Wastewater Treatment by the Process of Phytoremediation

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Abstract

This study describes the simple and cost effective method for the design of small scale wastewater treatment plant for the purification of wastewater which is generated from the household, canteen, laboratories of schools and colleges. The introduction of an increasing number of pollutants in the aquatic environment. The ability of plants to remove the pollutant from the wastewater has been researched and found number of applications to purify it. The current study explored the process of Phytoremediation by using duckweed plant and canna-Indica (Indian shot) for the removal of metal ions and phosphate from the wastewater. After the process of phytoremediation treated water will further purified by the sand filtration method. The various water quality parameters of the treated and untreated water were analysed. It was observed that there are significant reduction in hardness, turbidity, and dissolved oxygen value. Then the treated water can be reused for various household works and Agricultural works.

Key Words

Phytoremediation, Wastewater, Canna-Indica, Duckweed, Water quality parameters, Sand Filtration, Water Quality.

1. Introduction

In all over world the pollution is increasing day by day. The aquatic bodies and plants are also getting damage too. For survival of every living being should have access to sufficient amount of clean water in day to day life. **Water scarcity** describes the relationship between demand for water and the availability of water. Water scarcity is rapidly becoming a major problem for many developing countries like shortage of water and lack of access of safe water. The Increase in population growth has

resulted in increasing demand of water. There are number of technology systems exist in world to purify wastewater. But for huge proportion of population in this developing world that lives in rural areas such technologies would be too expensive. This study describes the simple and cost-effective method for the design of small-scale wastewater treatment plant for the purification of wastewater which is generated from the household, canteen, laboratories of schools and colleges. Phytoremediation is the process of wastewater purification by using plants. In past few decades this process become an important and eco- friendly technique for the removal of toxic metal ions and harmful substances from wastewater.

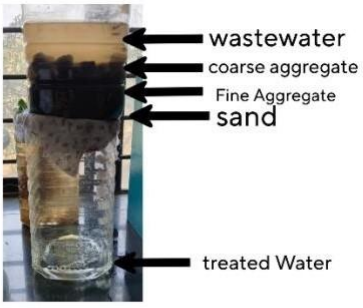
The wastewater purification by Sand Filtration Method is very cost-effective method. Sand filter can be easily assembled by using sand which is supported by different sizes of aggregates. In this process water percolates downwards, impurities are strained out by the filter media which results purified wastewater. The aim of this work is to purify the wastewater which is generated from the household, canteens and laboratories by combining the phytoremediation process and the sand filtration process.

2.Experimental Methods

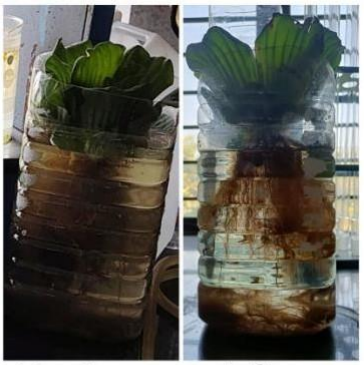
Standard methods are used for the determination of various water quality parameters. Such as Jar test method, Chlorination Method, Total dissolved solids, Turbidity, pH, pH meter and TDS meter respectively. But these methods are too expensive than the phytoremediation method. Phytoremediation method can be alternative, eco-friendly and less expensive method for the purification of wastewater by utilizing Plants to remove or to treat contaminants from the water like heavy metal ions, organic pollutants, and nutrients. This study explores the effectiveness of phytoremediation using aquatic plants to treat wastewater.

3.Collection of plants for Experiment

Two plants namely Duckweed and Canna- Indica (Indian shot) were collected from the Nursery.



2. Sand Filtration Method



1. Phytoremediation Process

4. Construction and working of filtration Plant

Three Transparent Plastic containers one for the phytoremediation process and two for sand filtration method. For Phytoremediation process, The container is filled with wastewater and on the top of the water we planted a plant named Duckweed. Duckweed helps to clean the aquatic environment. After the assembly of setup Gave rest to this setup for 1-2 weeks after 1-2 weeks it will start giving results. The sand filtration unit is very simple method. It requires two plastic containers, Cloth, Filter paper, different sizes of aggregates like coarse aggregate, Fine aggregate etc. and sample of wastewater. The topmost layer should consist of coarse (thick) aggregate and Second layer should consist of fine aggregate and third layer should consist of sand after applying the layer of sand, Place filter and then tie a cloth at the bottom of this layers respectively.Fig no. 1 represents the process of phytoremediation and Fig. no. 2 represents Sand filtration Method for the removal of metal ions, harmful substances from the wastewater. Using Duckweed plant for the process of Phytoremediation. Further the partially treated water will purified by the method of sand filtration. The water slowly percolates through the different layers arranged of various sizes of aggregates and the layer of sand. Clear Filtered water is collected at the bottom jar.

5. Conclusion

The wastewater generated from the household, laboratories, canteens etc. consist of harmful substances. Metal ions, chemicals, phosphate from soap, detergents etc. and it is hard to purify in rural areas. Duckweed is used to remove such impurities from wastewater generated from canteens laboratories, kitchens etc.

Phytoremediation is an effective method for the treatment of wastewater, it significantly reduce the pollutant levels. This study identifies the most efficient plant species for wastewater remediation, Providing sustainable alternative to conventional water treatment methods.

6. Refrences

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