"AN ENERGETIC AND LOW COST SYSTEM RED BED TECHNOLGY USED FOR WASTEWATER TREATMENT" A REVIEW

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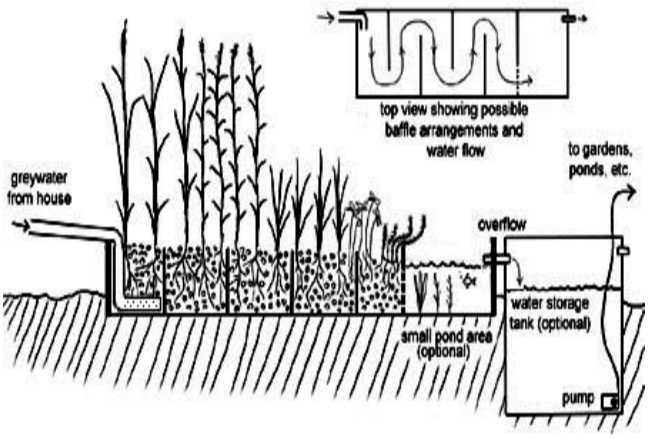
***Abstract*- Water is used for various purposes for domestic as well as industrial. Due to rapid growth of industrialization, urbanization water is an impure so many insoluble material and ingredients it's become wastewater. Now a day's the world is conflicting the major challenges of water. With an effective use of water it is an important to adopt well defined methodologies with an effective cost by using natural resources. Wastewater can be reutilized after doing certain activities by treatment. The treatment of wastewater is depends upon quality of wastewater. In developed area many human activities are increased therefore more addition of nutrients with nitrogen and phosphorous in waste water. Wastewater treatment sewage treatment plant is a multidisciplinary approach which utilizes substantial energy. The wastewater treats by using with an interaction of bacteria in this system. The reed bed technique is an artificial constructed wetland area to use for purifying wastewater which is passing through it. This new technique use to purify the wastewater with an energetic and effective cost as comparative conventional method. The new technique is to be use for purifying the wastewater with an effective cost as comparative conventional method.**

***Index Terms*- Constructed reed bed systems, types of reed bed system, cost effective, removal efficiency, removal of BOD, COD, Metals, and Nitrates etc.**

I. INTRODUCTION

Reed bed technology was developed by Dr. Käthe Seidel in the 1960s in Germany. This is an ecological engineering method for wastewater treatment, which developed in late 1960s and early 1970s, and spread throughout Europe in 1980s and 1990s, and spread throughout the world till now. For purifying wastewater use of the action of medium, aquatic plants and microorganism, though a series physical, chemical and biological ways. This technology is also called as Constructed wetland or Root Zone Technology. Reed bed systems are generally characterized particulate organic materials present in water bodies by the presence of three basic parameters-soils, supporting their growth. Plants sustain large microbial hydrology and vegetation. An artificially engineered reed bed treatment ecosystem essentially encompass self-reliant. They utilize particular combinations of plants, soils, bacteria, substrates and hydraulic flow systems to optimize the physical, chemical and microbiological processes naturally present within the root zone of the plants. Organic pollutants are broken down as a food source by the micro- organisms whilst other contaminants, such as metals or PCB's are fixed in humic acid and cation exchange bonds in the soil or mineral substrates in which these plants are rooted. Essentially, a reed bed is an artificially created wetland planted with specially chosen species of reed that have the ability to absorb oxygen from the air and release it through their roots. The development of substantial numbers of micro organisms which are able to collide any soluble material present wastewater pass through roots of plants which is an ideal condition. The complexity of microbial life forms and the reactions within the root zone of the reed bed result in a powerful water cleaning capability which is often much less constrained than in many chemical or physical treatment systems. Reed bed treatment systems have been successfully used for treating a wide range of wastewater concentrations. The huge capital amount invested in conventional wastewater treatment plants, which is not affording such type of conventional method for

small villages so reed bed system is in advance importance as an efficient and low-cost alternative for treatment of septic effluents in small villages. The use of reeds for the treatment of sewage was first developed by Seidel and Kickuth. The horizontal and vertical flow types of reed bed system common used in Europe also the use of naturally occurring wetlands is the norm in America. Stripping of noxious chemicals and heavy metals can also be done with constructed wetlands. The chemicals broken are down by and the bacteria that live around the plants roots and use the nutrients as plant material. In addition the roots provide a substrate for the macrobiotic and a gaseous exchange region where because of the hollow stems and roots, oxygen can be brought down and nitrogen, methane and hydrogen sulphide removed by diffusion. The plants habitually used are reeds *(Phragmites sp)*, but may include a range of wetlands plants. Reed bed systems are provide healthy environment in numerous ways so that the value of this system progressively in the world's. During periods of flooding, they mitigate flood and to trap suspended solids and attached nutrients. For wildlife area this system is an addition important for feeding and propagation also system provide a stopping place and shelter for ducks.



As with any natural habitat, wetlands are important in supporting species diversity and have a complex of wetland values. The present review is aimed at providing in a nutshell, the distribution of wetlands, the value of wetlands, the causes and consequences of the loss of wetlands. There are three types of macrophytes are emergent, free- floating and submerged. Surface flow reed beds are having all three types. Sub surface flow reed beds will only have emergent species. The major role in this system for treatment processes like influencing biological, chemical and physical by Macrophytes. The most important utility of macrophytes in reed beds has been classified by as physical and metabolic. Physical effects include: Filtration of suspended material, protection against erosion by reducing turbulence and flow velocities stabilization of sediments and providing the surface area for micro-organisms. Metabolic functions of macrophytes include nutrient uptake and O2 release from roots into the rhizosphere. Macrophytes have adapted to anaerobic conditions by developing internal air spaces which transport O2 to the root zone. These air spaces form an extensive system throughout the plant and can occupy 60% of the total tissue volume. Research differs on the potential for macrophytes to release O2 from roots to the surrounding rhizosphere thus providing aerobic conditions for plant nitrification to occur. A study by concluded that internal O2 movement not only supplied to buried plant tissues but also leaked O2 into the rhizosphere. Macrophytes can also provide habitat for flora and fauna and increase aesthetic appeal. Research differs on the significance of plant uptake in nutrient removal with nutrient loading is an important part in the proportion of nutrient removal by plant uptake.

II. TYPES OF REED BED SYSTEM

There are mainly two types of reed bed system as follows:

i. Based on Macrophytic

a) Free Floating Macrophytes

b) With Floating Macrophytes

c) With Submerged Macrophytes

d) With Emergent Macrophytes

ii. Based on Constructed

a) Surface Horizontal Flow (SHF) :

The water to flow over the surface of the bed between the stems of the reed plants which are planted in the soil. The water is visible, above the land having depth of around 150 to 200 mm. The good efficiency of removal of characteristics of wastewater through horizontal flow reed beds for 'tertiary treatment'. They are like a gravel-filled stream and constantly waterlogged. Dirty water flows in one end horizontally then through the bed and out of the other end.

b) Subsurface Horizontal or Vertical Flow (SSHF)

The water flow through media of gravels with surface of the reed bed which are planted. The reed plants are planted in the gravel. In this system there is no visible water in the bed. In this system water flow through gravel media it is an advantage to public safety of odour problems. This system is maximum efficient to reducing SS, BOD, COD etc. with an effective in removal of hydrocarbons, some heavy metals and nitrates.

c) Hybrid Flow (Vertical and Horizontal Flow)

The water flow through the bed's surface of the reed bed which are planted by using a network of pipes using either a pumping or a siphon system. This system is more efficient to removal of BOD, ammonia, heavy metals etc. Hybrid flow generate good bacterial environment when water flows down through the bed. For this system less area is required for construction as comparative sub surface horizontal flow. This system is developed by Seidel in Germany, so it is also known as Seidel system. Now a day's hybrid system is getting more attentiveness not only in Eroupe but around the world.

III. CONCLUSION

- Surface horizontal flow having with most effective for removal of suspended solids and moderate removal of pathogens, nutrients and other pollutants such as heavy metals.
- Sub surface horizontal or vertical flow having with most effective for removal of BOD, suspended solids and pathogen, Provides mainly denitrification and Provides mainly nitrification respectively.
- Sub surface horizontal flow is suitable for 'tertiary treatment'.
- Sub surface vertical flow is suitable for 'secondary treatment' by adding oxygen to this effluent and removing the pollutants.
- Hybrid flow having most effective he for removal of BOD, ammonia, heavy metals.
- In this system pollutants are broken by aerobic micro-organisms, while oxygen provide to microorganisms with the help of the reeds.

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