A Review- Treating the Wastewater Using Hybrid Wetland System

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Abstract **- This paper reports the pollutant removal performances of a hybrid wetland system for the treatment of liquid Wastewater. Project is the most beneficial waste management alternative to manage organic waste. This study helps to keep stable environment and social considerations to the decision-making process so that more sustainable solutions can be achieved. Different wastewater techniques are used now days to treat wastewater but very few are economical and one of them is constructed wetland method. As per the literature survey on various constructed wetland methods. Phytoremediation including multiple filter media are the effective and economical solution over the management of wastewater. It is observed that most of the researchers investigate different feasible and effective materials for the filter media of wetland reactor to improve treatment efficiency.**

Index Terms **- BOD, COD, Chemical reaction, Wetland system, Recycling.**

INTRODUCTION

Wastewater Pollution is one of the major issues in the World, and it is a big threat to Human Health. And organic waste or wastewater is one of them, Nagpur City is generating about 595 MLD sewage. You can imagine how much quantity of wastewater generated in the world on daily basis. As per the data collected from NMC's health department (sanitation) waste generated on daily basis was approximately 1225 metric tons in 2018-2019. The average garbage generated by every household in Nagpur is 2.22 kilogram per day. The city generates approximately 525 million liters of waste every day. Domestic waste is a serious issue in India and absence of proper sanitation in domestic wastewater is to affect human health. In India, about 38,255 million liters of sewage produced on daily basis, out of which only 22% of the sewage is being treated. There are different conventional methods for wastewater treatment such as active sludge process (ASP), rotating biological contactors (RBC), stabilization ponds, oxidation ditch, trickling filters (TL), lagoons and up flow anaerobic sludge blanket (UASB), micro-algae techniques, etc. Fuel recovery in the form of biogas like methane, by treating organic waste under anaerobic conditions. Generation of energy from organic waste is the best solution to reduce organic waste. Despite continued efforts have been made to promote the implementation of wastewater treatment systems, around 2500 million people in the world are still without access to improved sanitation. The lack of adequate wastewater treatment is commonly much higher in rural and small communities.

Among all nature-based technologies for wastewater treatment, constructed wetland is one of the most common technology. It has constructed filtration systems with defined filter materials (e.g., gravel and sand) and planted with wetland vegetation (e.g., common reed). In these systems, wastewater flows through the filter material and the treatment is carried out by chemical, physical and biological process. The presence of vegetation helps to remove nitrogenous compounds from wastewater and to satisfy BOD of wastewater, producing an effluent suitable for various reuse applications (e.g., irrigation of non-alimentary crops). Hybrid Reactor (Wetland system) is generally used to treat organic wastewater, in this study we have focused on parameters like PH, TDS, BOD, DOD, Nitrate and compare their results observed in different research paper and set a conclusion of Hybrid Wetland Reactor how this reactor improves the quality of Wastewater and helpful to reused.

OBJECTIVE

1. To analyse the wastewater parameter treated from constructed wetland reactor.
2. To study the comparison between affluent and effluent sample.
3. To identify best feasible solutions for the wastewater management.

CONSTRUCTED WETLAND

A constructed wetland is an organic wastewater treatment system that helps to improve the effectiveness of the process that helps to purify wastewater similar to naturally occurring wetlands. A constructed wetland is an artificial method to treat municipal or industrial wastewater, grey water, or storm water runoff. Constructed wetlands are engineered system that use natural functions, vegetation, soil, and organism to treat wastewater. A wetland is land area that is saturated with water, either permanently or seasonally, such that it takes on the characteristics of distinct ecosystem. Constructed wetlands artificial, economical and ecological wastewater treatment system that can perform effectively without chemical and electricity requirement and sludge disposal issue. A constructed wetlands is an organic wastewater treatment system that helps to purify water similar to natural occurring wetlands. The system use water, aquatic plants (i.e., reeds, duckweed) naturally occurring microorganisms and filter bed (usually of sand, soil/gravel). Constructed wetlands used for either secondary or tertiary wastewater treatment. General concept of constructed wetlands is that the plants, micro-organisms, and substrates act as filter and purification system.

1. First, wastewater is entered in wetland allowing for sedimentation of solids.
2. The process of water flow through the constructed wetland, plant roots and the substrate, remove the large particles present in wastewater.
3. Pollutants and nutrients present in the wastewater are naturally broken down and take up by bacteria and plants, removing them from water.
4. The retention time in wetland is depends on the design and desired quality level, along with UVs radiation and plant, secretion of antibiotics will also kill pathogens in wastewater.
5. After treatment in constructed wetland pure water can safely release and used for various purpose.

LITREATURE PAPER

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8)Technologies of Domestic Wastewater Treatment and Reuse: Options of Application in Developing Countries, Asmaa N. Mohammed and Mohamed A. ElBably , 4 November 2016 , In this paper Author said that problem of wastewater in developing countries like Egypt Morocco etc. He also said the new technologies solve these problems, but the cost is very high.and how wastewater can effect public and ecosystem health he justified.

9) Constructed wetlands: a review (International Journal of Environmental Studies), MaklasScholz and ByoungHwalee, January 2005, they have studied about the constructed wetland method from various research papers. They studied about the properties of wastewater and compare the result before experiment and after the experiment in constructed wetland. A high variability of the heavy metal removal efficiencies in constructed wetlands has been reported.

10)Treatment of Sewage Water Through Constructed Wetland by TyphaLatifolia (International Journal of Recent Technology and Engineering (IJRTE)), Kamal B, AnithaSelvasofiya S.D, Jeevanandham V, Santhosh P Y, Santhosh Kumar, December 2019, in this experimental setup, a wetland is constructed to investigate the performance of Typhalatifolia when planted in sewage water and investigated for a period of 4 weeks. Within the stipulated period of 4 weeks the change in the characteristics of the sewage was tested for every 7 days. During the treatment period, the plant Typhalatifolia has considerably reduced the chloride content by 29.69% and the BOD content by 20.51% in the sewage. it is found that as the time period increases the efficiency of the plant in treating the sewage also increases.

11) Effects of plants and microorganisms in constructed wetland for wastewater treatment, U.Stottmeister, A .K uschk, U. Kappelmeyer, M Kastner, O.Bederski, R. A. Muller, H. Moorman, 10 August 2003 , In this research paper on a closer look to mechanism of plant in construction wetland and the microorganism in the root zone which come into play when they remove contaminants from wastewater. Plants involvement in the input of oxygen into the root zone, in the uptake of nutrients and in the direct degradation of pollutants as well as the role of microorganisms are all examined in more detail.

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13) Biological treatment of leachate from stabilization of biodegradable municipal solid waste in a sequencing batch biofilm reactor, K. Bernat, M. Zaborowska, M. Zielińska, I. Wojnowska Baryla, W. Ignalewski, 1 September 2020, the aim of this study was to determine the effectiveness of pollutant removal in sequencing batch biofilm reactors. In the reactor with floating carriers, the effectiveness of

denitrification and total nitrogen removal increased 1.23- and 1.10-times, respectively, as compared to the control reactor. The highest efficiencies (67.7% and 73.0%, respectively) were observed in the reactor with submerged carriers.

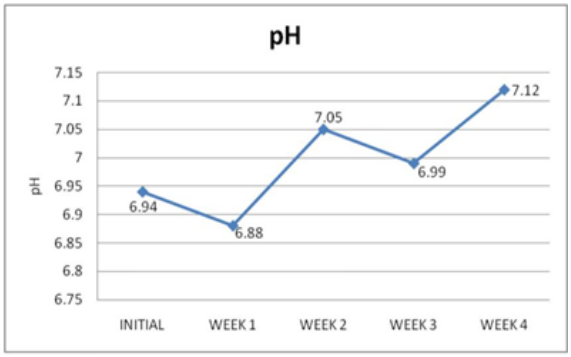
14) Horizontal subsurface flow constructed wetland for tertiary treatment of dairy wastewater: Removal efficiencies and plant uptake, María C. Schieranoa,b, María C. Panigatti b, María A. Maine a, Carina A. Griffa b, RosanaBoglione b, 23 July 2020,In this literature review their was evaluate contaminant removal efficiency of a pilot scale of the horizontal subsurface flow constructed wetland for the tertiary treatment of dairy wastewater. The chemical and bacteriological quality of dairy industry final effluent was improved by using horizontal subsurface flow constructed wetland. Then physicochemical and biological method to treat effluent and removal of efficiencies were high for suspended solid (78%), COD (68.7%), BOD (57.9%), and nitrate (47.8%) and nitrites (98.8%). The future studies will focus on the improving the quality of effluent through the application of hybrid wetland.

15) The use of hybrid constructed wetland for wastewater treatment with special attention to nitrogen removal: - A review of a recent developments, Jan Vymazal,19 May 2013, in this literature review the biological wastewater treatment due to the highly variable concentration of organic and inorganic constituent produced by the water treatment required durable, robust and the economical system that can be find the variation in influent quality and quantity. The hybrid constructed wetland method is used to primarily for enhanced removal of nitrogen and for the treatment of various industrial and agricultural wastewater. The constructed wetland method uses to remove of total nitrogen.

RESULTS

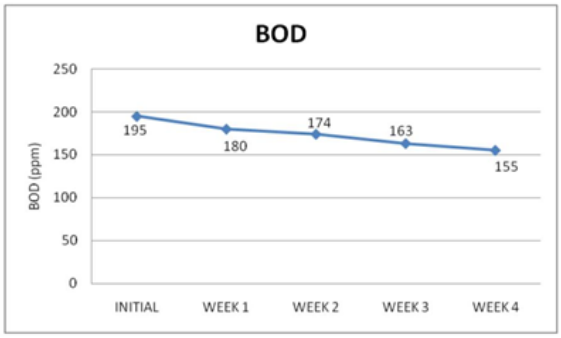
Results of different parameter in 4 weeks of the waste water by using constructed wetland method by typhalatifolia and the parameters are pH, BOD, COD and Turbidity.

Fig . Variation of pH in the sample



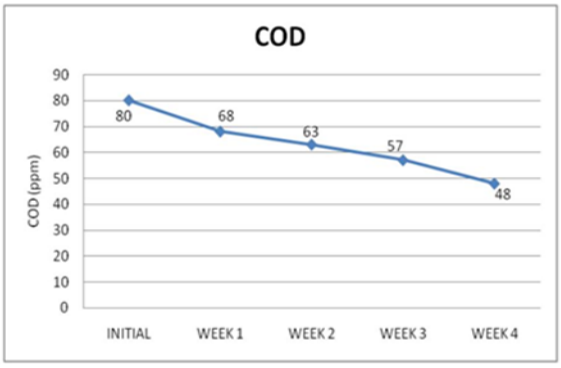
The pH value of sewage has been increasing and decreasing every week without any perfect pattern. While comparing the pH value of the initial and the final week there is an increase in the pH value from 6.94 to 7.12.

Fig. Variation of BOD content in the sample



BOD is one of the major parameters that has been reduced in the CW system. It has been reduced from 195 ppm during the time when the plant is planted in the sewage at a rate of 20.51% to a value of 155 ppm by the final week. This reduction in the BOD value indicates that Typhalatifolia is effective in the treatment of sewage since BOD is one of the major parameters to be minimized in the treatment process of water.

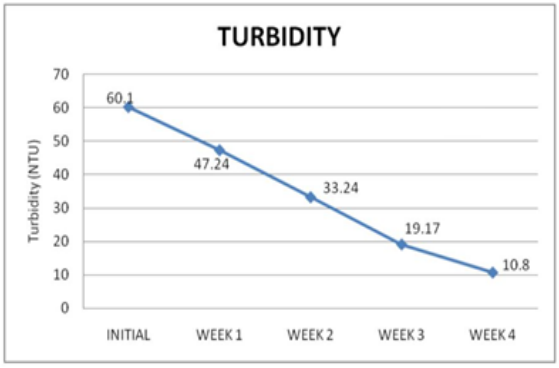
Fig. Variation of COD content in the sample



Along with the BOD reduction, the CW system has also reduced the COD content in the sewage water at

a rate of 40% from 80 ppm at the initial week to value to 48 ppm during the week 4.

Fig. Variation of turbidity in the sample



The turbidity value of the sewage water was as high as 60.1 NTU before the water was used in the CW setup. The CW setup with Typhalatifolia has considerably reduced the turbidity of the sewage water as the weeks pass by. At the end of the 4th week, the turbidity value has considerably reduced to 10.8 NTU which is about 82.02% lesser than the initial value.

CONCLUSION

In the contexts of constructed wetland methods, we observed during the study of this method that effectiveness over the treatment and management of wastewater with the conclusive experimental results are very much impressive. Most of the important wastewater parameters get satisfied during the treatment through this method. Economy and efficiency of this method is satisfactory as per the results and cost of construction and maintenance in various experimental studies.

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