

# Study on Removal of Heavy Metals from Dumping Leachate by Using Water Hyacinth

Shital G. Rupanawar<sup>1</sup>, Sunil B. Thakare<sup>2</sup>

<sup>1</sup>Department of Civil-Environmental Engineering, Anantrao Pawar College of Engineering and Research, Pune, MS, India

<sup>2</sup>Professor, Department of Civil-Environmental Engineering, Anantrao Pawar College of Engineering and Research, Pune, MS, India

**Abstract:** Due to over human population rate of degradation of environment and pollution increases day by day. As various heavy metals are main pollutant which causes hazardous effects on every living organism. Such a toxic pollutants can be removed from waste water by using physical chemical and biological methods but physical and chemical methods are costly and also causes negative impact on habitats of living organisms. Therefore biological methods such as phytoremediation (water Hyacinth) and eco-friendly method which is not only eco-friendly but also economically affordable. This research paper proves that study plants can be used to neutralize the hazardous effects of heavy metals.

**Keywords:** Heavy metals, waste water phytoremediation, Ecofriendly, Water Hyacinth (*Eichhornia crassipes*)

## 1. Introduction

Phytoremediation is an emerging biological method in which various naturally growing aquatic terrestrial plants can be used to remove toxic substances. At present the most serious problem of pollution is the direct result of human activity. Some metropolitan cities like Bombay, Calcutta, Bangalore, and Pune are showing typical urban pollution. Among these cities, Pune produces large quantity (1000-2000 mt/day) of Municipal Solid Waste (MSW). The only dumping of all these waste means without any treatment responsible for polluting water resources by leachate is a serious issue occurs in sample collected site.

The leachate consist of various hazardous heavy metals including dissolved organic pollutants. Plants are endowed with absorbing pollutants through the roots transport to the leaves and accumulates in their body (Goel, 2006). The presence of heavy metals in the leachate of dumping waste material is the main cause of pollution aquatic bodies. Various scientist reported that *Eichhornia crassipes* possesses potential aquatic to remove heavy metals from aquatic body (Cornell *et-al*, 1977, Reddy *et-al* 1990). The recently municipal waste and other industrial waste are treated by using water hyacinth (Kulkarni *et-al* 2006). The phytoremediation method has been attracting the researchers working in pollution field because of its less financial investment and eco friendliness.

The above information facts prompted us to use water hyacinth in the removal heavy metals from the leachate of dumping waste. Plant based bio-purification technologies have been collectively termed as phytoremediation; This refers to the use of green plants and their associated micro biota for the treatment of contaminated soil, ground and surface water. Large green plants have the capability to move large amounts of solution into the plant body through the roots and evaporate this water out of the leaves as pure water vapour in a process called transpiration.

## 2. Materials and Methods

### Collection of experimental plant

Water hyacinth (*Eichhornia crassipes*) obtained from Bhima River in Daund, Maharashtra state, was thoroughly washed with tap water to remove any soil/sediment particles attached to the plant surfaces.

The plants were placed in 1000ml capacity plastic tub having diameter 5 inch and containing 250ml polluted sample in each plastic tube collected from Uruli-Devachi (Hadapsar District Pune) in each plastic tube. To avoid the evaporation plastic tubes were exposed to sun rise 2hrs per day and kept plastic tubes in the shed.

After 2 Days and 4 Days the plant samples were collected from each sample analysed for Iron (Fe), Magnesium (Mn), Zinc (Zn), copper (Cu), Cadmium (Cd), Lead (Pb), Coparameters by using standard methods



Figure 1: shows the water sample



Figure 2: Shows Water Hyacinth Raised in polluted sample

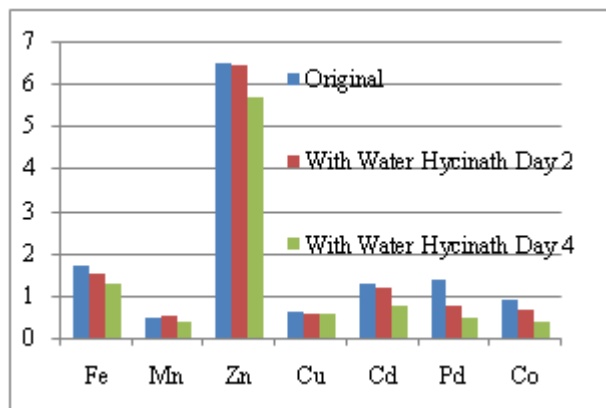


Figure C: Heavy metals in original and two days raised and 4 days raised water hyacinth sample

### 3. Results and Discussion

The samples collected from three sites were analysed and then *Eichhornia crassipes* raised in same samples for 2 and 4 days and again samples were analysed for heavy metals such as heavy metals. The results presented in fig. A, B, C suggested that each toxic element decreased in polluted samples with increase in the days of raising plants. Similar results observed while working on same plant (Padhisushant Kumar *et-al*).

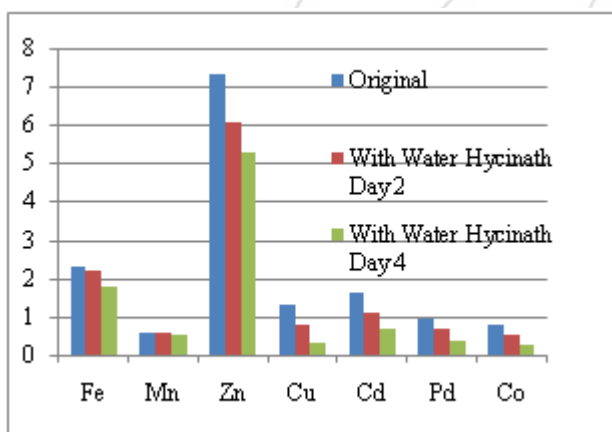


Figure A: Heavy metals in original and two days raised and 4 days raised water hyacinth sample

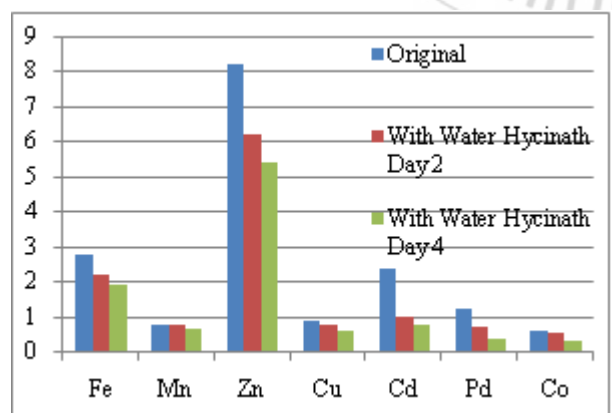


Figure B: Heavy metals in original and two days raised and 4 days raised water hyacinth sample

### 4. Conclusion

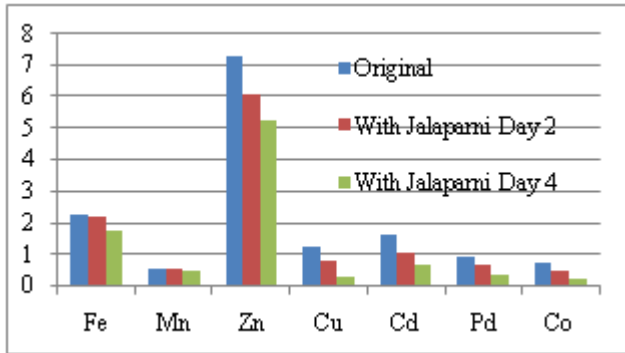
The water Hyacinth can be used to remove heavy toxic metals These plants would be best phytoremediation. The plants *Eichhornia crassipes* Raised in three polluted sample for 4 and 6 days were and then analyses for accumulation of heavy metals Iron (Fe), Magnesium (Mn), Zinc (Zn), copper (Cu), Cadmium (Cd), Lead (Pb), Co. The accumulation of heavy metals in plants.

### References

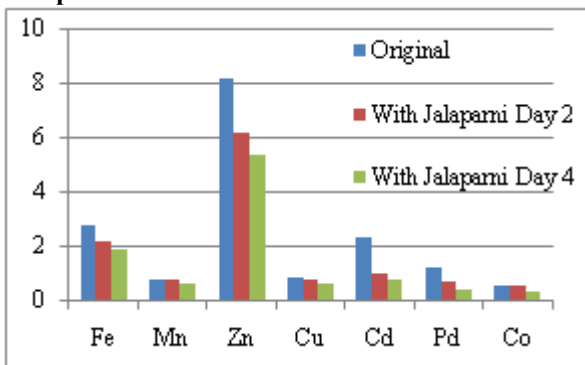
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**Heavy Metals**

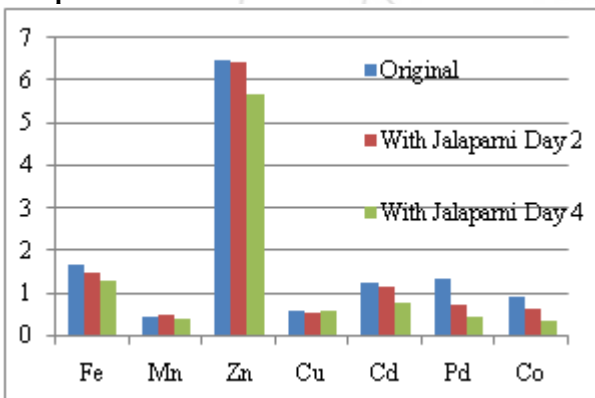
HM sample 1



HM Sample 2



HM sample 3



**Graph Fig Name** – Heavy Metals in Original and two Days Raised and 4 Days Raised Water Hyacinth Samples

Sample No.	pH	EC	Cl <sup>-</sup>	HCO <sub>3</sub> <sup>-</sup>	Ca <sup>+</sup>	Mg <sup>+</sup>	Na <sup>+</sup>	No <sub>3</sub> -N
<b>Original Sample</b>								
1	7.32	3.18	20.2	8.8	15.57	7.27	6.09	9.59
2	7.41	3.34	23.4	8.4	14.35	6.26	8.70	6.75
3	7.57	2.45	18.8	5.2	10.45	7.05	7.09	6.66
<b>Adding water Hyacinth-Day 2</b>								
1	7.62	2.45	17.6	6.2	9.86	4.48	4.89	5.85
2	7.59	2.35	18.4	5.9	10.29	4.81	6.07	5.68
3	7.63	2.27	16.9	6.6	10.07	4.9	6.29	4.94
<b>Adding water Hyacinth-Day 4</b>								
1	7.65	1.75	15.5	3.8	7.05	2.25	3.19	5.20
2	7.64	1.75	16.4	3.4	7.46	2.60	4.45	4.99
3	7.66	1.97	16.0	3.2	7.57	2.65	5.97	4.25