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TREATMENT OF TEXTILE WASTE WATER USING VERMIFILTER AND NON VERMIFILTER

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Abstract - *Textile industries are one of the major industries in the world. The textile industry utilizes various chemicals and large amount of water during production process. The waste water produce during this process contain large amount of dyes.If a textile mill discharge the waste water into the local environment without any treatment, it will have a serious impact on natural water body and in surrounding area. In this project, mainly aim to adopt vermifilteration and non vermifilteration technique for treatment of textile waste water. And to find the efficiency of vermifilter in reducing the quantiy of following parameters like BOD, COD, Colour, ph, Hardness, Alkalinity, Chloride content and TDS in both techniques are done.*

Key Words: Vermifilteration

1.INTRODUCTION

Textile industries are among the manufacturers which produce the highly polluted waste water large consumption of water and complexity of chemical substances usage in textile processing, leads to environmental pollution in this industry.Textile industries consume large quantities of water & chemicals, especially in dyeing and finishing processes. Water demand in textile industries has been estimated 100-200litre per kilogram of products. Consequently, recovery and reuse of waste water after employing appropriate treatment methods is very important in present scenario. On average 60 – 90 % of total water consumption is spent in washing processes. High concentration of dyeing agents, Total Dissolved Solids (TDS) and Chemical Oxygen Demand (COD) and also high potential of toxic substances presence are the major problems associated with textile waste water.

1.1 Objective of the study

To find the efficiency of vermifilter in reducing quantities of following parameters like BOD, pH, colour, TDS, TSS, Alkalinity, Chloride.

To compare the textile waste water treatment between vermifilter and non- vermifilter in different variations.

1.2 Scope of study

Discharged wastewater by some industries under uncontrolled and unsuitable conditions is causing significant environmental problems. The importance of the pollution control and treatment is undoubtedly the key factor in the human future. If a textile mill discharges the wastewater into the local environment without any treatment, it will have a serious impact on natural water bodies and land in the surrounding area. The data obtained from this project may be useful for designing & fabrication of an economically cheap treatment process using vermifilter. Earthworms are easily available in nature, the vermifilter apparatus can easily constructed and cheap, and have earthworm‘s potential to be used for the small scale industries which produced dyes as their effluent.

2. MATERIALS AND METHODS

Collection of textile waste water from DGK Dyeing industry Tirupur. Preliminary test was conducted. Tests like BOD, COD, pH, total suspended solids, total dissolved solids, hardness, chloride and alkalinity were conducted. Preparation of synthetic dye water from the composition obtained was done. Collection of earthworms, gravel, sand, garden soil, sawdust. Construction of vermifilter and non vermifilter. Synthetic dye water passed through both filters at varying hydraulic loading rate. BOD, dye concentration, ect, of the filtered water after filtration is tested at varying hydraulic loading rate. The water obtained after treatment from the filter system is tested for its characteristics. Results are tabulated and graph showing comparison between various chemical characteristics of vermifilter and non-vermifilter are analysed in different variations.

A laboratory model similar to non- vermifilter system was designed in which arrangement has been made to supply the wastewater from top as well as collect the treated wastewater from bottom of the system. About 400 numbers of earthworms were collected from Mannuthi agricultural college. They belonged to Eisenia fetida species. About 100 grams of cow dung was added along with earthworms to facilitate their growth. The vermifilter was also constructed in circular shape of dia 35cm. The depth of the filter is 60 cm

and it was divided into 4 parts of layers in which gravel, sand and vermifilter bed were placed from bottom layer to top. The system has provisions to collect the filtered water from the bottom which opens out in to a bucket.

The system consists of bottom most layer and was made of aggregates of 20 mm size and it fills up to a depth of 60 mm. above this lies aggregates of 10 mm size filling up to 50 mm height. On top of this, 50 mm thick layer of sand passing through 2.36 mm size sieve. The top most layer is about 120 mm consists of garden soil passing through 2.36 mm size sieve. The earthworms were added to this garden soil in alternate layers. A layer of net of wire mesh was placed below the layer of soil bed to allow only water to trickle down while holding the earthworms in the soil bed because it can crawl down to filter materials.

Earthworms were cultured in this vermifilter unit for one week. The textile wastewater was passed through the vermifilter at different hydraulic loads 40,50 and 60 $l/m^2/day$ respectively. For each value of HLR, the wastewater percolated down through various layers in the vermifilter bed passing through the soil layer inhabited by earthworms, the sandy layer and the gravels and at the end was collected from the bottom of the system. Next day this treated wastewater was collected and analysed for BOD, pH, TDS, alkalinity, chloride, colour etc. the test results corresponding to various HLR values for wastewater passed through vermifilter

Vermifilter

3. CONCLUSIONS

Vermifilteration technology is a recommended solution for textile waste water treatment in developing countries.Vemifilteration of textile waste water results in treated water which can be used for any purposes. As a preliminary step a dye water sample containing Ramafix Dye was collected from DGK dyeing industry, Tirupur and its chemical characteristics are analysed. Then the Vermifilter and non-vermifilter apparatus was made bucket. The materials like aggregates, sand, garden soil are collected and placed in layers in the apparatus. Using the standard dye water composition given from the industry synthetic water sample is prepared and it is poured to the non-vermifilter apparatus from top.

The treated water after one day was collected from the bottom and its characteristics were analysed. The treated filtered dye water corresponding to hydraulic loading rates of 40 l/m2/day ,50 l/m2/day and 60 l/m2/day was collected and its characteristics were found. For the vermifiltration process the apparatus consisting with earthworm is set up and the synthetic dye water is poured and The treated filtered dye water corresponding to hydraulic loading rates of 40 l/m2/day,50 l/m2/day and 60 l/m2/day was collected and its characteristics were found as same as non-vermifilter and the results are compared and studied.

Vermifiltration of waste water using waste water earthworm is a newly conceived technology. From the data obtained it was found that vermifilter is efficient for the removal of BOD, colour, TDS, reducing pH, chloride content and alkalinity etc. of textile waste water. About 42% of BOD was removed by vermifilter whereas these values are 15% 11.5% and 5% respectively for non vermifilter. The TDS content and pH of waste water decreased accordingly. The TDS content was reduced by 49.6% and pH and value by 7.2 in vermifilter and 26.9%and 7.1 in non vermifilter respectively. The chloride content is reduced by 77.8% in vermifilter and 18.8% in non vermifilter. These characteristics also have a negative correlation with hydraulic loading rate.

This process is aerobic and hygienic hence no odour. Results of vermifilter technology are most cost effective, odour free for treatment with efficiency, economy and potential decentralization.

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