

Use of Phytoremediation Technology to Upgrade Domestic Waste Water Quality: An Experimental Investigation

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Abstract— The increase in development of waste water in the in Domestic zone leading to the drastic changes in the environment which is the main challenge to scientist & the natural resources. The waste water shows an adverse effect on the water quality parameter like as D.O., B.O.D., C.O.D., pH, Conductivity & temperature of the surrounding aqua system. The irregular levels of these parameters cause pollution in water bodies & even death of aqua life. Although Domestic waste water are found dangerous and they enter in environment through various waste water channels. Phytoremediation system has been found possible to improve waste water quality to large amount without any secondary pollution. The current experimental investigation focus on the Phytoremediation Technology done to confirm the potential of selected plant like Canna Indica, Aloe vera, Taro plant. These plants are used for reducing above parameters from domestic waste water. The changes in the waste water quality parameters during the generation of waste water which plants were proving effective to improving the waste water. The canna Indica plant found very effective in all the investigation, about 40% of all contaminants.

Key words: Phytoremediation Technology, Domestic Waste Water Quality

I. INTRODUCTION

In the present experimental investigation are the modern preventive and eco-friendly measures at various levels in addition to the ongoing conventional processes. Consequently phytoremediation system tests the potential to treat waste water to maximum extent and without possibility of secondary pollution. Researchers have worked lot on the purification of waste water using different plants like Eichhornia Crassips, pistia stratiotes, Nelumbo lotea, Marselea quadrifolia. Phytoremediation methods have been proved to be more potential and economical when compare to other treatment methods in treatment of the domestic waste water.

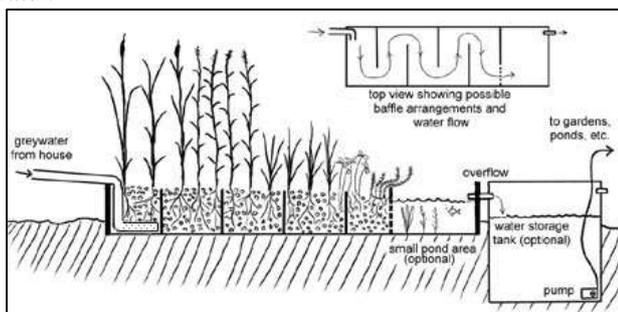


Fig. 1: Phytoremediation System.

Phytoremediation is Green, Simple Concept and eco-friendly. Phytoremediation is the use of green plants to remove pollutants from the waste water or render them harmless. Plant-based bioremediation technologies have received attention as strategies to remove contaminated

water. These strategies have collectively been termed as phytoremediation, it is biologically based remediation strategies, including phytoremediation, have been found cheaper, on a per volume basis, than current technologies. The targeted parameters for phytoremediation strategies include B.O.D., C.O.D., pH, conductivity, D.O., while some of these pollutants degraded or detoxified.

II. STUDY AREA

“S.B. Patil Educational Campus, Vangali, Indapur, Pune, Maharashtra, India (18°08’22.1”N, 74°57’33”E). The study area is about 1km far from National Highway No 65. Nearest Railway Station is Bhigwan, which is 35Km far from the study area. The study area is well connected by Tar roads to town and cities as Pune (135km), Solapur (120km), Baramati (50km), Indapur (7km).

The waste water generation of the institute is about 32000m³/day. The institute having 6 Hostels of capacity 500 students and 60 Houses for staff. The quality of waste water generated by all residential units is moderate and it is generated from kitchens, washrooms, toilets having Blackish Grey in color.

III. METHODOLOGY

A. Materials

The plants used for the present investigation are most commonly available like Canna Indica, Aloe vera, Taro plant.

1) Aloe Vera:

It is a stem less plant and very short growing about 50-90cm. The leaves are thick and fleshy green with small teeth. The Aloe vera plant has its own importance in “Ayurveda” about medicinal use also it has some other importance like to absorb the contaminants form waste water and can live on it. That advantage we have used.

2) Canna Indica:

Canna Indica is locally available plant of medium sized species green in color. The plant has singly stem with leaves. In Marathi it is also called as “Kardal”. Canna Indica plant is growing about 0.5 to 5m. It has also capacity to live on waste water, many researchers have found that the canna Indica have very effective potential to treat the waste water.

3) Taro Plant:

Taro is also a common name of various plants in araceae family. This plant is commonly used as vegetable. It need very small amount of water to live. Here we used this plant to treat the waste water because it generally grows on waste water channels.

A Drum of capacity 50 Liters for waste water collection, rubber pipes for water flow, water bottles for collection of treated water, plastic tabs for control the flow, Rectangular Glass tank (1.8mX1mX0.27m)



Fig. 2: Glass Model of Phytoremediation System.

B. Method

The waste water was first characterized for the basic parameters: Temperature, pH, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Dissolved solids (TDS), Total Suspended Solids (TSS). A stage wise treatment was undertaken.



Fig. 3: Phytoremediation System in working condition.

The steps in this procedure are as follows:

- 1) A Sedimentation tank was designed for proper settling and separation of waste water.
- 2) Plantation of the selected plants like Canna Indica, Aloe vera, Taro plant is done.
- 3) The waste water allows passing 1 liter per hour.
- 4) After 24 Hours of detention time the treated water is collected.
- 5) Then the treated water is characterized.

IV. RESULTS

| Sr. No | Parameter | Untreated Effluent | Effluent Treated with(mg/l) | | |
|--------|-------------|--------------------|-----------------------------|--------------|-----------|
| | | | Aloe vera | Canna Indica | Taro |
| 1 | Color | Grey | Colorless | Colorless | Colorless |
| 2 | Temperature | 25° | 23° | 22° | 22° |
| 3 | pH | 8.99 | 8.03 | 7 | 8.03 |
| 5 | BOD | 10.95 | 8.74 | 5.51 | 6.66 |
| 6 | COD | 25.61 | 18.67 | 10 | 13.37 |
| 7 | TDS | 921 | 764 | 563 | 649 |
| 8 | TSS | 165 | 151 | 110 | 128 |

Table 1: Characterized Waste water parameters before and after treatment.

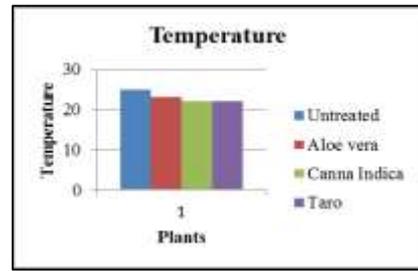


Fig. 4: Changes Observed in Temperature before and after Treatment.

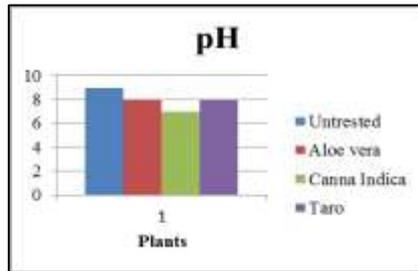


Fig. 5: Changes Observed in pH before and after Treatment.

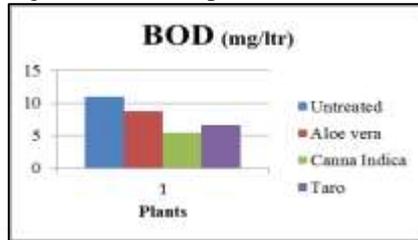


Fig. 6: Changes Observed in BOD before and after Treatment.

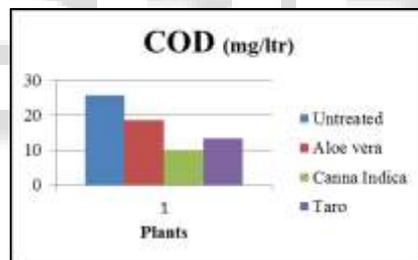


Fig. 7: Changes Observed in COD before and after Treatment.

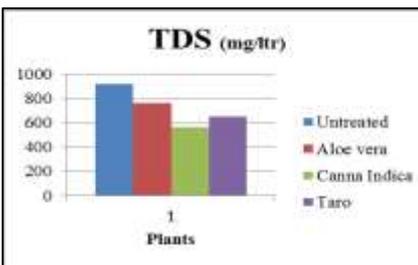


Fig. 8: Changes Observed in TDS before and after Treatment.

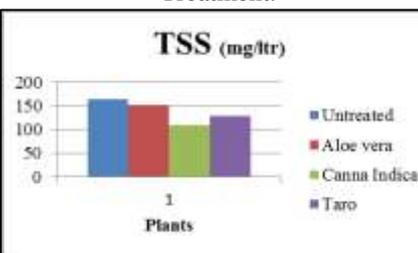


Fig. 9: Changes Observed in TSS before and after Treatment.



Fig. 10: Changes Observed in water samples after Treatment.

The results have been found very impressive. This treated water we supplied to landscaping and these plants grows satisfactorily and found useful to greenery and landscaping purpose, there is no any harmful reaction found on any plant.

V. CONCLUSION

The phytoremediation is incredibly found effective and eco-friendly technology. These all test plants- like Canna Indica, Aloe vera, Taro plant are expected effectively reduce almost all the physical, chemical and biological parameter from the domestic waste water with a significant level based on the appropriate results Canna Indica reduced 34%, Aloe vera reduced 30% and Taro plant reduces about 24% contaminants from the given waste water. In order to manage secondary pollution, this model might be implemented practically for the management of domestic waste water in an eco-friendly way. The Canna Indica plant found very effective potential than other plants used.

VI. FUTURE SCOPE

As our experimental investigation found to be successful, economical than other conventional methods of waste water treatment, in future the Phytoremediation technique is going to be implemented in "S.B. Patil Institutes.

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