PURIFICATION OF WASTE WATER BY PHYTOREMEDIATION TECHNIQUE

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Abstract: Phytoremediation is an emerging, ecofriendly and alternative technology to remove heavy metals with the use of plants with organic and inorganic pollutants. In in this chapter we discuss about the pollution created by nag river waste water. This discharge is allowed to ground or water bodies, it percolates through the soil and pollute the fertile soil which affects the agriculture.For the experiment we use GI tank which rectangular in shape,having dimensions of 3.04m length,0.5m depth and 0.91m width with suitable outlet. In the tank contain materials like pebbles,sand,garden soil with layers of 15cm.This experiment perform in the college campus.we use Indian grass for the the phytoremediation. Indian Grass is well known for being a perennial and non-invasive grass species.It is a wide spread emergent aquatic plant,generally grows near bog,streams ,river pools and many shallow aquatic bodies. This plant is useful treatment by its plants-roots-rhizome system. In this project we compare four plants scolocasia-esculenta,helianthus annus, canna indica, Indian grass. With reference (table no.6.1) of test report of treated sample has clearly shown that present study plant as Indian Grass is reasonably better self-purification capacity as compare to previous study plant.

Keywords: Phytoremediation, sewage, treatment bed, contaminants, Indian grass.

1. Introduction

These natural waste water treatment systems are used to improve treatment efficiencies by using natural processes. The nag river flows 24 hr. and about 90% of waste water is again recycled in treatment plant, which adds to higher cost to the plant. But in this experiment we are going to purify waste water by low cost natural method or process which is recently known as phyto-remediation. Thus this experiment helps to recycle the nag river waste water in such a way that the treated water can be used for many purpose like gardening, washing, curing of construction and also it can be recharged in ground without contamination of ground water. The nag river waste water are colored, highly alkaline, high in COD, BOD, suspended solids, temperature. It also contains nitrogen, phosphates, toxic chemical oil and grease. Mainly in this chapter we discuss about the pollution created by nag river waste water.Acceptable and permissible limits of waste water are given in table No. 1.1

which are used for the observations and comparing parameters after testing.

Parameters	**Unit**	**Max. permissible limit**
pH	-	6.5 – 8.5
COD	Mg/lit	250
BOD	Mg/lit	30
TSS	Mg/lit	100
TDS	Mg/lit	500-2000
Total hardness	Mg/lit	200-600
Turbidity	NTU	1-5

Table No. 1.1 Acceptable and Permissible limit of treated waste water

2. Methodology

Initially, plants in bed were acclimatized for three months with suitable dilutions each time .As the time passed the concentration were increased such as 30%, 60%, 80%, and 100% of sewage through plant treatment. These plants were transplanted in treatment bed and gives time for initially set up in treatment bed. The collected waste water from Nag River was directly poured in inlet tank. Waste water (effluent)is passed from inlet tank to outlet tank of the container in a zigzag manner and the flow is control such that the root of plants take sufficient time to uptake the impurities from waste water. The sample of waste water before treatment was tested also after every 12hrs and 24hrs. Interval the sample was collected for lab analysis. Test sample before and after treatment were analyzed for selective parameter like color, odor, temperature, pH, SS, TSS, TDS, TS, turbidity total hardness COD, BOD using standard methods. Finally, pollution reduction of sewage and treatment efficiency of the test plant was calculated. Empty container is shown in fig.

Materials	Height (cm)
Pebbles	15
Sand	15
Garden Soil	15

Table No.2.1 .Layers of pebbles, sand and gravel

2.1 Details of treatment plant

Indian grass is one of the few species meeting all criteria required for phytoremediation.It is very useful due to its effectiveness and low cost natural methods.It has been used in many countries worldwide such as Australia Brazil Thailand etc. Indian Grass is well known for being a perennial and non-invasive grass species.It has a straight and stiff stem which allows it to withstand high velocity flows of water.When grass are up to the 30cm and color is green-yellow above and light green beneathpart.Roots are up to 25cm in depth.

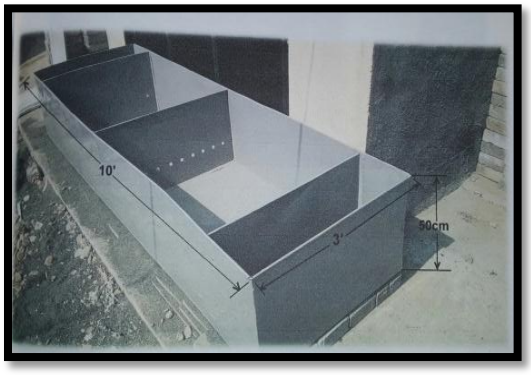


Fig.2.1 Empty container

Fig.2.2 Layers of Pebbles, sand and soil

Fig.3.Experimental set up with Grass

2.2 Collection of waste water sample and plant

The sample was collected from 'Nag nalah (Nagpur)' located near 'Ashok square'. The sewage was treated using 'Indian grass 'by phytoremediation (root zone) process after studying its pretreatment characterization. Plastic containers were used for the collection of waste water. Near about 150 lit of waste water was collected. The sample was tested at 'water resource department' ajni.

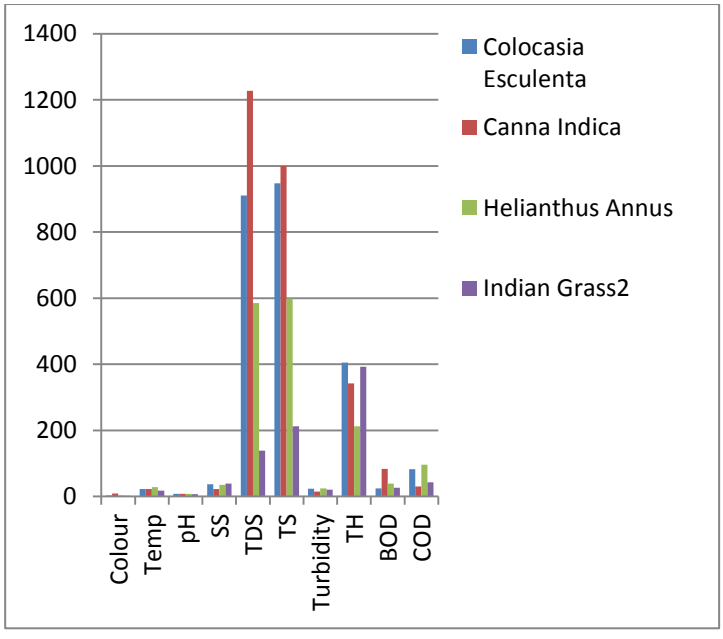
fig.4. Collection of waste water

2.3 Selection of plant

As per references and literature reviews , there were so many plants which were used in phytoremediation technique for waste water.Considering all results related to all treatment of waste water, Indian Grass is more suitable and easily available in surrounding area.Seeds of grass directly sowed in the container.

3. Comaparison analysis

We have compared the results analysis of the various plants like 'ColocasiaEsculenta plant (Allu), Canna Indica,Sunflower and Indian Grass.The results are following in tables.



Graph no.1. Result analysis of different plants.

Sr. no.	Parameter	Permissible Limit	A	B	C	D	remark
1.	Color	-----	2.5	9	2.6	2.25	**Plant D is the best**
2.	Odor	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	---
3.	Temp.	----	22	22	28	17	**Plant D is the best.**
4.	pH	6.5-8.5	7.65	7.8	7.3	7.1	**Plant D is the best.**
5.	SS	100	37	22	34.67	39	**Plant B is the best.**
6.	TDS	500-2000	910	1227	585	139	**Plant D is the best.**
7.	TS	----	947	1000	599	212	**Plant D is the best.**
8.	Turbidity	1-5	23.2	14.1	24.16	20.5	**Plant B is the best.**
9.	Total hardness	200-600	405	342	212	392.75	**Plant C is the best.**
10.	BOD	30	24	8.3	38.38	26.5	**Plant B is the best.**
11	COD	250	82	30	96	43	**Plant B is the best.**

Table no.3.1 Compare analysis

A= Colocasia Esculenta Plant

B= Canna Indica

C= Sunflower

D= Indian Grass

4. Conclusion

With reference (table no.6.1) of test report of treated sample has clearly shown that present study plant as Indian Grass is reasonably better self-purification capacity as compare to previous study plant.

5. Application

- Phytoremediation is promising new technology that uses plants to enhance biodegradation.
- Phytoremediation is a remediation technology that has indicated cost saving compared to conventional treatment at contaminated sites such as Nag River whiach is located at Nagpur.
- The plantation of Indian grass can be established besides the nag river to clean up the waste water.

6. Acknowledgment

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7. References

- "Phytoremediation of lead from wastewater using aquatic plants" Journal of Agricultural Technology 2012 Vol. 8(1)
- "Phy-toextraction: The Use of Plants to Remove Heavy Metals from Soils,"Environmental Science and Technology, Vol. 29,1995.
- "Comparitive In –Vitro Studies On Native Plant Species At Heavy

Metal Polluted Soil Having Phytoremediation Potential" International Journal Of Scientific Reasearch In Enviormental Sciences,2012

- Phytoremediation Potential Of Vetiver Water Grass Of Contaminated With Selected Heavy Metal" By Ashton Lim Suelee,2015