were required 5 days of testing for the preliminary cycle. After the fifth day, the plants were passing. So that gave for weakening interaction results additionally give more compelling for duckweed.

In the phytoremediation interaction, "duckweed" is the productive plant for normal wastewater treatment; the graphical portrayal will be given information about the phytoremediation treatment measure. It will be help full for future investigation reasons about phytoremediation.

The requirement for development and preservation of the climate in India requires the arrangement of energy and financially savvy auxiliary wastewater treatment offices for little networks like schools, emergency clinics, universities, ranches, and ventures where on-location wastewater removal innovation dominates.

The phytoremediation framework works utilizing regular measure and generally don't need generous energy inputs. The organic cycles are ordinarily sun powered driven as light and carbon sources are utilized to infer the microbial and plant measure. We are taking the three kinds of various plants. Lotus, duckweed, and sunflower demonstrated to have a noteworthy capacity in treating dairy wastewater. At the same time, the most extreme decrease of contaminations was not accomplished if there should arise an occurrence of consistent investigation.

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