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Greywater Treatment by Using Luffa, Coconut Coir, Charcoal

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ABSTRACT

Nowadays due to increase in population, water demand has also increase which has led to the idea of using grey water as a source of water.Greywater is a waste water generated from household, office buildings and streams.This includes water from kitchen,showers, sinks etc.In the study a vertical flow filter set-up prepared by using GI sheets and filled with the low-cost media for treatment of domestic greywater.Filter performance was examined with certain physicochemical and biological properties of greywater like hardness, pH, BOD, COD and total dissolved solids. This technology is environment friendly and cost effective. The materials used as a filter bed in this study are luffa, coconut coir and charcoal. Treated water use for Irrigation, toilet flushing, car washing, gardening, firefighting, etc.

Keyword: -Domestic greywater, Luffa, Coconut Coir, Charcoal, Multimedia Filter, Natural Media.

1. INTRODUCTION

Water is becoming a rare resource in the world. With increasing population, the gap in between the supply and demand for water is increasing. The low-cost technology would definitely save huge quantity of water by reusing the treated water.The increasing disparity between readily available sources of clean water and the growing demand associated with population growth and economic development witnessed in recent decades. Because of the scarcity of clean water, treated greywater potentially provides an alternative source for irrigation, flushing, gardening. The domestic greywater is characterized in terms of its physical, chemical and biological composition.For removing organic pollutants from water, different low-cost materials are used as adsorbents.In this study luffa, coconut coir and charcoal are used to treat greywater which are good at filtration and are easily bio-degradable.

Filtration technology is a low-cost treatment technology based on physical process to treat greywater contaminants like colour, odour, pH, hardness, BOD, COD and Total solid etc. for a wide range of application in domestic for improving excellent quality of the greywater.In this experiment materials such as luffa, coconut coir and charcoal media are proven to be more efficient in improving the effluent quality and the study mainly aims to develop a promising and cost-effective technique for domestic greywater treatment. Considering this the domestic greywater has been treated in small scale which is more or less effective and can be re-used for various purposes. An overall vision of multimedia filter technology an alternative method for treating greywateris provided in this study. Treated water is used for Irrigation, toilet flushing, car washing, gardening, firefighting, etc.

2. LITERATURE SURVEY

Here we will discuss the literature related use of Natural filter media for treatment of grey water. In the project it has been achieved to review the literature available in the field of wastewater treatment by using natural filter technology. Some of important literatures connected with topic are furnished below:

The natural fibrous materials which are effective in purification purpose has been identified and used for domestic purification. The materials used as a filter bed in this study are Sisal fiber, Areca husk fiber activated carbon and river sand. The removal efficiency of these materials has been studied by setting the filter bed for different contact period. Influent greywater sample (raw water) and effluent greywater sample (treated water) collected and analyzed for pH, TDS, TSS, TH, BOD, COD, oil and grease, chloride and sulphate in the laboratory and compared with THPCB and WHO standards. The removal efficiency of this parameter is between 0 to 25 are

12.5% (TDS), between 30 to 40 are 50% (TH, BOD, COD, sulphate) and 40 to 50 are 25% (TSS, oil and grease) and above 50 are 12.5% (Chloride).[1]

The project proposes a grey water Recycling system that will provide water to meet the Needs of the college boy's hostel and irrigation Purpose around the hostel. The water can be used for cleaning and flushing purposes. The grey water Recycling system components were designed and they consist of piping system, diversion system, Filtration and storing system, pumping system and Distribution system. The project includes Underground storage tank, filtration tank and Overhead tank. The filtering media used is activated Charcoal, which is replaced every six months. The Filtered water is stored in underground storage tank for a particular time, then pumped to overhead tank by efficient piping system, and stored there. When the need for water arises, it can be delivered.[2]

This paper intense to provide an overall vision of multimedia filter technology an alternative method for treating waste water. Treated water use for Irrigation, toilet flushing, car washing, gardening, firefighting, etc. Filtration technology is the simplest and low-cost treatment technology based on the principle of attached growth process. Multimedia Filters represent a significant improvement over single media filters. A multimedia filter model was developed by G.I. sheet for treatment of domestic wastewater. Different packing media are used such as Activated carbon, sugarcane bagasse, sand and grass mulch.[4]

3. MATERIALS AND METHODOLOGY

3.1 Materials

Greywater: Greywater is defined as wastewater that includes water from baths, showers, hand basins, washing machines, dishwashers, and kitchen sinks, but excludes streams from toilets. Some authors exclude kitchen wastewater from the other greywater streams. Wastewater from the bathroom, including showers and tubs, is termed light greywater. Greywater that includes more contaminated waste and from laundry facilities, dishwashers and, in some instances, kitchen sinks is called dark greywater.

Luffa: Luffa sponges are the fibrous interiors of the fruits of luffa plant (luffa cylindrica) as shown in fig-1. The fruits are regularly cylindrical, sometime striped and pale green in colour. When they are dried, a network of fibers is released and forms the luffa sponge that is about 30 to 60 cm long and 8 to 10 cm wide Luffa fibers have various industrial uses, more especially as engine filters and as shock and sound absorbers. For this purpose, a filter model with luffa sponge as filter media was tested for its effectiveness in the purification of water.

Fig-1 Luffa

Preparation of Luffa cylindrica: The plant materials were dried at room temperature for a period of three days. After drying, the outer cover of luffa cylindrica is removed to obtain the sponge. And this dried sponge is used as a filter media in filtration unit.

Coconut Coir: Coconut coir is extracted from the outer shell of a coconut. The coconut coir is shown in fig-2. It is the natural fiber of the coconut husk where it is a thick and coarse but durable fiber. These are multi-cellular, lignocellulosic, hard, a very coarse, and rigid variety of natural fruit fiber. Coconut coir was function as the main filter to screen out large solids such as algae.

Fig-2 Coconut Coir

The chemical composition of coconut coir is given in Table 1.

Table 1: Chemical composition of Coconut coir

Lignin	45.84%
Cellulose	43.44%
Hemi-Cellulose	00.25%
Pectin's and related Compound	03.00%
Water soluble	05.25%
Ash	02.22%

Charcoal: Charcoalis impure form of graphitic carbon as shown in fig-3, which is obtained as a residue when carbonaceous material is partially burned, or heated with limited access of air. Coke, carbon black, and soot may be regarded as forms of charcoal; other forms often are designated by the name of the materials, such as wood, blood, bone, and so on, from which they are derived. The charcoal is easily available material and hence the project is economical. Charcoal is used to remove contaminants and impurities, using chemical adsorption active. Charcoal carbon filters are most effective at removing sediment, taste and odour from water.

Fig-3 Charcoal

Preparation of charcoal: Collected coarse size charcoal was washed thoroughly with help of water to remove unwanted materials. This washed charcoal is kept in sunlight and allowed to dry.

3.2 Methodology

The filtration tank was constructed from metal plate and the rectangular filtration tank is 0.75 m high, 0.15 m long and 0.15 m wide. The tank has a compartment of the filter medium where various filtering materials were placed.The domestic greywater was collected from local drainage system. The wastewater from inlet tank enters the inlet chamber and flows in down flow regime sequence. The compartments were packed with charcoal, coconut coir and luffa in down flow regime respectively. The wastewater was collected in the collecting chamber and after reaching the outlet level the treated effluent was collected in the outlet tank.

4. RESULTS AND DISCUSSION

It was observed that that adsorbent materials such as charcoal, coconut coir and luffamedia may prove to be more efficient in improving the effluent quality in terms of its physiochemical content. It was also observed that the experimental filter model will significantly assist in the removal of BOD, COD, TDS, hardness and will also improve the pH quality of the effluent Comparison of parameters Before & After Filtration:

Table 2: Comparison of parameters Before & After Filtration

Sr. No.	Parameters	Units	Before filtration	After filtration
1	Colour	Hazen	Grey	Light Grey
2	Odour	-	Non offensive	Non offensive
3	pH	-	8.4	8.0
4	Hardness	mg/l	294	117.9
5	BOD	mg/l	118.3	49.8
6	COD	mg/l	226	93.5
7	TDS	mg/l	641	569

5. CONCLUSION

In this study, it can be concluded that luffa have good performance to adsorb of oil byproduct from polluted water especially for high concentration of pollutant.It was observed that coconut coir media has function as the main filter to screen out large solids.Charcoal carbon filters are most effective at removing sediment, taste and odour from water.The media used in this study such as luffa and coconut coir are bio- degradable and has no negative effect on environment.The Multimedia Filter process had given an excellent result and significantly assist in the removal of pH, TDS, BOD, COD, hardness and will improve the physio-chemical quality of the effluent.Also, the above media may enhance the performance of the treatment system.Hence, this technology is environment friendly and cost effective.

6. REFERENCES

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