Review Paper on Treatment of Grey Water Using Low Cost Technology

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Abstract : **Water is one of the most abundant resources. India is suffering from the worst water crisis in its history and around 700 million people face problem of water shortage, approximately 200000 people die every year due to inadequate access to clear water .As due to increase in population , water demand has also increase which has led to the idea of using grey water as a source of water .Grey water is a waste water generated from household, office buildings and streams .This includes water from kitchen ,showers , sinks etc. the best alternative and cost effective process in rural areas is the reuse of grey water . With the help of proper treatment grey water can be put to good use. By applying proper treatment grey water can be reused for other purposes. As there are some low cost technologies which will help to treat the grey water. This paper presents a review of existing low cost technologies for treatment of grey water.**

Keywords- grey water , reuse of grey water ,low cost technology

I. INTRODUCTION

Water is becoming a rare resource in the world .As per the international water management institute in India by 2025 one person in three will live in condition of water scarcity. With increasing population, the gap in between the supply and demand for water is increasing. The low cost technology would definitely save huge quantity of water by reusing the treated water. In many developing countries access to clean and safe water is a major problem. Poor water quality is a cause of livelihood and poor health with 80% of all diseases in developing countries. Grey water is slowly gaining importance in the management of water resource. Grey water contains chemical contaminants, physical contaminants and micro organisms. Grey water may contain chemicals from soap, dyes, and bleaches. It may also contain bacteria, viruses, protozoa. So it is very important to treat grey water by using low cost technologies. There are some low cost technologies like stabilization tank, filtration tank and root zone technologies. Stabilization tank is a cheap alternative. Stabilization tank work well in nearly all environments and can treat most type of waste water. Then root zone waste water treatment system makes use of biological and physical treatment process to remove pollutants from the waste water.

2. LITERATURE REVIEW

The literature mentioned in papers collect information of treatment using different low cost technologies for greywater treatment and the most important aspect in protecting and improving the health of the people with safe and clean water.

1. A.D. Mande et. al.,(2018) this review paper did the detailed study on low cost household water treatment methods. In this review paper there are various low cost households water treatment methods are there like ceramic candle filter, silver impregnated pot filter and bio sand filter. In this there are various media used in this treatment methods like resin, activated carbon etc.

2. Indranil Guin et. al.,(2017) Introducing the application of filtration process, victimization low price natural absorbent for domestic waste water treatment. In this they have given the main advantage of filtration process is that the maintain high concentration of micro-organisms in high removal rate.

3. S Gautamet. al.,(2017) this paper discuss cost effective waste water treatment technologies for small size sewage treatment plant in India. It also provides an analysis of technologies used commonly in this sector in terms of cost assessment and foot print requirement for selecting its suitability in Indian climate.

4. Elzein. Z. et. al.,(2016) This research paper explains the use of constructed way plan as a sustainable waste water treatment method in urban area, it also gives the uses of analytical approach by studying some examples that have used constructed wet lands for waste water treatment .

5. Karnapa Ajit.(2016) This research paper explains about the grey water characteristics, proper guidelines for reuse of grey water depending upon socio economic conditions of country. Various biological techniques with disinfection units like MBR gives 100% removal of TSS, BOD, COD, etc.

6. Sameer S Shastri (2014) This paper defines about the approval of system for implementation create lots of environmental benefits which will not only help in effective management of waste but also has economic savings, the reduction in all mandatory parameters such as pH, BOD, COD, TSS, TDS.

7. Mahamood Farahani. et. al., (2015) This research paper did the detail study of grey water and from where the greywater is generated. Grey water is originating from showers bathrooms sinks and kitchen sinks. The Hazrat-e-masoumeh university recommended the use of trickling filter with suspended plastic media. In this trickling filter method the waste particles are removed from the system by 1cm mesh screen and then the greywater is conducted to buried septic tank and resulting water is pumped to the trickling filter containing plastic media and sludge.

8. Sandhya pushkar singh et. al., (2015) This paper present a review on grey water treatment by using existing technologies. Bioremediation, sand filter and simple technologies have been shown to have limited effect on grey water. The treated grey water can be used for irrigation gardening and construction purpose.

9. K.D. Bhuyar et. al.,(2015) conducted study on treatment of waste water by using membrane biological reactor. The industrial waste water can be treated by using membrane bio reactor. The result is a dramatic increase in the number of new commercial system. Membrane bioreactor is becoming one of such flourishing technology in water and wastewater treatment field.

10.Vijaya V Shegokar et.al.(2015) In this review paper they have mentioned about low cost treatments systems recycling, reuse, low cost materials.

11.AMR M. Abdel-kader et. al., (2013) Introducing rotating biological contactors system to study the efficiency of greywater treatment. RBC plant is composed of three parts first is RBC tank unit, second is settling tank unit, &third is disinfection tank unit. This model was verified by using data from RBC experimental pilot plant. Result of this study showed that the treatment efficiency of RBC system based on BOD removal ranged between 93% to 96% and also based on TSS removal ranged between 84%to 95%.

12.Dilip M. Ghaitidak et.al.(2013) This paper explains about variation in generation of characteristics of greywater,the technologies develop to check the efficiency of a particular systems.

13. Shankar dhone et. al., (2011) Water conservation due to grey water treatment and reusing urban setting with specific context to developing country. They describes design aspect, performance evaluation, water conservation and payback period of greywater collection, treatment and reused system in urban household in Nagpur India.

14. Saroj B. Parjane et. al.,(2011) This review paper gives the performance of grey water treatment plant by economical way for Indian rural development. In this report they have present the finest design of laboratory scale grey water treatment plant, which is the combination of physical and natural operation.

15.Francis W. Kariuki et.al (2011) This paper describes about reuse of grey water for landscape irrigation the low cost technology for GWT was found to disinfect salmonella specially in grey water, improve the turbidity and significantly reduce the total and fecal coli forms, flocculation and disinfection units requires to be improved to achieve complete removal of all coli forms. Lemon juice which is routinely used in the households was found to be an effective disinfectant.

16. Fangyue Li et. al., (2009) This literature review shows that all types of greywater have good biodegradable. The bathroom and laundry are deficient in both nitrogen and phosphor. This also reveals that physical process alone are not sufficient to guarantee and adequate reduction of organic nutrients and surfactants.

17. Robert E. Eden et. al., (1996) An investigation into greywater reused for urban residential property. This explains the greywater testing, result of filtration, filter design, appropriate disinfectant and physical to date.

METHODOLOGY

Stabilization Tank-

Stabilization tank is one of the low cost treatment used to treat grey water .water stabilization tank designed to treat the wastewater and to reduce the organic content, pathogens from waste water.

Stabilization tank is a natural process which takes time because Removal rates are slow . Stabilization tank work well nearly in all environment and can treat most type of wastewater. It is basically a tank in which greywater is allow to pass , at the end the particle's will settle down at the bottom and we will get the treated water at the end .stabilization tank is a cheap alternative. It requires large space as compare to other process

Root Zone Wastewater Treatment-

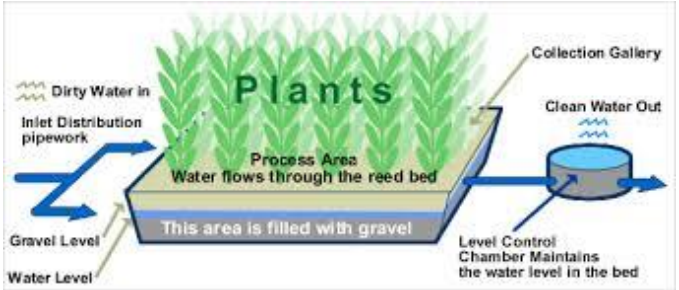

Fig.No.1

Rootzone is a scientific term used to cover all the biological activities among different types of microbes, water soil and sun Root zone wastewater treatment is consists of filter beds, containing gravels, sand and soil.

The Rootzone wastewater system makes use of physical and biological treatment processes to remove pollutants from wastewater. It is a natural process, due to its natural process, there is no need to add any chemicals, mechanical pumps or any external energy. Rootzone wastewater treatment also reduces the maintenance cost . It is also one of the low cost technologies to treat grey water.

Filtration through winnowing sieve-

This type of filtration is used when the water source is populated by wind borne impurities such as dry leaves, stalks and course particles the raw water is passed through the winnowing sieve and the impurities are filtered. This type of filter is widely used in villages of the Bamaka area.

Jempeng stone filter method-

This is one of the water filtration method developed in bali. Indonesia, a small artificial pond is cut by the side to an irrigation canal which carries muddy water .in this jempeng stone filter unit is carved out of a porous material called cadas .this unit has an average height of 60cm , dia of 50 cm and wall with a thickness of 10-`12 cm. this unit is placed on the top of a stone supporting gravel bed .this method can even treat highly turbid water .

Horizontal flow course media filter-

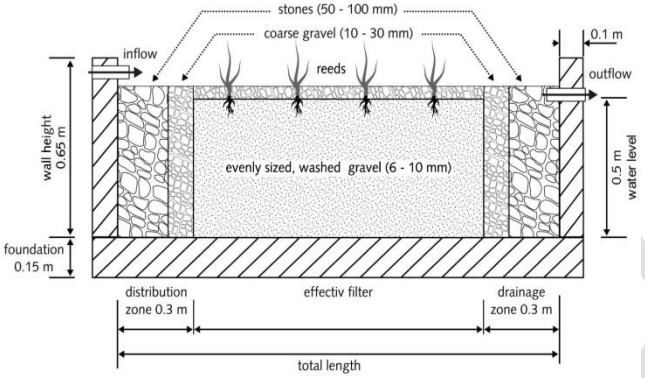

Fig.No.3

Horizontal flow course media filter technique uses coarse gravel or crushed stones as filter media and is very fitted to turbid waters with tubidities larger than fifty NTU.A combination of filtration and sedimentation of suspended solids occurs throughout the horizontal passage of water through the filter. At the same time, biological mechanisms similar to those in slow sand filtration help to get rid of pathogens, although in restricted manner. Research at Asian institute of technology, Thailand.

Biological treatment

Biological treatment techniques like Membrane Bio Reactor Rotating Biological Contactor and sequential batch reactor to be effective grey waste water

Membrane bio reactor-

Membrane bio reactor is used when the treatment efficiency is important consideration and they are available in two Configurations: “external” or “submerged”. In the external configuration the sludge is recirculated from aeration basin to pressure driven membrane system and the suspended solids are recycled back into the bioreactor and effluent passes through membrane. Membrane bioreactor is the modification of activated sludge process in which membrane filtration units are placed by secondary settler.

Rotating Biological Contactor

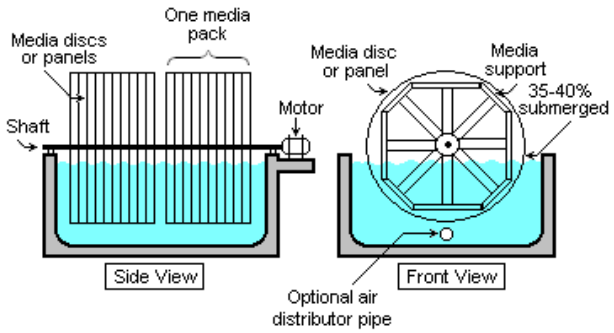

Fig.No.2

It is a biological treatment process in which biological medium remove pollutants in wastewater before disposed treated water to the environment (river, lake or ocean).rotating Biological Contractor consists of closely spaced parallel discs mounted on rotating shaft above surface of waste water on the surface of the disc microorganisms grow and biological degradation of wastewater pollutants takes place.

The discs consist of plastic sheets ranging 2 to 4 m in diameter are up to 10 mm thick. Modules have arranged in parallel and in series to meet the flow and treatment requirements. The discs are submerged in waste water about 40% of their diameter.

Approximately 95% of the surface area is thus submerged in waste water and exposed to the atmosphere above the liquid. Carbonaceous substrate is removed in the initial stage of RBC. Carbon conversion is being completed in the first stage of a series of modules, with nitrification being completed after the 5th stage. Most design of RBC systems will include a minimum of 4 or 5 modules in series to obtain nitrification of waste water.

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