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Treatment of Dairy Waste Water by using Groundnut Shell as Low Cost Adsorbent

Deepika Dinakar[1], Aswathi Mithran[2]

[1]M.Tech student, Environmental Engineering in the Department of Civil Engineering
[2]M-Dasan Institute of Technology Ulliyeri, Kerala, India
[3]Assistant Professor, Department of Civil Engineering, M-Dasan Institite of Technology Ulliyeri, Kerala, India

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Abstract - *Milk has important place in human life. The dairy industry involves processing of raw milk into products like consumer milk, butter, cheese etc. The quantity of water required in a milk processing plant depends upon the size of the plant, generally expressed in terms of the maximum weight of milk handled in a single day, and the processes involved. The dairy industry is generally considered to be the largest source of food processing wastewater in many countries. With increase in demand for milk and milk products, many dairies of different sizes have come up in different places. These dairies collect the milk from the produces, and then either simply bottle it for marketing, or produce different milk foods according to their capacities. In this paper the waste water from dairy is passing through the grounut shell medium particle size retained on 4.75 mm IS sieve. By using low cost adsorbent minimize the hazardous effect which is harmful to the environment to considerable extent*

Key Words: Dairy waste water, Groundnut shell, Column Chromotography, pH, BOD, COD, etc

1. INTRODUCTION

The dairy industry is generally considered to be the largest source of food processing wastewater in many countries. With increase in demand for milk and milk products, many dairies of different sizes have come up in different places. These dairies collect the milk from the produces, and then either simply bottle it for marketing, or produce different milk foods according to their capacities. Present study focuses on using groundnut shells, which are basically the waste usually fed to cattle's, as absorbents for dairy industry effluent. Water is one of the universal substances, which is used alike by all the living species to sustain life. Clean and plentiful water provides the foundation for prosperous life and communities. We rely on clean water to survive, but now we are heading towards a water crisis. The changes in climatic patterns are threatening lakes and rivers, and also the key sources that we tap for drinking water, which are being overdrawn or tainted with pollution.

The main characteristics of waste from dairy industy

i)High dissolved solids

ii) High suspended solids

iii) High BOD

iv) Phosphorus

v) Nitrogen

vi) Oil and

1.1 Need of Study

Management of the quality of this precious resource is, therefore, of special importance. Disposing different kinds of wastewater such as domestic, industrial and agricultural effluent into environment, especially to surface water, can cause heavy pollution of this body sources. With regard to increasing wastewater disposed standards to the environment, high considerations should be made when selecting proper treatment processes. . It should be kept in mind that economical aspects are important, too. In addition, employing environment friendly methods for treatment is emphasized much more these days . In this study, dairy effluent is collected and analyzed for different parameters such as pH, TSS, BOD and COD. After checking such parameters groundnut shells are use for reduce their concentration and purification, which has property to reduce or to absorb the impurities.

1.2 Objectives of study

- To check the feasibility of use of groundnut husk as adsorbent for dairy wastewater.
- To determine various parameter of treated & untreated dairy wastewater as pH, B.O.D, C.O.D, T.S.S.
- To study Environmental pollution control due to dairy waste water.
- Removing of organic matter by adsorption techniques & reduction of B.O.D, C.O.D, and increase of pH of natural water.
- To achieve the sustainable development of environment by avoiding pollution of streams.
- To reuse the wastewater for various quality.eg. Gardening, flushing sewer, cleaning, farming.

1.3 DAIRY WASTE SOURCES

Each unit operation generates dairy waste water like wash water from cleaning of milk cans, process equipment's, tankers, pipelines floors and portions of spilled milk, spoiled milk and milk leakage from milk pumps and pipelines. There are different categories.

- Cooling water
- Sanitary waste water
- 3Industrial waste water

2. METHODOLOGY

Step 1- Fabrication of Experimental Setup

The experimental setup for conducting the study has been fabricated. Column chromatography is adopted for conducting the experiment. The material used for the fabrication of column will be PVC pipe.

Step 2- Collection of Adsorbent

The groundnut shell medium retained on 4.75mm IS sieve is used as absorbent. Sieve analysis is carried out for the preparation of groundnut shell rusk. Groundnut is generally the seeds that ripen underground, of the following plants, all in the Faboideae subfamily of the legumes

Step3- Collection of Dairy Waste Water Sample

The source for the collection of waste water sample throughout the present study was Milma peringolam near kunnamangalam Calicut. The methodology involved in collection of samples at different units

Step4- Selection of Water Quality Parameters and its determination

This project includes the study of removal efficiency of water quality parameters such as pH, BOD, COD, Total suspended and total dissolved solids

Step5- Determination of Initial Characteristics of Waste Water

For the determination of initial characteristic of waste water testing the untreated dairy waste water for the parametes such as ph, colour, turbidity, total solids, BOD, COD.

Step6- Compare the actual result with permissible parameter

The actual result obtained after conducting the initial characteristic determination will be compared with the permissible limits of parameter. For that an effluent standard for dairy industry has been used

Step7- Treat a dairy waste water with groundnut shells rusk

The waste water from the dairy is passing through the groundnut shell medium through each of the column having diameter 2 inch, 2.5 inch and 3 inch. Primarily the waste water is passed through 20 cm height of groundnut shell medium in each of the three column. The contact time adopted for conducting the experiment are 2 hour, 6 hour, 24 hour. After 2 hour, 6 hour and 24 hour and the treated water is tested. Similarly the waste water is passed through 40 cm and 60 cm height of the groundnut shell medium.

Step8- Testing of treated dairy waste water for various quality parameters

The treated water after passing through the groundnut shell medium are collected from the bottom of the column through the collecting pipe. The treated dairy waste water is tested for various water quality parameters

Step9- Compare the treated waste water readings with untreated waste water parameter

Comparison can be carried out between the treated waste water and untreated waste water. The comparison can be analyzed through the graphical representation

Step10- Checking the removal efficieny

The removal efficiency is found by comparing the various parameters such as pH, turbidity,TDS, suspended solids, BOD and COD before and after the treatment.

Fig- 1: Experimental Setup

3. RESULT AND DISCUSSION

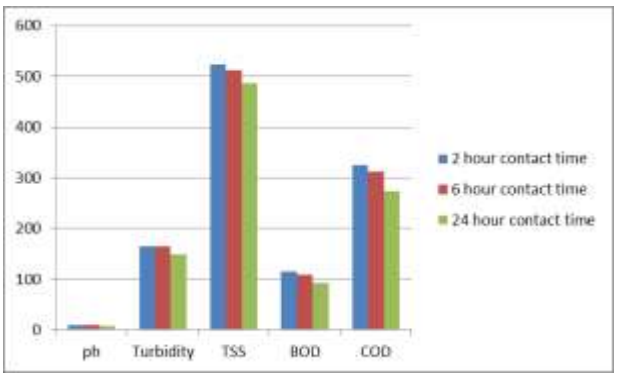

Chart- 1: Variation of parameters with time in 20 cm height of material in 2 inch pipe

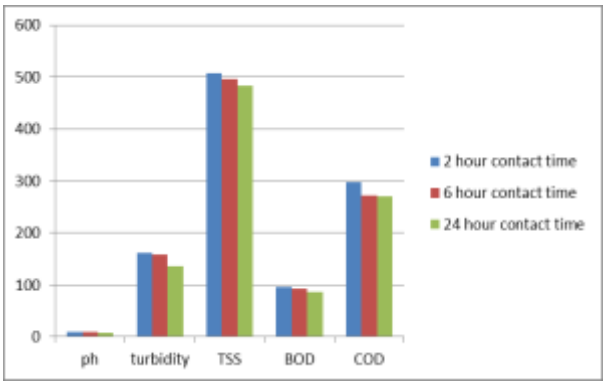

Chart- 2: Variation of parameters with time in 20 cm height of material in 2.5 inch pipe

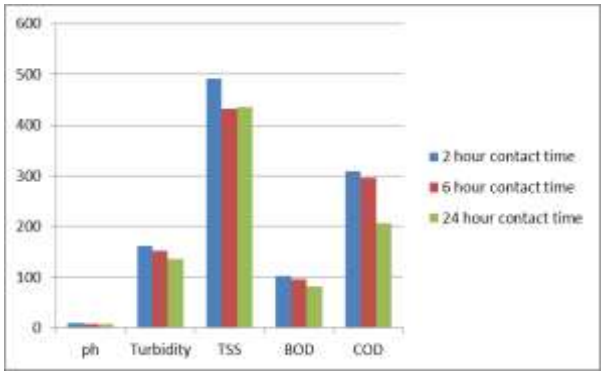

Chart- 3: Variation of parameters with time in 20 cm height of material 3 inch pipe

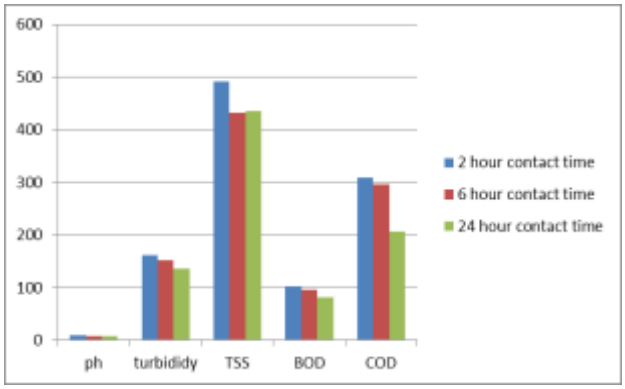

Chart- 4: Variation of parameters with time in 40 cm height of material 2 inch pipe

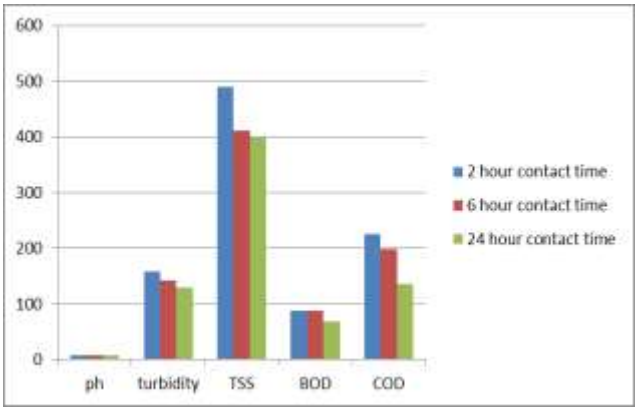

Chart- 5: Variation of parameters with time in 40 cm height of material 2.5 inch pipe

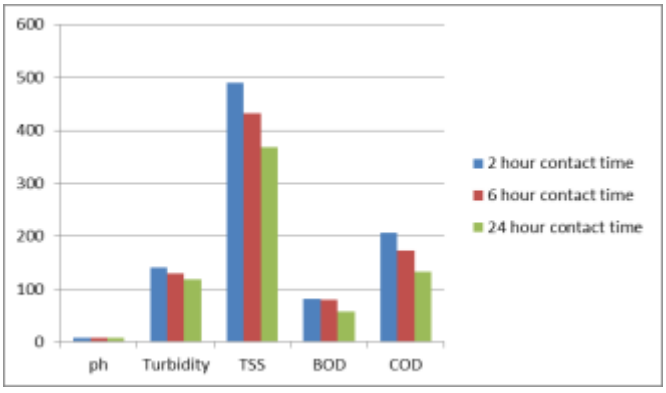

Chart- 6: Variation of parameters with time in 40 cm height of material 3 inch pipe

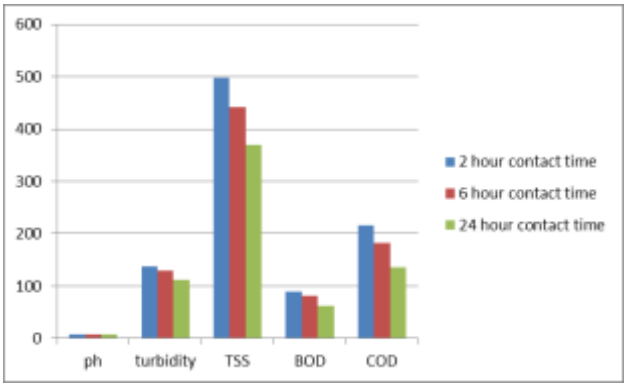

Chart- 7: Variation of parameters with time in 60 cm height of material 2 inch pipe

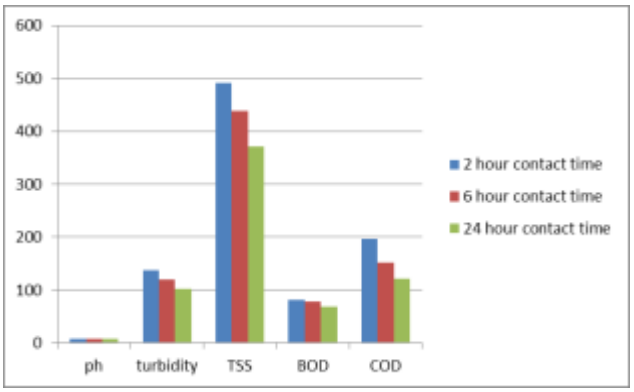

Chart- 8: Variation of parameters with time in 60 cm height of material 2.5 inch pipe

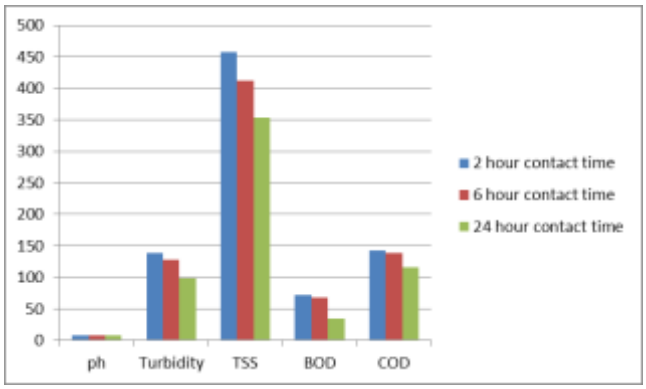

Chart- 9: Variation of parameters with time in 60 cm height of material in 3 inch pipel

Effect on pH: As from the above study it has been seen that pH of dairy waste water sample after passing through 3 inch diameter pipe in which the height of ground nut shell is 60cm is found to be more feasible as compare to other pipe having diameter 2, 2.5 inch and height of material 20, 40, 60 cm.

Effect on total solid: TS of dairy waste water sample after passing through 3inch diameter pipe in which the height of ground nut shell is 60cm is found to be more feasible as compare to other pipe having diameter 2 and 2.5 inch and height of material 20, 40, 60 cm.

Effect on BOD: As from the above chart it has been seen that BOD of dairy waste water sample after passing through 3 inch diameter pipe in which the height of ground nut shell is 60cm is found to be more feasible as compare to other pipe having diameter 2 and 2.5 inch and height of material 20, 40, 60 cm.

Effect on COD: As from the above chart it has been seen that COD of dairy waste water sample after passing through 3 inch diameter pipe in which the height of ground nut shell is 60cm is found to be more feasible as compare to other pipe having diameter 2 and 2.5 inch and height of material 20, 40, 60 cm.

Beacuse of large diameter and the height ground nut shell material, hence the large vol. of material in these pipe and the large surface area of material which coming in contact with the dairy waste water which adsorb the impurities present in the dairy waste water.

3. CONCLUSION

Wastewater treatment is a process used to remove contaminants from wastewater or sewage and convert it into an effluent that can be returned to the water cycle with minimum impact on the environment, or directly reused. The treatment of wastewater is part of the overarching field of sanitation. Sanitation also includes the management of human waste and solid waste as well as stormwater (drainage) management. By-products from wastewater treatment plants, such as screenings, grit and sewage sludge may also be treated in a wastewater treatment plant. Biological processes can be employed in the treatment of wastewater and these processes may include, for example, aerated lagoons, activated sludge or slow sand filters. To be effective, sewage must be conveyed to a treatment plant by appropriate pipes and infrastructure and the process itself must be subject to regulation and controls. Present study focuses on using groundnut shells, which are basically the waste usually fed to cattle's, as absorbents for dairy industry effluent. Water is one of the universal substances, which is used alike by all the living species to sustain life. Clean and plentiful water provides the foundation for prosperous life and communities. We rely on clean water to survive, but now we are heading towards a water crisis. Industrialization activities for the development of nation contribute to global environmental deterioration as these activities caused depletion, degradation and deterioration of natural resources and biodiversity. Additionally, these industrial activities indirectly overload water body with thousands of water pollutant and subsequently polluting the environment. From the above study it has been seen that the parameters such as pH, total solid, BOD and COD of dairy waste water sample after passing through 3 inch diameter pipe in which the height of ground nut shell is 60cm is found to be more

feasible as compare to other pipe having diameter 2, 2.5 inch and height of material 20, 40, 60cm IRJET.

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