

Vermi Filter –A effective cost technology for domestic wastewater

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Abstract - Nearly 97% of water is present in the form of sea, which is salty and cannot be used for domestic or municipal use. 2% of water is present in form of ice and glaciers. And only 1% of water is present for domestic used. Therefore there is scarcity of water in nature. [1]

The construction cost and maintenance cost of wastewater treatment plants is more. Therefore there is necessity of replacement traditional method of treatment. [2] Therefore in the present study an attempt is made to know the efficiency of vermifilter for removing the parameters pH, removal of Biological oxygen demand and chemical oxygen demand of domestic wastewater. In this study waste water is treated using vermifilter containing earth worms and the results are compared with waste water treatment by traditional method, for the treatment of domestic wastewater. The domestic waste water is collected from hostels, apartment, kitchen food court, wash rooms of collage & school.

Keywords: Domestic Sewage, Vermifiltration, Earthworms, Low cost, Odor- less & sludge free process.

1.INTRODUCTION

Nearly 70 to 80% of the water supply used by society was returns in municipal wastewater in the sewer system as sewage. [1] The domestic wastewater contains high pH, COD, BOD, and solids - both dissolved and suspended solids. The domestic wastewater has to be treated to reduce the pH, COD, BOD before discharging into the environment (rivers and oceans). Aerobic bacteria will consume more dissolved oxygen (DO) from the river/ ocean water to decompose this organic material thereby depleting the DO values. [3]

Treatment of domestic wastewater by vermifilter have been found that effective in removing pH, Turbidity , BOD, COD , TDS and (TSS) from domestic wastewater by the general mechanism of biodegradation of organic wastes .

It is found that treatment of domestic wastewater by vermifilter no need of aeration, chemicals, whole process is odorless and no sludge is formed.

2. ABBREVIATION

BOD (Biological oxygen demand), COD (Chemical oxygen demand), TS (Total solids), TSS (Total suspended solids), TDS (Total dissolve solids), E (Effluent), I (Influent).

3. STUDY AREAS

Analysis of domestic wastewater come from hostels, apartments, kitchens, wash rooms of collage & school.

4. MATERIAL AND METHODOLOGY

It is the process of removing contamination from domestic wastewater soil using earthworms.

4.1 Construction of Bed

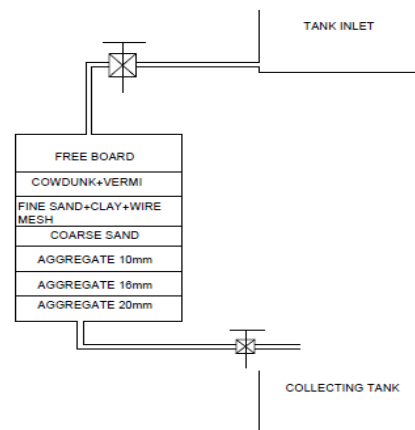


Fig-1: Experimental system



Fig-2: Vermifilter model

4.2 The filling material of bed

- **Top layer:** Free Board
- **Upper layer:** Cow dung + Earthworm
- **Upper layer:** Fine Sand + Clay + Wire Mesh
- **Middle layer:** Course sand
- **Bottom layer:** Aggregate 10mm
- **Bottom layer:** Aggregate 16mm
- **Bottom layer:** Aggregate 20mm

4.3 Experiment Work

The waste water was initially characterized for the basic Parameters: Color, pH, Temperature, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), Total Dissolved solids (TDS).A stage wise treatment was undertaken.

5. RESULTS AND DISCUSSION

Table -1: Average Characteristic of domestic wastewater

Sr. No.	Parameter	Untreated Influent	Treated Effluent
1.	Turbidity	37	4
2.	Temperature	27°	25°
3.	pH	7.4	6.9
4.	COD (mg/l)	280	30
5.	BOD (mg/l)	206	17.22
6.	TS (mg/l)	365.5	20
7.	TDS (mg/l)	360	36

5.1 pH

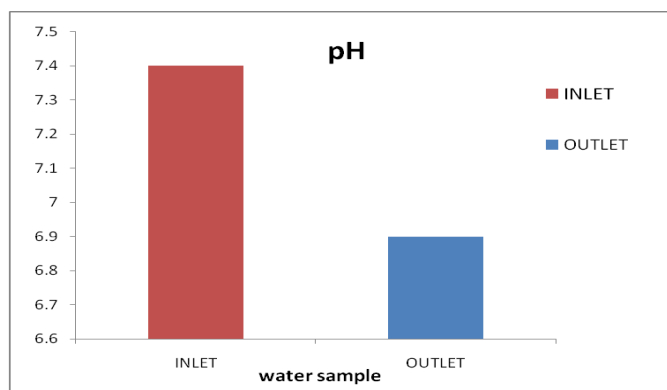


Chart -1: pH value comparison

Inlet pH of domestic wastewater was found 7.4 , it was reduce to 6.9 by vermifiltration.

5.2 Turbidity

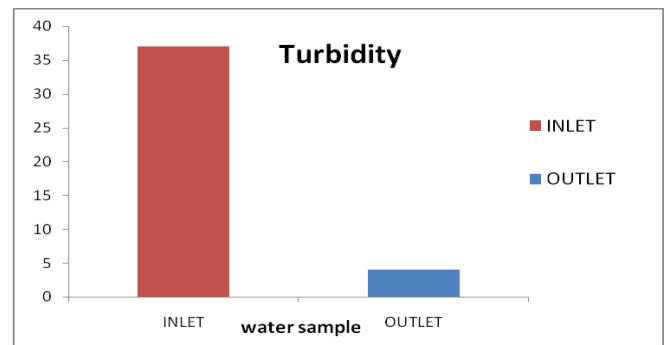


Chart -2: Turbidity value comparison

Inlet Turbidity of domestic wastewater was found 37, it was reduce to 4 by vermifiltration.

5.3 COD

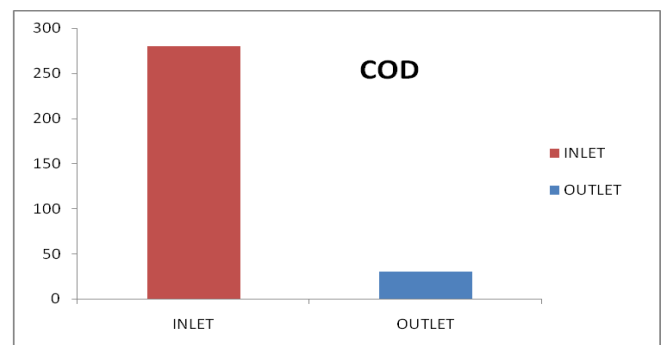


Chart -3: COD value comparison

Inlet COD of domestic wastewater was found 280 mg/lit it was reduce to 30 mg/lit by vermifiltration.

5.4 BOD

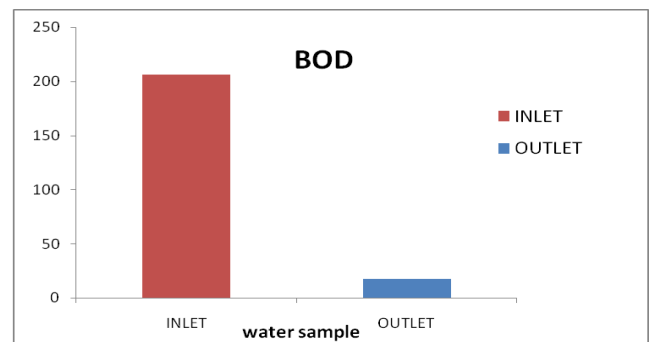


Chart -4: BOD value comparison

Inlet BOD of domestic wastewater was found 206 mg/lit and it was reduce to 17.22 mg/lit by vermifiltration

5.5 Total Suspended Solid

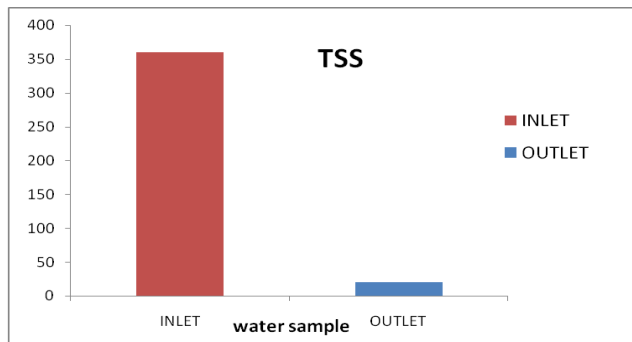


Chart -5: TSS value comparison

Inlet TSS of domestic wastewater was found 365.5 mg/lit and it was reduce to 20 mg/lit by vermifiltration.

5.6 Total Dissolve Solid

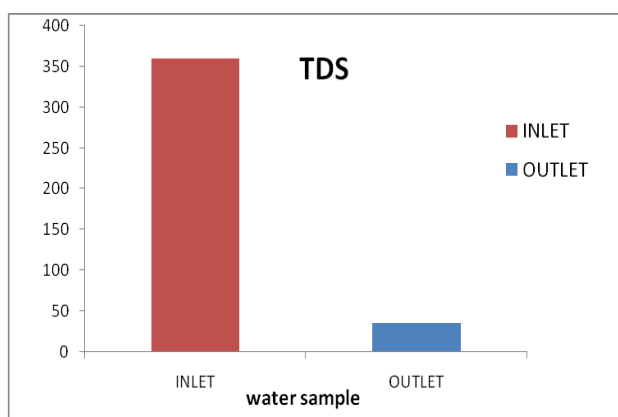


Chart -6: TDS value comparison

Inlet TDS of domestic wastewater was found 360 mg/lit and it was reduce upto 36 mg/lit by vermifiltration

6. CONCLUSIONS

- Performance of earthworms in the decomposition of organic waste present in domestic wastewater is aerobic in nature, hence overall process is odorless.
- In this process no aeration and chemicals are required, hence cost effective.
- Treatment of domestic wastewater by vermifilter have been found to remove the pH about 3% to 5%, Turbidity by 80% to 87%, 3 days' BOD (BOD3) by over 80%, COD by 90%, Total dissolved solids (TDS) by 85% to 90%, and the Total suspended solids (TSS) by 90% to 95% from domestic

wastewater by the general mechanism of biodegradation of organic wastes .

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