LOW COST WASTE MANAGEMENT TECHNIQUE FOR KJEI'S CAMPUS PUNE

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Abstract: This study deals with determination of the characteristics waste water generated from the KJEI'S campus area by using the constructed wetland system. Also for the solid waste which generated from the campus area, vermi-composting process is used. Our expected conclusion of this project is that by using these treatments it will be a more economical and beneficial for the campus area. It has also reduced the cost of the construction, low cost maintenance and saving the electricity and most important is that to provide effective and economical solution for waste management.

Index Terms **– Canna indica, constructed wetland, vermi-composting, waste water treatment, low cost.**

I. INTRODUCTION

Waste is any matter that have the bad effect on the human life. It containing the liquid waste discharged by the residential area, commercial area, industrial area, agricultural land, institutional area and carrying the large amount of the contaminants and absorptions. In general utilization, it has been seen that the waste containing the solid waste and liquid waste. This waste carries the various the various types of bacteria which are very harmful to health. These bacteria are coming from the different sources which has to be treated and the other hand the solid waste management and the other hand the solid waste management (SWM) is the process of storage, collection, transportation, processing and disposal of solid unconsumed waste in landfill. It is the process of consolidation in which it contains the various collection processes, different types of transportation sources, storage, recovery processes for recyclable material, reduction of waste volume and quantity by techniques such as composting, refuse derived fuel (RDF) and disposal in a appointed engineering sanitary landfill. In this project we are going to perform various test on the liquid waste which is generated from the KJEI'S campus and at the end of the project we are going to prepare the solution for our college campus which low cost technique is suitable for treatment.

II. PROBLEM STATEMENT

The Liquid waste generated in the campus is treated in sewage treatment plant but it requires high initial and maintenance cost. so we are going to study the characteristics of water to provide the low cost waste management technique like construction wet land technique. as we know the liquid waste treated in STP but there is not a provision for the solid waste generated in the college campus area so we are also study the how much solid waste generated in campus and how can we treat that waste by using economical waste management.

III. OBJECTIVE OF THE WORK

1. To study the characteristics of waste water and solid waste generated in campus area.
2. To design suitable low cost technique for wastewater.
3. To design vermi-composting plant for KJEI's campus.

IV. LITERATURE REVIEW

- Research on vermi-composting as a plant growth promoter and diseases suppressive substrate in latin america
  By:- Marta C. Rivera, Eduardo A.Right. Vermi-Composting involves the utilization of earthworms to manage organic wastes organic wastes and transform them into a stabilized product without including a thermophilic phase.
- Treatment of municipal wastewater through constructed wetland
  By:- Anwar Tahseen and Singh Bihari and Kumar Rakesh . The studied wetland plants can reduce the level of turbidity, cod, bod, ts, tss the systems with canna can more successfully reduce the aggregate organic compounds than colacasia used in the study.
- Constructed wetlands: an approach for wastewater treatment
  By:- Ashutosh Kumar Choudhary, Satish Kumar and Chhaya Sharma This paper provides a review of the mechanism of removal of contaminants from wastewaters in the root zone of constructed wetlands which includes both aerobic and anaerobic microbiological conversions, sedimentation, mineralization, chemical transformations, physicochemical adsorption, chemical precipitation and ion exchange.

V. METHODOLOGY

First of all the survey is being carried out to study the how much amount of waste is generated from the KJEI's campus. It has been observed that mass quantity of the waste is generated from the campus area. So we can carry forward our research in this field. Then the materials which we have to used for the waste management is selected and the properties of those materials are studied. After completing the study we are going to collect the sample from the campus area. Once the sample is collected of waste water from the STP of the college campus area. Now, we are going to do the laboratory test and analyze all parameters required to know their properties like BOD, COD, ph, etc for waste water and for the for the solid waste we are going to do the vermin-composting. After knowing the properties of the waste water we are selecting the beneficial methods like construction wetland method for the waste management. The working processes of the selected methods are as follows:-

5.1 CONSTRUCTION WET LAND METHOD

A constructed wetland is a shallow dip filled with filter material generally like soil, sand, gravel, and plants. Wastewater is discharged into the basin from above the surface or below the surface and it comes out of the basin after passing through the various layers of soil, sand and gravel in the wetland. A constructed wetland contains the five essential units which are: basin, substrate, vegetation, liner, inlet and outlet.

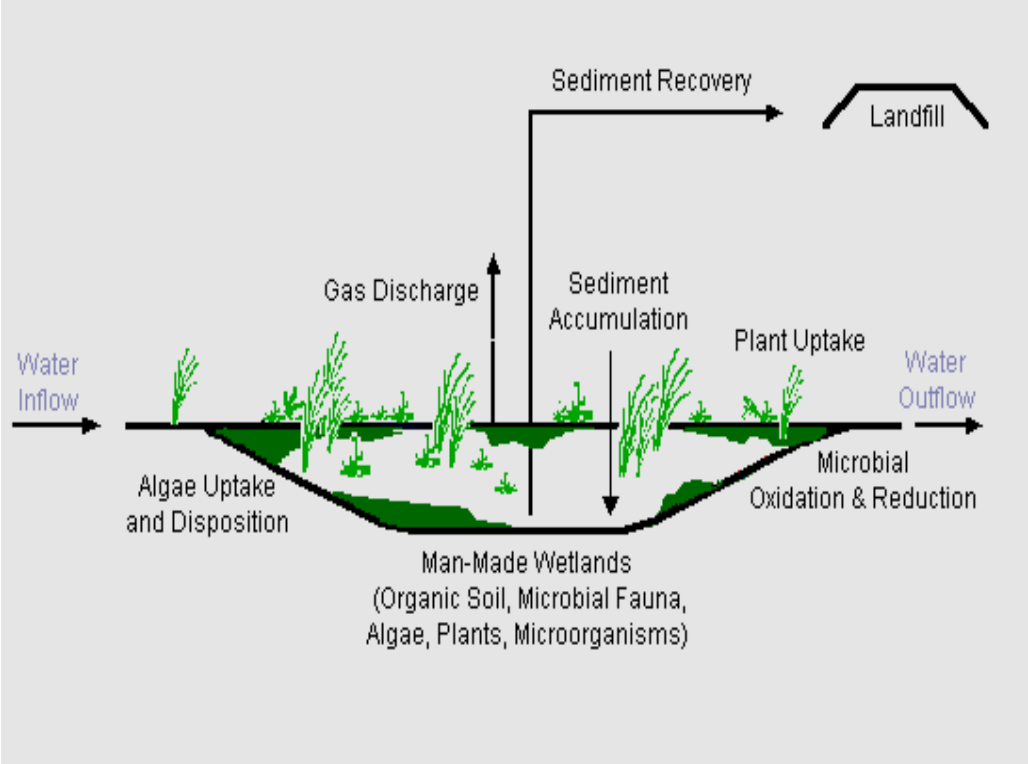

fig. no. 5.1.1 process of constructed wetlands

In this experimental set up of fiber glass pond with sizes of 3.28 ft length, 1.64 ft width, 1.30 ft height according to thedesign it will converted into these dimensions by using the appropriate scale. The vertical drum as the inlet it will be used in which we can store the waste water. In that drum 40 litres of waste water can be stored. At the bottom of that drum there will be a hole is pinned for the small diameter pipe. The vertical pipe will be used for the distribution of waste water. Plastic cans will be used for the collection of treated water. Treated water samples will be collected and analyzed in laboratory. The horizontal subsurface flow constructed wetland will be prepared as follows:

Three layers of support bed in constructed wetland will be prepared with coarse aggregate (gravel), sand, garden soil. Coarse aggregate of 20 kg total weight will be used for making bottom layer of 10 cm height. After medium sized sand placed on the aggregate with total to 15 kg to form a middle layer of 10 cm height and 30 kg of garden soil to form upper layer of 10 cm height will be used in construction of bed. For construction wetland we choose the canna indica plant and it will be planted into that prototype. The rectangular tub with plant will be provided a normal slope for the purpose of water flows through the all layers in that tub and from the roots of the plants. Inlet flow and outlet flow of wastewater will be adjusted to maintain the flow rate as per the design. After the water comes out from the outlet take all the test of it like BOD, COD, ph etc to now the efficiency.

fig. no. 5.1.2 layer of aggregate

fig. no. 5.1.3 plants of canna indica

Fig. no.5.1.4 layer of sand

fig. no. 5.1.5 layer of garden soil

5.2 VERMI-COMPOSTING PROCESS

5.2.1 Selection of earthworm species for vermi-composting process:

After the some research for the treatment of the solid waste generated in the campus area by the vermin-composting we select the african species of earthworms that is eisenia fetida and eudrilus eugenae which are very efficient to maintain vermi-composting process in India. Eisenia fetida has a capacity to handle the high temperature and has very high reproductive potential. It is less sensitive to density pressure and eudrilus eugeniae is found to be a very efficient species for culture maintenance in India.

5.2.2 Methodology used for vermin-composting:

The agro waste was collected from market area and that will be transported at the vermin-compost project site by local vehicles.

5.2.3 Initial Steps For Vermi-Composting:

Agro waste from market area transported at the vermin-compost project site. Biodegradable agro waste material is cut into small pieces by using the cutter machine. The bio-degradable agro waste is allowed to its partial decomposition for 10 to15 days for achieving better activity of earthworm vermin-compost production. Partially decomposed agro waste material is arranged in layers at the vermin-compost project site.

5.2.4 Manufacturing process: preparation method of vermi-compost bed:

In the manufacturing process the length of 1 bed is 9 m, width is 1.5 m, depth is 0.4m, total numbers of bed is 10 and the total waste generated from the campus area is 2000 kg/day (2 tonnes). For the institutions building the waste generation per capita is 0.4kg/day. Once the all process is done after that we get the fertilizes from it which we can used it for the various purpose.

VI. COST COMPARISON BETWEEN CONSTRUCTED WETLAND AND SEWAGE TREATMENT PLANT

TABLE NO.6.1 DESCRIPTIVE STATICS

Sr. No.	PARAMETER	CONSTRUCTED WETLAND	SEWAGE TREATMENT PLANT
1.	Construction Cost	90,00,000/-	45,00,000/-
2.	Equipment Cost	Not required	27,00,000/-
3.	Electricity Cost	Not required	1,50,000/month
4.	Maintenance Cost	1,00,000/year	15,000/month (approx.)
5.	Area Required	4522m^2	185m^2

VII. RESULTS AND DISCUSSION

TABLE NO.7.1 DESCRIPTIVE STATICS

Sr. No.	Test conducted	Before Treatment			After Treatment		
		I	II	III	I	II	III
1.	pH	8.92	8.3	8.73	6.64	6.3	6.83
2.	TDS (mg/lit)	800	1200	1600	320	440	280
3.	TSS (mg/lit)	160	200	160	400	280	360
4.	TS (mg/lit)	1200	1600	2000	800	400	800
5.	DO (mg/lit)	5.2	4.7	6.3	3.4	2.7	3.1
6.	BOD(5 Days 20℃) (mg/lit)	210	185	265	24	25	25
7.	COD (mg/lit)	520	452	640	32	35	36

VIII. CONCLUSION

The studied wetland plants can reduce the level of cod, bod, ts, tss to different degree in waste water. The systems with canna indica can more successfully reduce the aggregate organic compounds than STP used. Since the technology is low cost, environmentally friendly and simple, the use of constructed wetland in institutional wastewater treatment is a promising technology which could be adopted by the developing countries where limited resources are available for the installation of high tech treatment plants.

IX. REFERENCE

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