IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Waste water treatment using improved vertical flow Wetland

Dr. S.J Mane[1], Charul Purohit[2], Ankita Karlekar[3], Gayatri Pawar[4], Jayashri Kharkar[5]

Associate professor, Department of Civil Engineering, DY Patil College of Engineering, Akurdi, Pune, Maharashtra, India[1]

U.G Student, , Department of Civil Engineering, DY Patil College of Engineering, Akurdi, Pune, Maharashtra, India[2]

Abstract:

The Grey water generated is collected and analysed. Conventional Reed bed and modified Vertical flow Reedbed (wetland) for treatment of effluent were compared.The plants used for this purpose was Phragmitis Austrails for modification. Hollow plastic balls (polypropylene) used. From experiment it is found that the one with modified Reed bed system give a better quality treated water.The project present the method of construction of root zone treatment and the effectiveness of removal of various contaminants like Total solids,Total dissolve solids,Dissolve Oxygen Demands,tyrbidityhave been minimize to certain extent using process so that water can be used for secondary purposes.

Index Terms **- Reed bed, contaminants, polypropylene, filter.**

I.INTRODUCTION:

Water pollution is the major obstacle for the efficient use of water and causes the problem of water scarcity. Water pollution is also defined by WHO (1989) that any alteration in composition or condition directly or indirectly- as a result of anthropogenic activities, so that it becomes less suitable for any or all the functions and purposes for which it would be suitable in its natural state. Besides, increasing man made degradation of water quality has become a great concern in the present context of growing population, intensive industrial development, speedy urbanisation and diversification of human activities with the consequent ever increasing uses and abuses of this vital natural resource. Due to the high cost of infrastructure investment, continual replacement and ongoing operation costs of conventional treatment plants, such technologies are beyond the financial grasp of most developing countries. Thus there is a critical global need for cost-effective, long-term wastewater treatment technologies and approaches to deliver public health and environmental protection.

Waste water treatment: Grey water is abundantly available waste water resource. Hence recycling grey waste water can be used as an alternative irrigation source. The treatment adopted in an eco-friendly manner where special equipment and electricity are not required. Reeds are rough coarse grasses having extensive root system that grows in wet areas. By providing greening and cooling landscaped zones, reed beds enhance public spaces. Provide habitat and promote biodiversity.

Reed Bed System:it is the artificial wastewater treatment system consisting of shallow ponds or channels which have been planted with aquatic plants, and which rely upon natural, biological, physical and chemical processes to treat wastewater. It typically has impervious clay or synthetic layer and engineered structures to control the flow direction, water level and liquid retention time. These plants can be used to treat variety of wastewaters including urban run-off, municipal, industrial, agricultural and acid mine drainage (Gersberg, 1984). Reed beds have positive characteristics of a natural wetland and can also be controlled to eliminate the negative aspects of natural wetlands. There are two basic types of reed beds, viz., free water surface reed bed

Free water surface reed bed (FWS): These systems typically consist of basins or channels with some sort of subsurface barrier to prevent seepage, soil or another suitable medium to support the emergent vegetation and water at a relatively shallow depth flowing through the system. The shallow water depth, low flow velocity, and presence and subsurface reed bed. of the plant stalks and litter regulate water flow and, especially in long, narrow channels minimize short circuiting. Reeds are coarse grasses growing in wet places. Reed bed is one of the natural and cheap methods of treating domestic, industrial and agricultural liquid wastes. Reed bed is considered as an effective and reliable secondary and tertiary treatment method where land area is not a major constraint (Wood, A. and L.C.Hensmann.1988). Generally reed bed is made in shallow pits, installed with a drain pipe in a bed of pieces of lime stones and filled up with pebbles and graded sand (Crites R.W., 1994). In this sandy body, reed plants generally with hollow root which bring oxygen into the filter bed are planted (Lawson, G.J. 1985).

Application of root zone technology (RZT) is finding wider acceptability in developing and developed countries, as it appears to offer more economical and ecologically acceptable solution to water pollution management problems. Root zone systems whether natural or constructed, constitute an interface between the aquifer system and terrestrial system that is the source of the pollutants. These are reported to be most suitable for schools, hospitals, hotels and for smaller communities (Horner, 1996). The country's reportedly first RZT system was designed by NEERI at Sainik School, Bhubaneshwar, Orissa. It has reportedly been giving a very good performance of removing 90% BOD and 63% nitrogen (CPCB 2000). The objective of this work is to analyse the wastewater generated in the university campus and evaluate the suitability and effectiveness of treating effluents by root zone system and compare the results with conventional methods of treating waste water with STP.gggg.

II.OBJECTIVES:

1. Preservation of water quality in public water bodies.
2. Reduce of sewage water for the prpose of secondary application.
3. To produce environmentally safe water.
4. High level of bacterial viral removal.
5. Decreased biological oxygen demand .
6. Evaluate technical information on the use of reed bed.
7. To evaluate the performance of reed bed with respect to influent and effluent characteristics (Typha sp.).To work out the component-wise cost of the designed reed bed system

III.MATERIAL USED.

Plastic balls are used attached between the layer of gravel and soil in reed bed.

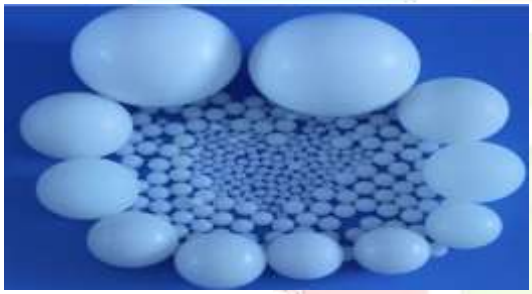
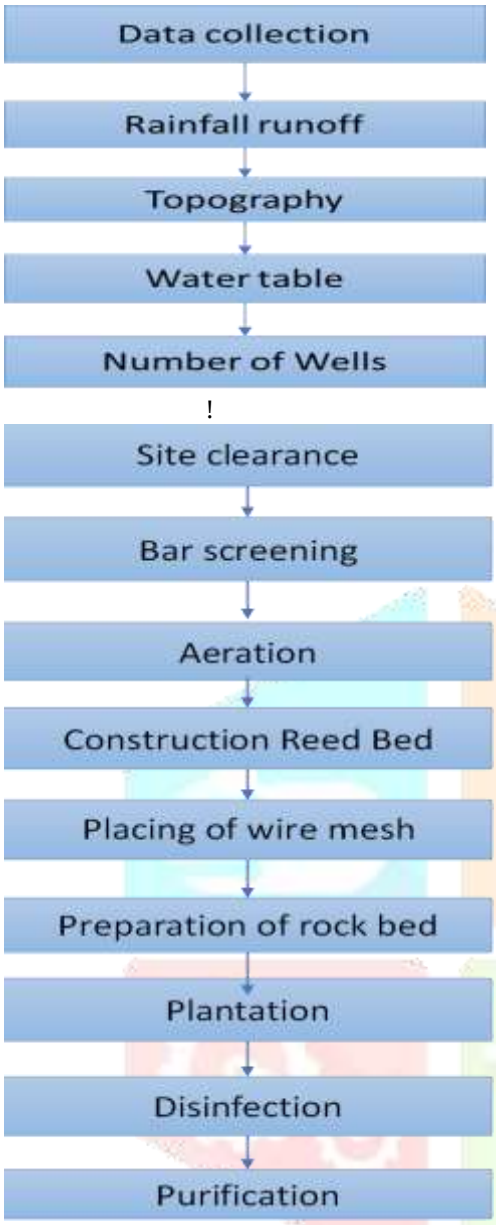


Fig1. plastic balls

Characteristics of plastic balls are as follows:-
1.Hollow plastic balls Sizes from 3/8" (10mm) to 6" (150mm)
2.Hollow plastic Balls Float to Create an Effective Vapor and Thermal Barrier
3.Chemical Resistant – Balls do not absorb liquids
4.Hollow Ball Blankets cover 91% of Surface Area
5.Balls Rise and Fall with Liquid Level
6.Made from Polypropylene Material that Meets FDA Requirements
7.Custom Ball Sizes are Available Upon Request
8.Hollow Ball Blanket Allows for Metal Part Processing
9.Natural, Colors, and Black for UV Resistance
10.Maintenance Free - Hollow Balls are Easy to Install
11.Hollow Polypropylene Balls withstand continuous working temperature of 220º F
12.Precision Ground Hollow Plastic Balls are available (6.35mm,28mm and so on)
13. Plastic balls at surface to attach microorganism.

IV.METHODOLOGY

13. Plastic balls at surface to attach microorganism



I. EXPERIMENTAL IMPLEMENTATION AND RESULTS

In this study, the design of an economically viable technology called "Reed Bed" was attempted for treating the greywater from the karim residency sawantwadi so reuse of secondary purpose. A waste water drain carrying a mean discharge of 3 m3/d was used for this study.
The waste water coming from the drain (influent) was analysed for its characterization with respect to discharge, pH, EC, BOD5, Carbonate and Bicarbonate. Based upon the influent characteristics, root zone depth of proposed macrophyte (Typha sp.), a reed bed was designed with suitable dimensions with respect to area, depth and bed slope.
Based upon the computed design dimensions, a reed bed was constructed and the emergent macrophyte Typha latifolia was planted. The system was tested for its functional performance using three observations in consecutive three months after establishment of macrophytes, including its cost components. The system is still functioning satisfactorily.
The major conclusions drawn from monitoring of the data are summarized below: Bed Construction:
a) pH values obtained from effluent water was slightly lower compared to influent water.
b) EC showed descending trends from the influent to effluent channel through the reed bed system. The maximum EC values declined from 1.19 to 0.98 dS/m
c) The decline in BOD5 trend was found from influent up to the end of effluent channel.
d) Carbonates and bicarbonates showed the falling trend as waster water passes though the reed bed system
e) As the system was continuously operated, the quantum of pollutant removal performance of the system increased as the duration of system operation increased.
f) Overall analysis with reference to pH showed that the effluent water could be used for secondary purpose without much deleterious effect on the soil and plant system. The increasing trend of the pollutant removal with the growth of macrophytes for further improvement in the BOD5 reduction and other quality parameters looks to bring still better results in future.
s shows the route map of Sonewadi village and how the boreblasting technique is being used at particular locations in village to increase the ground water level of village and satisfy villagers daily needs.

g) 1. The study was undertaken to design and develop this eco-friendly wastewater treatment system to treat the sewage water from karim residency sawantwadi .. Experiments were carried out for determining these parameters; pH, Electrical Conductivity (EC), Biochemical Oxygen Demand(BOD5), Carbonate, Bicarbonate. The results obtained from different laboratory and field experiments.

V. CONCLUSION

1.Reed bed system is most advisable for domestic grey water treatment in cities which will create beautiful garden like beds while purifying waste water up to a acceptable limit of quality.
2.Reed bed is faster in terms of construction. It consumes very less material, labour and there is no need of any machinery to install a reed bed
3.Reed bed is suitable in the locations where road connectivity is less.
4.It is found to be an effective method for the removal of various materials that are harmful to our environment and human beings
.

REFERENCES

[1] Byung J.Kimm, Raul R. Cardenas, "An Evaluation of Reed Bed Technology To Dewater Army Wastewater Treatment Plant Sludge", USACERL Technical Report ep-93/09 September 1993.
[2] AS.Afifi,N.Bazazew,K.Nassa, "Using Reed bed System for Wastewater Treatment and Reuse in Urban Semi/Urban Community in Gaza Palestine", 36th WEDC International Conference ,Nakuru ,Kennya 2013.
[3] R.Subalakshmai,C.Minikandam T. Renganthan, "Construction and performance evaluation of reed bed wastewaters treatment unit", Journal of Chemical and Pharmaceutical Sciences, 2005.
[4] M Sundaravadivel, S.Vigneshwaran, "Construction Wetland for waste water treatment", Wastewater Recycle reuse and Reclamation - Vol 1-1999.
[5] K.V Emmanuel, "Reed Bed For the Treatment of Tannery Effluent", United Nation Industrial Development Organization 9Sept 2001).
[6] Sangotola, T.M. ,Aribisala,J.O.Awopetu, "Industrial wastewater treatment using reed bed construction wetlands", , M.S. (IJERT) august 2015.
[7] G. Sun, K.R. Gray , A.J. Biddlestone, S.J. Allen, "Effects of effluent recirculation on the performance of a reed bed system treating agricultural wastewater", The international quality journal, Discovery Agriculture, 2015. (22 March 2003).
[8] Jos T.A. Verhoeven, Arthur F.M. Meuleman, "Wetlands for wastewater treatment opportunities and limitations", Publication in climatology. Centerton,(New Jersey), 8(1), 104, 1955.