

# KNOWING THE ABILITY OF ARTOCARPUS HETEROPHYLLUS AND PHASEOLUS VULGARIS IN THE TREATMENT OF DAIRY WASTEWATER

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**Abstract** - The dairy industry is one of the major sources of food processing. These industries produce huge amount of dairy wastewater. Such wastewater is to be treated by using naturally and easily available coagulants and then tests to be carried out by using naturally and easily available coagulants and then tests to be carried to check the water different characteristics of wastewater like BOD, COD, pH and turbidity etc. The final effluent can be readily used for irrigation and sludge itself becomes a good fertilizer. The efficiency of turbidity and other parameters is studied via two different coagulants which decrease the turbidity and organic pollutants of produced wastewater. Natural coagulants used are Artocarpus heterophyllus (jack fruit seeds) and Phaseolus vulgaris (common beans). Natural coagulants are naturally occurred plant based coagulant that can be used in coagulation-flocculation process of dairy wastewater treatment for reducing turbidity. The maximum percentage reduction of various parameters can be observed by increasing the dosage of natural coagulants.

**Key Words:** Natural coagulants, Artocarpus heterophyllus, Phaseolus vulgaris, BOD, COD, pH and turbidity

## 1. INTRODUCTION

Wastewater is characterized as any water, whose quality has been unfavorably being manhandled by anthropogenic impact. This incorporates fluid waste released from residential homes, business, and medical clinics, agrarian and business parts. A considerable lot of the poisons recognized in wastewaters are classified as non-directed "Rising toxins". The contact of this sort of wastewater with the encompassing condition results in antagonistic impacts on the organic equalization of sea-going biological systems, causing awkwardness at various tropic dimensions conceivably identified with the activity of poisonous and geo toxic specialists and in a roundabout way by eutrophication.

Industrialization is spine for improvement of nation. Be that as it may, contamination brought about by businesses is a genuine worry all through the world. Of every single modern movement, the nourishment part has one of the most noteworthy utilizations of water and results in the generation of vast measure of wastewater. The dairy business is a case of this segment. Dairy industry is one of the real nourishment businesses in India, and India positions first among the most extreme significant milk creating country. The dairy business is one of the real wellsprings of wastewater. The Dairy business produces somewhere in the range of 3.739 and 11.217 million m<sup>3</sup> of waste for each year (for example 1: To multiple times the volume of milk prepared). Wastewater is created in milk handling unit, for the most part in purification,

homogenization of liquid milk and the generation of dairy items, for example, spread, cheddar, milk powder and so on.

Large amount of water is used to clean dairy processing plants; hence, the resulting waste water can contain detergent, sanitizers, base, salts and organic matter, depending upon source. Wastewater volume and strength fluctuated widely from day to day due to partly differences in production, therefore, data of waste water volume per unit of product processed (liters waste water/kg product).

Wastewater concentration (mg/L) and weight of waste generated per unit of product processed (g waste/kg product) also changes. Climate of the area and production of the dairy plant are two major reasons, responsible for changing wastewater character. This variation is At present, in order to decrease waste hazards and to restrict the resulted effects on the environment, investigators studying the possibility of using new methods and materials to treat wastewater. Coagulation and flocculation process are physical- chemical methods that widely used in the treatment of wastewater. The key concern of the environmental engineers is how to lower the coagulants and flocculants cost and to improve the characteristics of the produced sludge for safe utilizing. Flocculation and coagulation constitute the backbone process in most waste water and water treatment plants. Their aim is to increase the separation of particulate species in down- stream processes such as filtration and sedimentation. The increasing industrialization and urbanization with considerably increasing the rate of water pollution. Curtail in supplies of natural resources of water have made this a serious limitation for industrial growth and for a reasonable standard of urban living.

In order to decrease waste hazards and to restrict the resulted effects on the environment, research for the wastewater treatment is necessary. The applicability and possibility of using new methods and materials to treat wastewater is the demand. Coagulation and flocculation process are physical and chemical methods that are extensively used in the treatment of waste water. Presently, the prime concern of the environmental engineers is how to lower down the coagulants and flocculants cost and to improve the characteristics of the produced waste for safe utilization.

## 2. OBJECTIVES

The main objective of this project is to identify the turbidity removal efficiency of Artocarpus heterophyllus and Phaseolus vulgaris in dairy wastewater samples collected and also to check the feasibility of the use of Artocarpus heterophyllus and Phaseolus vulgaris adsorbent for dairy wastewater. To determine the removal efficiency of adsorbent over various parameters such as pH, Turbidity, Biochemical Oxygen Demand, Total dissolved solids, Total suspended solids. To

check the feasibility of the use of *Artocarpus heterophyllus* and *Phaseolus vulgaris* adsorbents in combined proportions for dairy wastewater.

### 3. MATERIALS AND METHODOLOGY

#### 3.1 Sample Collection

Firstly we have visited the KMF DIARY that is located in Gejjalagere, Maddur (Tq), Mandya (D) then Samples were collected in clean and sterilized bottles of 2 L capacity, this samples are collected to examine the water quality in the KMF diary waste water and we were taken the samples of one random place and brought to the laboratory of physical-chemical parameters selected are pH, COD, BOD, Dissolved oxygen, Total hardness, Alkalinity, Acidity and Turbidity By standard methods.

#### 3.2 *Artocarpus heterophyllus* Seed Powder Preparation

*Artocarpus Heterophyllus*(Jackfruit seeds) were collected from households and was boiled and sundried for 48 hrs. Then the seeds were grained to fine powder in grinding mills. The powder was sieved using 0.45mm mesh and was stored in an airtight container to prevent entry of moisture into it and to avoid loss of its activity. The fine powder was used as coagulant for an analysis.

#### 3.3 *Phaseolus vulgaris* Seed Powder Preparation

*Phaseolus vulgaris* (Beans seeds) were collected from households and was boiled and sundried for 48 hrs. Then the seeds were grained to fine powder in grinding mills. The powder was sieved using 0.45mm mesh and was stored in an airtight container to prevent entry of moisture into it and to avoid loss of its activity. The fine powder was used as coagulant for an analysis.

#### 3.4 Jar Test Apparatus

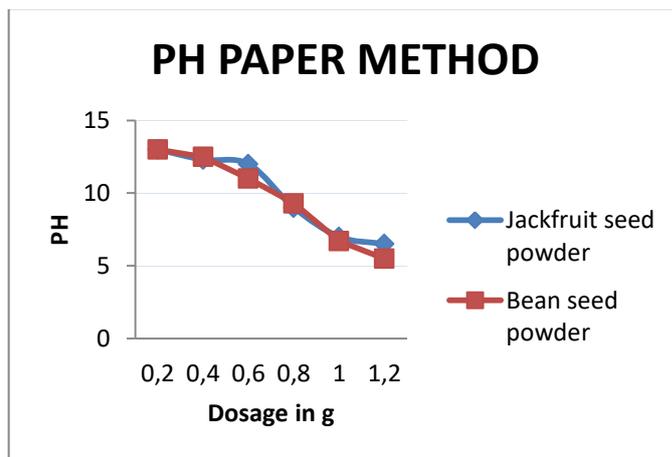
Coagulation and flocculation are the most common method used for the removal of Turbidity, Colour, suspended matters, Microorganisms and other odour producing substances. It involves the addition of coagulants that brings together the small destabilized particles to form large flocs so that they settle under the force of gravity and can be easily separated from the water. Jar test apparatus was selected for coagulation – sedimentation. Jackfruit seed powder and Beans seeds was fed to the respective samples in varying dosages. Initially rapid mixing was carried out for 2 minutes at 100 rpm followed by slow mixing for 25 minutes at 20 rpm. The sample after coagulation was allowed to settle for 30 minutes. The supernatant obtained was filtered and its characteristics were determined.

## 4. RESULTS AND DISCUSSION

#### 4.1 PH Method

The pH is a measure of acidity of the water. pH of water plays very important role, if the pH is beyond 6.5-8.5 range the water will affect the mucus membranes and water supply system.

Chart 1: PH Paper method

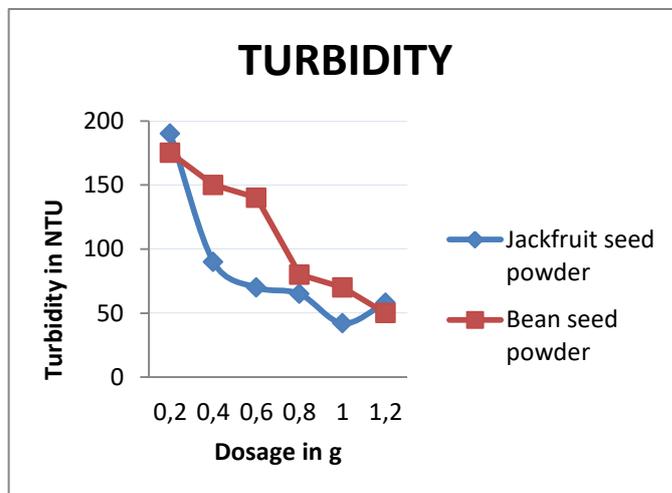


The pH of waste water quality standard as per BIS is 6.5-8.5. Initially when the wastewater is collected is found to be in Gejjalagere 15 after the treatment it will reduced to 7.5 for the dosage at 1 mg/l for Jackfruit seed powder and also it reduced to 6.7 for the dosage at 1g for Beans seeds.

#### 4.2 Turbidity

Turbidity is the cloudiness or haziness of fluid caused by large numbers of individual particles the are generally invisible to the naked eye, similar to smoke in air.

Chart 2: Turbidity

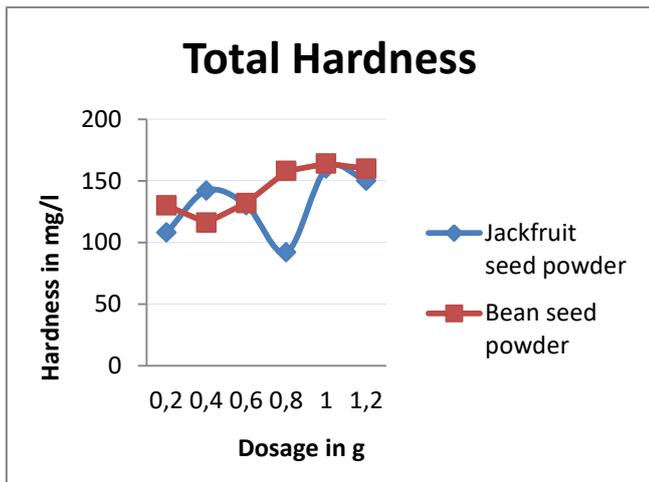


The Turbidity of waste water quality standard as per BIS is 10 NTU. Initially when the wastewater is collected is found to be in Gejjalagere 220 NTU after the treatment it will reduced 43 NTU for the dosage at 1 mg/l for Jackfruit seed powder and also it reduced to 70 NTU for the dosage at 1g for Beans seeds.

#### 4.3 Total Hardness

Hardness can be defined as a measure of the capacity of water to precipitate soap.

Chart 3: Total Hardness



The Total Hardness of waste water quality standard as per BIS is 300 mg/l. Initially when the wastewater is collected is found to be in Gajjalagere 98 mg/l after the treatment it will reduced to 160 mg/l for the dosage at 1 mg/l for Jackfruit seed powder and also it reduced to 164 mg/l for the dosage at 1g for Beans seeds.

4.4 Alkalinity

Alkalinity is a measure of the water stability to neutralize acidity.

Chart 4: Alkalinity (Jack fruit seed)

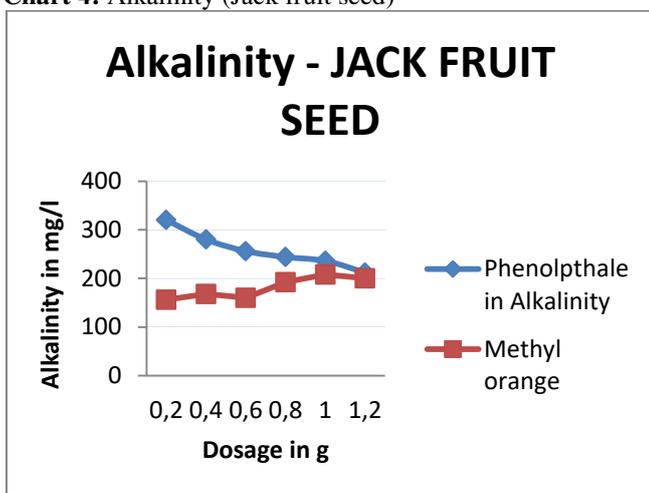
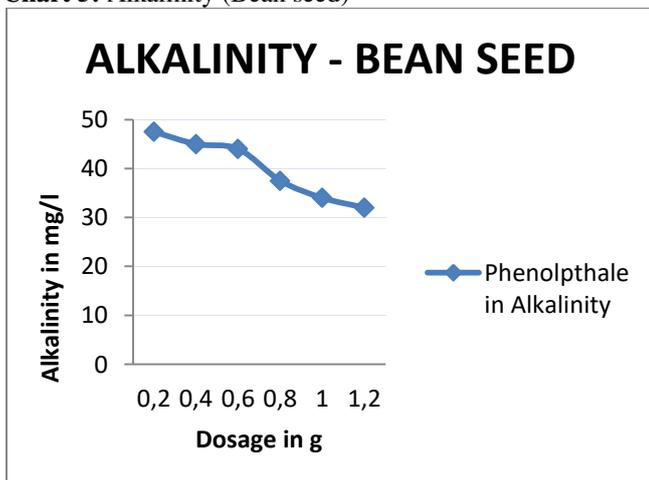


Chart 5: Alkalinity (Bean seed)



The Alkalinity of waste water quality standard as per BIS is 200-600 mg/l. Initially when the wastewater is collected is found to be in Gejjalagere 602 mg/l after the treatment it will reduced to 336 mg/l for the dosage at 1 mg/l for Jackfruit seed powder and also it reduced to 224 mg/l for the dosage at 1g for Beans seeds.

4.5 Acidity

Acidity is the measure of the capacity of water to neutralize bases. Acidity is the sum of all titrable acid present in the water sample.

Chart 6: Acidity (Jack fruit seed)

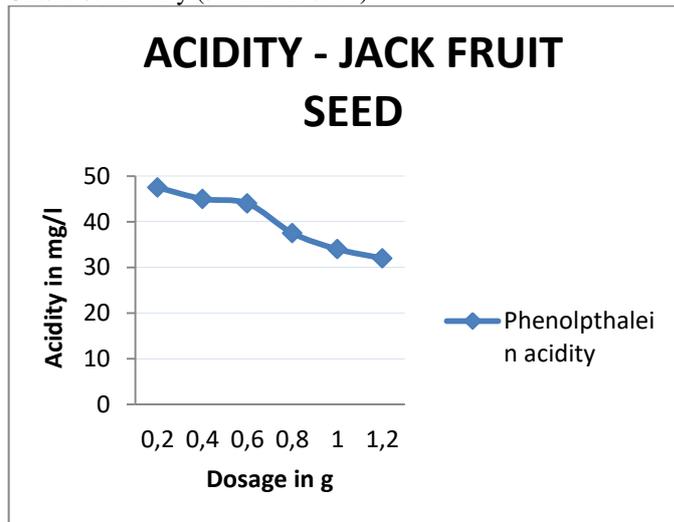
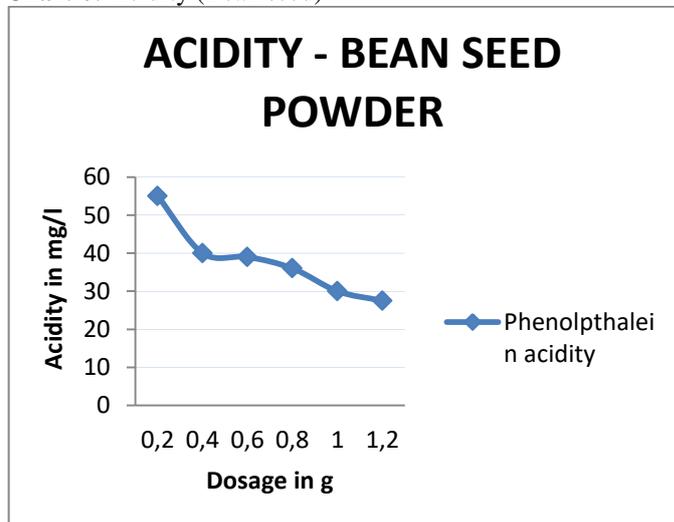


Chart 6: Acidity (Bean seed)

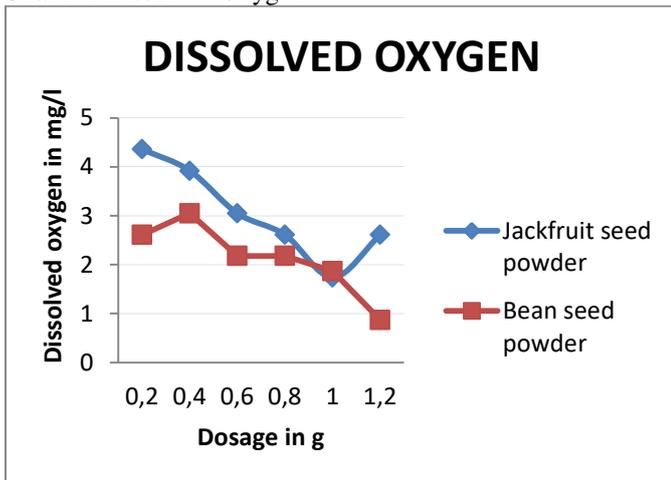


Acidity of waste water quality standard as per BIS is 0-100 mg/l. initially when waste water collected in Gejjalagere acidity is found to be 45mg/l after the treatment it will reduced to 0 mg/l for the dosage 1 mg/l for Jackfruit seed powder and also it reduced to 0 mg/l for the dosage at 1g for Beans seeds powder.

4.6 Dissolved oxygen

DO is necessary for good water quality, and the amount of oxygen, that is present in water.

Chart 7: Dissolved Oxygen



The Dissolved oxygen of waste water quality standard as per BIS is 5 mg/l. Initially when the wastewater is collected is found to be in Gejjalagere 6.45 mg/l after the treatment it will be reduced to 1.74 mg/l for the dosage at 1 mg/l for Jackfruit seed powder and also it reduced to 1.87 mg/l ( Gejjalagere) for the dosage at 1g for Beans Seed Powder.

### 5. CONCLUSIONS

In the present study, the treatment of diary waste water is carried out or KMF diary waste water .

- The present treatment has shown that KMF diary waste water is much more polluted in terms of various chemical parameters such as pH, hardness, alkalinity, acidity, BOD, COD etc.
- Dairy waste water was allowing described limit. These results shows that the diary waste water receives high pollution from the surroundings .And the wastage of river highly contaminated and if the similar conditions continue for the longer period, Dairy waste water may soon become ecological in active.
- The main objective of study was to know physical and chemical characteristics of Dairy waste water. Samples were collected and analysed for different physical and chemical parameters reveals that Dairy waste water is pollutant due to wastage coming from KMF dairy waste water and industries waste water.
- The present study shows that some of the parameters were above or below the permissible limit of waste water standards. Some parameters like pH, turbidity, BOD, COD etc.
- The Ph of the Dairy waste water near industrial area is quite moderate. COD concentration value comparatively high due to the high temperature and low dilution. The alkalinity of water body was much higher than the world and Indian standard. Hardness is quite less than the level specified in the standard.
- The maximum percentage reduction of various parameter can be observed at a dosage of 1gm/L of jackfruit seeds reduce the 50 % PH, 80.45 % of turbidity, 65.44% of Alkalinity, 73% of Dissolved oxygen.
- The maximum percentage reduction of various parameter can be observed at a dosage of 8%/L of Aloe vera gel reduce the 55.33% of PH, 68.18% of

turbidity, 62.79% of Alkalinity, 71% of Dissolved Oxygen.

- At the end of the studying of the experiment we conclude that using maximum amount of dosage we can reduce the pollution of water.

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