

# Use of Bio-Filter for the Treatment of Municipal Waste Water

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**Abstract**— One of the major sources, which pollutes the environment is the wastewater produced from the human activity. At present, in order to decrease waste hazards and to restrict the effects on the environment, investigators studying the possibility of using new methods and materials to treat wastewater. The prime concern of the environmental engineers is to lower the coagulants cost and to improve the characteristics of the produced purification. A municipal sewage treatment plant include primary treatment to remove solid material, secondary treatment to digest dissolve and suspended organic material. This present work illustrating the role of Bio-Filter media which includes coconut coir, maize and sugarcane to assist the treatment of municipal waste water and to study their physico-chemical characteristics. The prevailing purification technologies used to remove the contaminants are too costly and sometimes non-eco-friendly also. Therefore the work is oriented towards low cost and eco-friendly technology for waste water purification, which will be beneficial for community. The project work discuss the purification of waste water process by using various locally available natural material like coconut coir, maize and sugarcane to reduce Total Solids, pH, Turbidity, DO, Chloride, Hardness, Alkalinity etc. in purifying municipal waste water.

**Key words:** Bio-Filter, Coconut coir, Maize, Sugarcane

## I. INTRODUCTION

Water is vital to the existence of all living organisms, but this valued resource is increasingly being threatened as human populations grow and demand more water of high quality for domestic purposes and economic activities. Among the various environmental challenges of that India is facing this century, fresh water scarcity ranks very high. Wastewater obtained from various sources need to be treated very effectively in order to create a hygienic environment. The principal aim of wastewater treatment is generally to allow human and industrial effluents to be disposed of without danger to human health or unacceptable damage to the natural environment.

Reduction of strength of domestic wastewater using three different bed materials coconut coir, maize and sugarcane as a filter media is one such type of treatment method adopted. The utilization of fixed films for wastewater treatment process has been increasingly considered due to inherent advantages over suspended growth system. The present work is intended to study the application of the comparative study between the coconut coir, maize, and sugarcane as a fixed bed for treating domestic wastewater and to know the comparative removal efficiency of pH, Hardness, Chloride, DO, Total solid, Alkalinity, Turbidity with conventional gravel bed in a small volume reactor.

## II. OBJECTIVE

To analysis the existing physico-chemical parameter of municipal wastewater to know the current pollution status. To analyze the effectiveness of bio-filters materials like coconut coir, maize, sugarcane.

Finally drawing out the conclusion based on finding of lab testing and suggesting the appropriate bio-filtration material and recommending the future scope of work.

### A. Material Used:

Collection of Bio-Filter Material: The Bio-Filter materials used for this study are coconut coir, maize and sugarcane was collected from local market and farm.

### B. Preparation of Bio-Filter Material:

- 1) The coconut coir is washed 2-3 times using raw water without using any chemical and allow it for sun dry for 24 hour to the removal of Turbidity.
- 2) The sugarcane are washed properly using raw water to removal of colour and sugar contain. Then it was kept in sunlight for 24 hours to remove the moisture present in the sugarcane.



Fig. 1: Coconut coir



Fig. 2: Maize



Fig. 3: Sugarcane

### C. Experimental Setup:

#### 1) Bio-Filter Design:

The Bio-Filter Tank was constructed by Glass Fibre. Thickness of glass is 10mm. The filtration tank size is 0.6m long 0.30m wide and 0.80m high. The total Bio-Filter media depth is 0.45m and contains static head of 0.15m. Outlet pipe is provided at the bottom of the filter to collect the sample after filtration.

#### 2) Bio-Filter Media:

The filtration tank consists of three Bio-filter media in a series. The Bio-Filter materials are coconut coir, maize and sugarcane. Each layer has a thickness of 0.5 m and in between sandwiching layer of fine sand is provided has a thickness of 0.4m. In filter media, coconut coir is placed at top layer, sugarcane is provided at the bottom layer and maize is provided in middle.



Fig. 4: Bio-Filter Tank

### III. RESULT AND DISCUSSION

In this study it was observed the Bio-Filter materials like Coconut coir, Maize, Sugarcane, have good efficiency in removing the physico-chemical characteristics of waste water. It is observed that the Bio- Filter model will efficiently remove Hardness, Chloride, DO, Total solid, Alkalinity, Turbidity, Total dissolved solid, Total suspended solid and maintaining pH. Hence it is found that Bio-Filter is effective to remove impurities from the domestic waste water and the treated waste water use for Irrigation, toilet

flushing, car washing, gardening, etc. with proper maintained and care.

#### A: Comparison of parameters before and After Filtration:

Parameters	Unit	Result Before Filtration	Result After Filtration
pH		7.8	7.3
Alkalinity	Mg/lit	32	28
Hardness	Mg/lit	252	226.3
Chloride	Mg/lit	61	52
Turbidity	NTU	30	22
Total Solid	Mg/lit	440	360
TSS	Mg/lit	40	80
TDS	Mg/lit	400	280
DO	Mg/lit	2.6	2.1

Table 1: Comparison of parameters before and After Filtration.

### IV. CONCLUSIONS

From this study, it is concluded that the naturally available material have good performance in removing impurities from municipal waste water. Thus the Bio-Filter is very helpful in removing pH, Hardness, Chloride, DO, Total solid, Alkalinity, Turbidity, TSS, TDS, will improve the physico-chemical quality of the effluent. It can also be concluded from the study that the Bio-Filter may be considered as efficient pre-treatment process for waste water treatment. The efficiency of Bio-Filter is mainly depend upon the thickness of filter media. The study revealed that the Bio-Filter will performed well for the future need and has less cost of Bio-Filter media. This present work will help to understand a new eco-friendly low cost filtration method. Hence the technology is eco-friendly and cost effective.

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