Feasibility of Dairy Wastewater Treatment by using Natural Coagulants

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***Abstract*- The dairy industry is one of the most polluted water generating industry, not only in terms of the volume of effluent generated, but also in terms of its characteristics as well.**
This paper deals treating of dairy waste water with natural seeds like carica papaya Seeds and saw dust.
Various tests are conducted to evaluate the properties of dairy waste water and treated dairy waste water.

Key Terms— Dairy wastewater, carica papaya Seeds, saw dust, Coagulation, Turbidity.

I. INTRODUCTION

Water is surely key substance in all natural and human activities. Water is tasteless, odorless and nearly colorless chemical substance.

The dairy industry is one of the most polluted water generating industry, not only in terms of the volume of effluent generated, but also in terms of its characteristics as well.

This paper deals treating of dairy waste water with natural seeds like carica papaya Seeds and saw dust.

Wastewater and grey water use are increasingly considered a method combining water and nutrient recycling, increased household food security and improved nutrient for poor households.

II. DAIRY WASTEWATER

The dairy industry produces different products such as consumer milk, yoghurt, ice-cream, cheese, condensed milk, and milk powder etc...

The water requirement is huge. Moreover, the liquid effluents generated through dairy product production exhibit high concentration of organic matter, such as protein, carbohydrates, fats, grease, and having high value of COD, BOD, Turbidity, total solids etc. also contains high detergents and sanitizing agents which affect aquatic life.

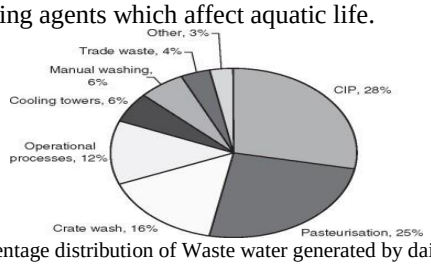

Fig 1: Percentage distribution of Waste water generated by dairy industry.

TYPICAL CHARACTERISTICS OF DAIRY WASTEWATER

S. N	PARAMETERS	LIMITS DAIRY WASTE	PERMISSIBLE LIMITS
1	COD	468 mg/l	250
2	BOD	210 mg/l	30
3	Oil and grease	240 mg/l	10
4	Chloride	136 mg/l	48-469
5	Alkalinity	462.5 mg/l	200
6	pH	7.34-7.38	7.5
7	TSS	942 mg/l	100
8	TDS	680 mg/l	500
9	Conductivity	1200 mS/cm	1mS/cm

STUDY AREA

NAME	SHIMOGA MILK UNION DAVANGERE DAIRY
PLACE	KARNATAKA SH-76 DODDA BATHI DAVANGERE DISTRICT
LAND AREA	25.35 acres
CAPACITY	0.60 Lakh LPD
MSL	602.5 m
LATITUDE	14.46° N
LONGITUDE	75.92° E

Fig.no 2: View of Bathi dairy

III. OBJECTIVES

- To study the Characteristics of dairy wastewater.
- Preparation of natural coagulants like moringa oliefera seeds, papaya seeds, neem leaf, saw dust.
- Fixing of different dosage of natural coagulants for dairy waste water treatment for removal of pH,

Turbidity, BOD, COD, Oil and grease, Chloride, Conductivity.

- Determination of optimum dosage of coagulants.
- To check the suitability of treated water for drinking and irrigation.

IV. MATERIAL AND METHODOLOGY

A. *Materials used for Coagulation are*:

1. Carica papaya seeds.
2. Saw dust

Collection of Dairy Wastewater:

Dairy waste water collected from the local dairy industry in davangere. The physio – chemical characteristics of samples were analyzed. Samples of dairy effluent were collected in clean containers of some litres of capacity and precautions will be taken for collections of waste water.

We will collected the effluent from a waste water collection tank in dairy industry.

1. CARICA PAPAYA SEEDS POWDER:

Fig.no.03: Dry seeds powder.

2. SAW DUST:

Fig.no.04: Saw dust.

B. *Methodology*:

Methodology involves following steps

- Analysis of Samples.
- Weighing and adding of coagulants.
- Flocculation by using jar test apparatus.

Analysis of samples:

The samples were analyzed before and after treatment using jar test apparatus for various parameters.

Fig.no.05: Sample before jar test

Weighing and adding of coagulants:

Weigh the coagulants by using weighing balance for required dosages like 0.2gm, 0.4gm, 0.6gm, 0.8gm and 1.0gm of different coagulants. That weighed coagulants are added to per half litre of wastewater.

Flocculation by using Jar test apparatus:

The coagulation and flocculation experiments was carried out by using Jar Test apparatus.

The optimum dosage of natural coagulants can be determined by varying the dosages of coagulants as 0.2mg/L, 0.4mg/L, 0.6mg/L and 0.8mg/L.

Fig.no.06: Flocculation by using jar test apparatus.

V. TESTS CONDUCTED FOR WASTEWATER SAMPLES:

1) pH test.
2) Turbidity test.
3) Total dissolved solid test.
4) Chloride test.

***RESULTS AND DISCUSSION*:**

1) CARICA PAPAYA SEEDS POWDER

Table1: Parameters studied before and after treatment of waste water for Carica papaya seeds powder.

Sl no	Parameters	Initial values	After treatment (gm/L)				
			0.2	0.4	0.6	0.8	10
1	Ph	6.61	6.62	6.55	6.38	6.35	6.3
2	Turbidity (NTU)	92.6	111.2	131.2	125.5	113.6	107.3
3	TDS (mg/l)	5.42	5.02	5.68	5.87	5.72	5.72
4	Chloride	345.37	145.7	125.13	131.14	142.15	142.15

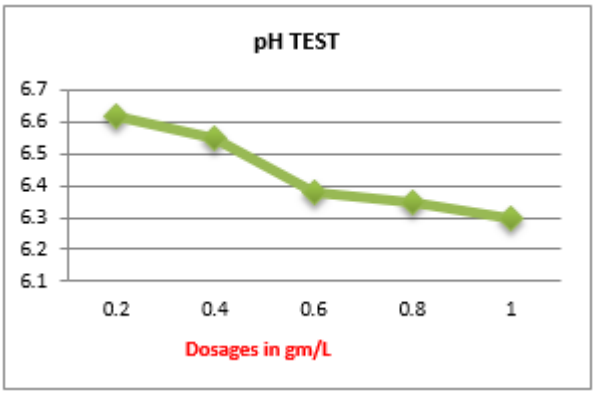

Fig.no.07:: pH reduction by different dosages of papaya seeds powder

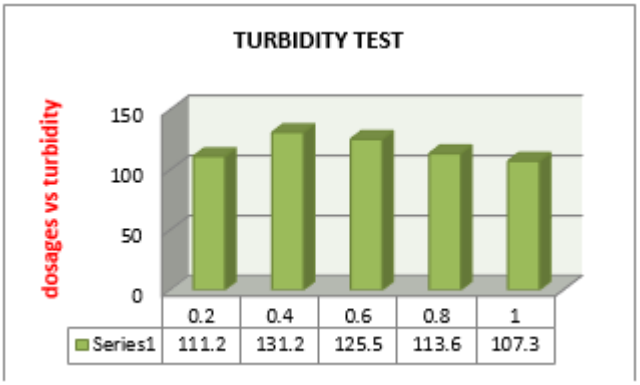

Fig.no.08: Turbidity reduction by different dosages of carica papaya seeds powder

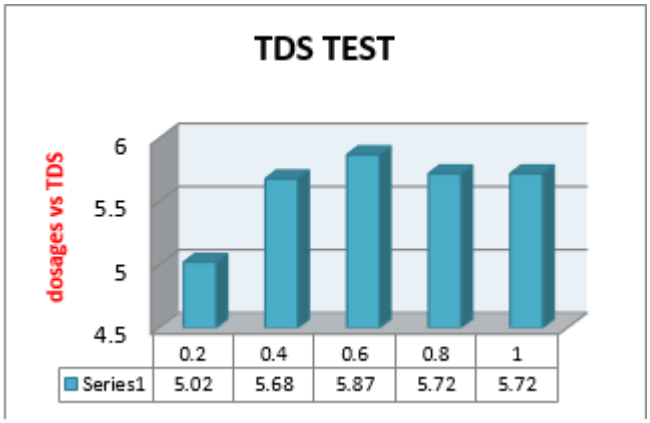

Fig.no.09: Removal of TDS different dosage of carica papaya seeds powder

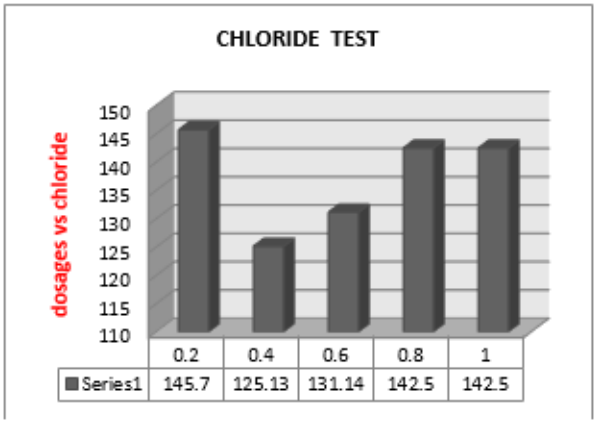

Fig.no.010: Removal of chlorides by different dosage of carica papaya seed powder

Table2: Parameters studied before and after treatment of wastewater for saw dust.

Sl no	Parameters	Initial values	After treatment (gm/L)			
			0.2	0.4	0.6	0.8
1	pH	8.23	8.14	8.10	8.02	8.02
2	Turbidity (NTU)	49.5	30.2	19.8	15.9	17.2
3	TDS (gm/l)	4.92	5.19	4.17	4.68	4.89
4	Chloride	345.37	127.13	116.12	121.6	121.13

2) SAW DUST:

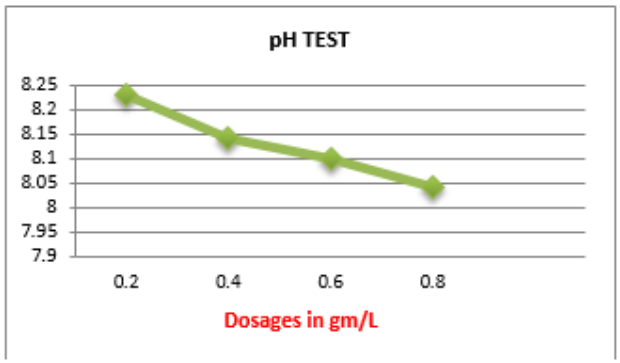

Fig.no.11: pH reduction by different doses of Saw dust.

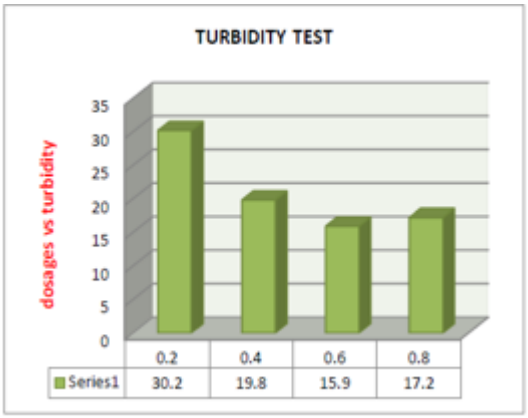

Fig.no.12 : Turbidity reduction by different doses of saw dust.

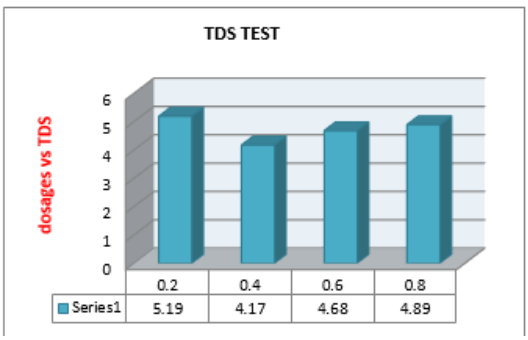

Fig.no.13 : Removal of TDS different dosage of Saw dust

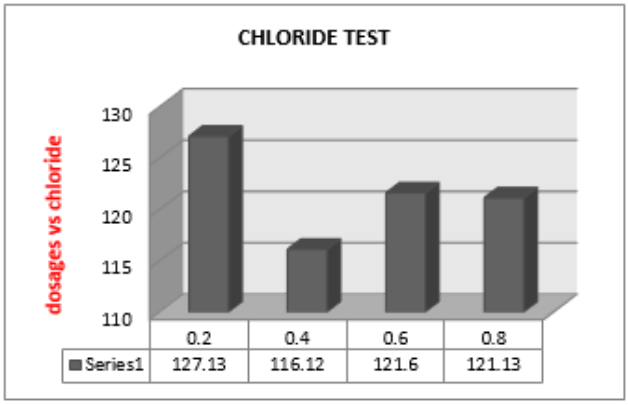

Fig.no.14: Removal of Chloride by different dosage of Saw dust.

VI. CONCLUSION:

- In this study we can observe that pH was reduced maximum up to 6.3 by using carica papaya seed powder of dosage 0.8gm/L.
- The maximum turbidity removed by saw dust which is 17.2NTU for dosage of 0.2gm/L, the maximum reduction of chloride is obtained by Saw Dust that is 66.34% with the dosage of 0.2 gm/L than other coagulants.
- The maximum reduction of TDS is 5.02 and 4.68 by using 0.2 gm/L and 0.4 gm/L dose of Carica Papaya and Saw Dust respectively.
- From the study we can conclude that Carica papaya seed powder and saw dust are more efficient coagulants for treating wastewater.

VII. SCOPE OF THE PROJECT

- Natural coagulants derived from plants and renewable sources, contributing to a sustainable and economical water treatment and waste water treatment

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