DOMESTIC WASTE WATER TREATMENT BY USING CANNA INDICA PLANTS

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Abstract: Domestic Wastewater can be recycled naturally by using the roots of Canna Indica plants and soil bacteria for domestic re-usage such as for gardening, flushing of toils. The main aim of this study is treatment of untreated wastewater from domestic use. The various parameters such as pH, turbidity, electrical conductivity and dissolved oxygen are analyzed.

*Index Terms –***Root zone treatment system, domestic wastewater treatment, Canna Indica Plants.**

I. INTRODUCTION

The wastewater flow through the root zone in a horizontal or vertical way, where the organic pollutants are decomposed biochemically by the bacteria present in the rhizosphere of root plants. The filter media are selected carefully to provide favorable conditions for both plants and bacterial growth and to avoid clogging. Organic pollutants are removed drastically from wastewater and are reduced to their elemental forms. It also has the potential to accumulate heavy metals in the root zone. Out of about 61948 million liter per day of sewage generated treatment capacity exists for only about 23277 million liter per day. Thus, there is a large gap between generation and treatment of wastewater in India. Even the treatment capacity existing is also not effectively utilized due to operation and maintenance problem. Operation and maintenance of existing plants and sewage pumping stations is not satisfactory, as nearly 39% plants are not conforming to the general standards prescribed under the Environmental (Protection) Rules for discharge into streams as per the CPCB's survey report. This treatment can be used efficiently and effectively for treatment of domestic wastewater generated from school, colleges, private organizations etc.

Objective of the research

To study the various parameters such as pH, turbidity, electrical conductivity and dissolved oxygen for domestic wastewater after flowing over the Canna Indica Plant bed.

Pollutant Removal Mechanism

1. The presence of plant biomass and substrate media will physically retard the pathways of wastewater enhancing the sedimentation of suspended solids.
2. The breakdown of organic matter and destruction of pathogens can occur in the exposure of the sunlight and atmospheric gases.

3. The oxygen released by the hairs of the plant's root will provide the water with oxygen and this presence of oxygen will help the growth of aerobic bacteria which will breakdown organic matter and provide nutrients to the plants

4. By the nitrification process done by nitrosomonas and nitrobacter the ammonia present in the water will be converted to nitrates. These nitrates in the presence of denitrifying bacteria will be reduced to atmospheric nitrogen.

II. METHODOLOGY

Construction of treatment unit

1. The unit consist of a basin i.e. a rectangular tray with inlet pipe at top and outlet pipe at the bottom of the tray

2. The basin is filled with layers of gravel and sand, planted with aquatic plant named Canna Indica and by three layers of sand, the bottom layer filled with coarse sand (small stones), the intermediate layer filled with fine-grained oval gravel, after that is a layer of charcoal and the top layer filled with sandy loam.

3. The canna indica plants are allowed to grow to maturity. While the growth of plants till maturity fresh water is supplied. After the growth of canna indica plants domestic waste water is fed through the inlet and allowed to infiltrate.

Fig. Treatment Unit

Experimental procedure

1. After reactor is stabilized in about 30 days with tap water, doses of sewage applied with increasing percentage of sewage.
Each dose is continued for two watering that is 6 days then next higher dose was applied. Gradual increase in sewage dose is
done so that the plants adapt the quality of water.

2. Water samples are taken once from inlet chamber and outlet chamber of the root zone treatment unit. The samples are collected by putting a clean beaker below the inlet and outlet pipe of constructed wetland.

3. The samples are analyzed for pH, turbidity, electrical conductivity, dissolved oxygen and according to Standard Methods for Waste and Waste water Examination.

III. RESULTS

The samples were collected from the inlet and outlet and analysed for determination quantity in laboratory of Dhole Patil College of Engineering, Pune. The various parameters analyzed such as pH, turbidity, electrical conductivity and dissolved oxygen .

Parameters	Inlet Parameters	Outlet Parameters	General Standards
pH	5.26	6.8	6.5-8.5
Turbidity	244 NTU	74 NTU	50-150 NTU
Dissolved Oxygen (DO)	4.6 mg/lit	5 mg/lit	5 mg/lit and above 5 mg/lit
Electrical Conductivity	2.09 mS/m	1.17 mS/m	Below 150 mS/lit

IV. CONCLUSION

1. During supplying waste it was observed that sewage is very good for plants as during the sewage treatment process plants are seen to be grown very well.

2. There was considerable decrease in turbidity and electrical conductivity of water in outlet as compared to turbidity of inlet water. The Dissolved Oxygen (DO) was seen to be increased.

3. Therefore, from the result we came to the conclusion that this method is effective for reducing turbidity, electrical conductivity increasing dissolved oxygen, and bringing pH near to that of neutral water.

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