Potential of Water Hyacinth for Treatment of Dairy Wastewater

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Abstract— **In this paper it is shortly discussed that dairy industry have shown tremendous amount in growth in size. The water generated from this industry is characterized by high Chemical oxygen demand, Biochemical oxygen demand nutrients and organic and inorganic contents. If this wastewater is directly discharged without treatment in to the sewers it will affects on human health and aquatic life and soil fertility powers.**

In this article the study is to treat the waste water generated from dairy industry by water hyacinth (Eicchornia-Crassipes) The Physiochemical and Organic parameters are examined to verify the quality and extent of pollution by which P^H , BOD, COD, TDS, TSS, TN, TP and significant reduction in the parameters were observed and hence found more useful. In this study it is observed that initially the wastewater sample was so Alkaline but after treatment the P^H observed near to the neutral also BOD reduction efficiency was 80%-85% and COD reduction efficiency was 70%-75% Also remove the nutrients and other chemical elements from sewage and industrial effluents and use the treated wastewater for Agriculture purpose. The Stress is given on best lowest cost treatment.

Index Terms— **Chemical Oxygen Demand, Biological Oxygen Demand, Water Hyacinth, dairy Industry.**

I. INTRODUCTION

Dairy industry is called as a largest source of food processing industry and causes several Environmental problems because of generation of strong wastewater having high BOD and High COD contents. Water is used in all processes in dairy industry also the waste generated from such type of industry is having high concentration of organic materials, high BOD and High COD, Total Suspended solids, Total Dissolved Solids .etc. for such ingredients requires treatments to optimize environmental problems.

Constructed wetlands are the artificial wastewater treatment system consisting of shallow ponds having aquatic plants which rely upon natural microbial, biological, physical, chemical process to treat wastewater. For experiment we have selected a plant from grass family called as Water Hyacinth. Latter on The experiment is conducted .The water can be made ready for reuse after experiment. The root analysis of the plant before and after the experiment has been done so that it can be evaluated that the plant had taken the water for its photosynthesis process. The main focus of this experiment is to degrade the dairy waste in natural environment without using polluted chemicals and to make the water for reuse and irrigation purpose.

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II. MATERIALS AND METHODS

2.1 Source of wastewater

The given waste water is collected from The Prabhat Dairy plant near to the Sangamner. Tal. Sangamner. Dist. A.nagar.

2.2 The Experimental setup:

The untreated dairy waste water flows discharged into the steel boxes with controlled manner with a flow rate of 10 lit. This dairy waste water is treated by using water hyacinth the details of experimental set up is given below.

The steel boxes of size 24x24x35cm depth. There are five ponds each having same dimensions and a Liquid depth of 10cm,15cm,20cm,25cm and 30cm of pond 1,2,3,4,and 5 respectively. A layer of gravel 5cm is placed at the bottom of each pond passing through 6mm sieve. The applied flow pattern is surface flow type. The plants of water hyacinth having 1kg mass were planted on the top of the each pond. On 13 Nov 2014. These tests were carried out up to 27 Nov.2014 i.e. total 15 days. All parameters were performed as per the Std. methods like P^H, BOD, COD, TSS, TDS, TN, TP, Alkalinity, etc. can be tested every day. All these Analytical tests were conducted in Environmental laboratory of Amrutvahini polytechnic Sangamner dist. A.nagar and some test in Prabhat milk factory laboratory.

Figure No. 1: Laboratory Setup of treatment of dairy waste water.

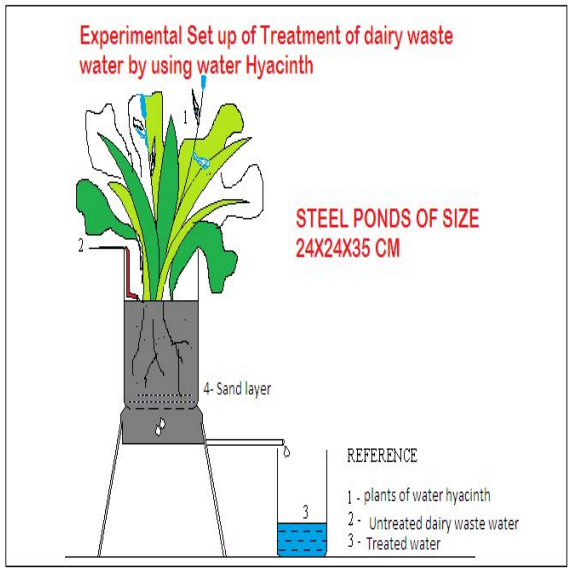

Figure No. 2: Experimental Setup

The Initial Conditions of dairy wastewater (Raw water) are given in following table.

TableNo-01 Date-13-11-2014

Sr. No.	Parameter	Unit	Value
1	PH	-----	7.65
2	Alkalinity	mg/L as $CaCO_3$	62
3	Total Solids	mg/l	1870
4	Total dissolved solids	mg/l	656
5	Suspended solids	mg/l	-----
6	BOD_5@ 20^0C	mg/l	1329
7	COD	mg/l	1925
8	Oil and Grease	mg/l	230
9	Chlorides	mg/l	179
10	TK	mg/l	65
11	TP	mg/l	19

III. Results and Discussion

P^H Result: A Hydrogen ion (P^H) Concentration in the waste water during the study P^H values were measured throughout the experiment .The settling basin P^H values fluctuated with p^H values that ranges from 7.4-8.3

BOD Result: Performance Appraisal Water hyacinth ponds: The BOD and COD removal performance of all the five ponds is monitored regularly and is presented in table also Concentration in the waste water is depicted in the graph during the test.

Performance of Pond -1 (Liquid Depth 10cm) Table No-02

Day	COD (mg/l)	BOD (mg/l)
1	1925	1329
2	1765	1135
3	1525	885
4	1390	745
5	1165	530
6	960	320
7	836	240
8	783	190
9	695	105
10	650	65
11	640	56
12	635	49
13	620	36
14	605	23
15	600	20

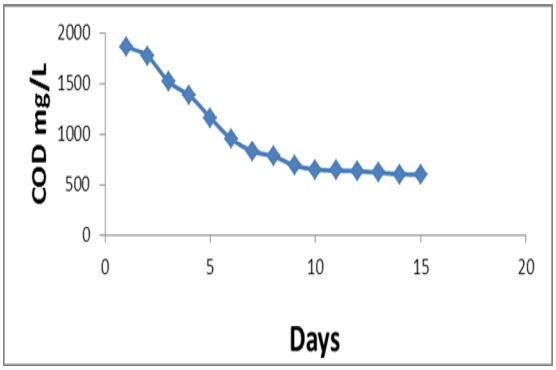

Fig. No. 3 Graph of COD V/s Days of Pond No.1

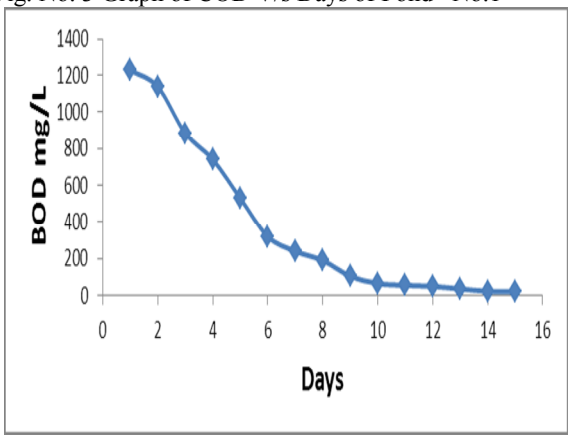

Fig. No. 4 Graph of BOD V/s Days of Pond No .1

Performance of Pond -2 (Liquid Depth 15cm) Table No-03

Day	COD (mg/l)	BOD(mg/l)
1	1925	1329
2	1810	1175
3	1750	1120
4	1680	1045
5	1605	978
6	1520	892
7	1410	795
8	1335	715
9	1230	620
10	1140	535
11	1050	450
12	985	389
13	960	368
14	955	355
15	935	330

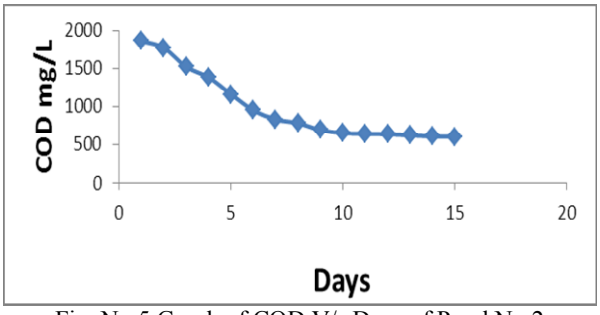

Fig. No.5 Graph of COD V/s Days of Pond No.2

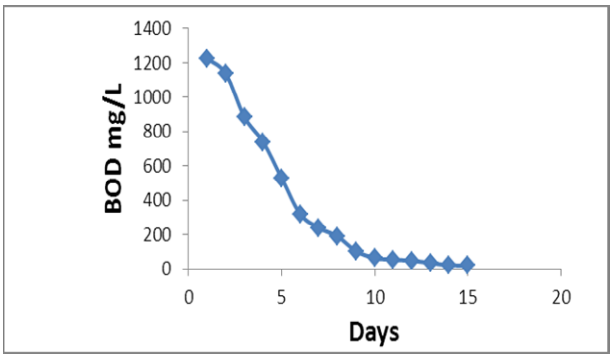

Fig. No. 6 Graph of BOD V/s Days of Pond No.2

Performance of Pond -3 (Liquid Depth 20cm) Table No-04

Day	COD (mg/l)	BOD(mg/l)
1	1925	1329
2	1840	1205
3	1790	1144
4	1705	1065
5	1635	990
6	1550	902
7	1470	835
8	1395	760
9	1360	730
10	1280	656
11	1250	620
12	1205	589
13	1180	560
14	1170	555
15	1155	540

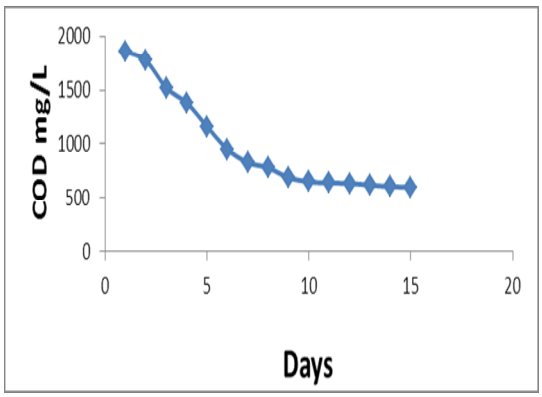

Fig. No. 7 Graph of COD V/s Days of Pond No.3

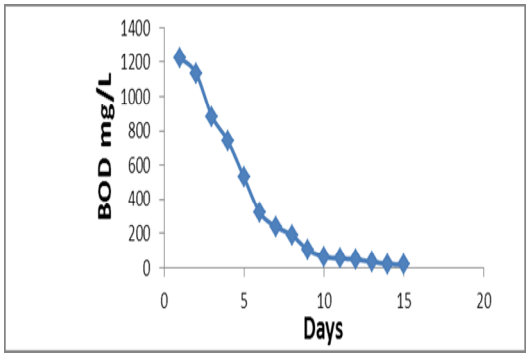

Fig. No. 8 Graph of BOD V/s Days of Pond No.3

Performance of Pond -4 (Liquid Depth 25cm) Table No-05

Day	COD (mg/l)	BOD(mg/l)
1	1925	1329
2	1825	1190
3	1810	1174
4	1750	1115
5	1685	1052
6	1590	950
7	1510	885
8	1455	820
9	1390	760
10	1320	695
11	1295	670
12	1255	639
13	1210	595
14	1195	570
15	1185	560

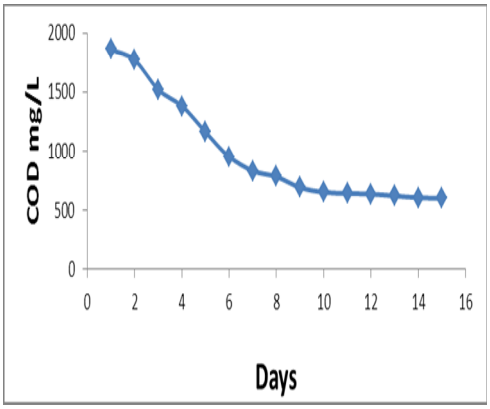

Fig. No. 9 Graph of COD V/s Days of Pond No.4

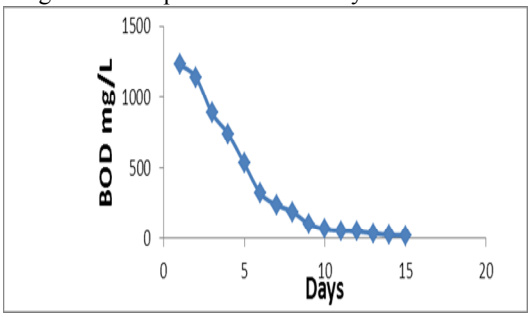

Fig. No. 10 Graph of BOD V/s Days of Pond No.4

Performance of Pond -5 (Liquid Depth 30cm) Table No-06

Day	COD (mg/l)	BOD(mg/l)
1	1925	1329

2	1825	1190
3	1810	1174
4	1750	1115
5	1685	1052
6	1590	950
7	1510	885
8	1455	820
9	1390	760
10	1320	695
11	1295	670
12	1255	639
13	1210	595
14	1195	570
15	1185	560

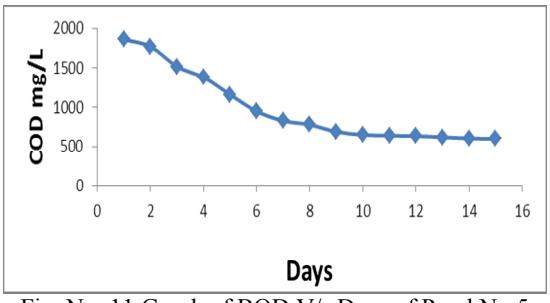

Fig. No. 11 Graph of BOD V/s Days of Pond No.5

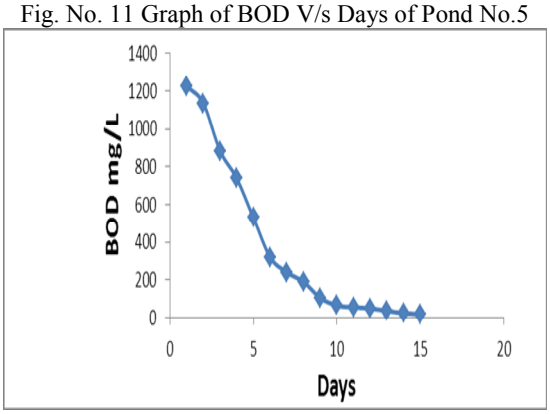

Fig. No. 12 Graph of BOD V/s Days of Pond No.5

CONCLUSION

In above treatment processes in dairy waste various analytical parameters were studied and it is found that initially the p^H of waste sample was more alkaline but after treatment it becomes nearer to the neutral level. Also the removal efficiency of BOD is 80%-85% and that of COD is 70% -75% the values shows that the treated value of waste water can be efficiently used for irrigation and local purpose. Hence this treatment process proves that it is handy solution for organic effluent food based industry.

Future Scope:

This Technology of Treating waste water by using water hyacinth can be used to treat waste water of sugar industry, textile industry, paper and pulp industry to analyze BOD, COD, Phosphate, Nitrates Parameters.

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