

Phytoremediation: A Promising Approach Towards the Decontamination of Wastewater

Prof. A.M. Kharwade¹, Yugal M. Govind², Danish G. Baig³, Ashik N. Mandpe⁴, Akashdeep V. Tagade⁵, Mohammad Ghayyur⁶.

¹ Assistant professor, Environmental Engineering, Nagpur Institute of Technology, Nagpur
^{2,3,4,5,6} Final Year Student, Nagpur Institute of Technology, Nagpur

Abstract: Due to industrialization and increasing population, the quality of water is degraded on a daily basis which includes heavy metals ions from municipal as well as industrial activities which will impact on ecosystem and the health of people. Water quality is disturbed daily by various inorganic and organic pollutants of the various strategies developed so far, the phytoremediation technique using aquatic plants is the most preferable.

The phytoremediation technique using phytoplant is the most preferred in this review article. The objective of this review article is to focus on Indian species use for decontamination of wastewater preference to the types of wastewaters, types of heavy metal ions, removal of efficiency, and duration.

Keywords: Phytoremediation, Phytoplants, Heavy metals.

1. INTRODUCTION

Phytoremediation is an expanding technology that employs higher plants for the clean-up of contaminated environments that has several advantages over physical remediation methods, including lower cost. The conventional methods of remediation may cost anywhere from 760-76000 Rs per cubic meter, while the cost of phytoextraction is estimated to be as low as 3 to 4 Rs per cubic meter. This technology can be applied to both organic and inorganic pollutants present in the soil, water, or air. Phyto Plants can remove a variety of pollutants including pesticides, antibiotics, metals and aromatic compounds. (5)

Phytoremediation: Use of green plants and their microorganisms to reduce environment problems without the need to excavate the contaminant materials. (9)

In this work, we selected Canna indica species tolerant and highly tolerant heavy metals to remediate in wastewater. These plant cultures were then exposed to different types of metal concentrations in order to identify those with a putative capacity to remove highly bacterial infected and heavy metal contaminated wastewater. In this, there are six types of the process involved which is Phyto-extraction, Phyto-Stabilization, Phyto-transformation, Phyto-stimulation, Phyto-volatilization, and Rhizo-filtration.

Phyto-extraction: The Uptake of contaminants by plants roots and movement of these contaminants from roots to the above part of plants –by absorbing, concentrating and precipitation the contaminants. (9)

Phyto-stabilization: The immobilization of contaminants in the soil through Absorption and Accommodation by roots, Precipitation within the roots, and reduction of migration to groundwater. (9)

Phyto-Transformation: Also known as Phyto-degradation, it is the breakdown of contaminants taken up plants by metabolic processes within the plant. (9)

Phyto-stimulation: Also known as Rhizo-degradation. Breakdown contaminants within the plant root zone, or rhizosphere. (9)

Phyto-volatilization: Involves plant taking up contaminants from soil transforming them into volatile forms and transpiring them into atmosphere. (9)

Rhizo-filtration: Adsorption or precipitation on two plants roots or absorption of contaminants in the solutions surrounding the root zone. (9)

Table -1: Various Phytoplant species use for remediation for different type of metals.

Plant Species	Type of Waste water	Heavy metal ions	Removal Efficiency	Duration	Author/ Reference
Eichhornia Crassipes	Industrial waste water	Ag	53.35 %	21 days	Victor J. Odjegba et. Al. (1)
		Cd	48.52 %		
		Cr	56.39 %		
		Cu	47.59 %		
		Hg	16.52 %		
		Ni	26.30 %		
		Pb	52.50 %		
Canna Indica and Cyperus rotandus	Domestic waste water	Cr	0.1258 %	1 months	Urvashi Gupta et. Al. (2)
		Fe	0.4197 %		
		Cu	0.0105 %		
		Zn	0.1166 %		
		Pb	0.0099 %		
Landoltia punctata	Domestic waste water	F	21.00 %	10 days	Amanda F. Braga et. Al (3)
Hydrilla verticillata	Industrial + Sewage + Domestic waste water	F	24.40 %	7 days	S. Sinha, R. Saxena et. Al. (4)

Eichhornia Crassipes : Eichhornia crassipes (Water hyacinth) is a member of pickerelweed family



Canna Indica : Also known as Indian shot



Cyperus Rotandus: Also known as nut grass or java grass



Landoltia punctata: Also known as dotted duckweed.



Hydrilla verticillate: Also, commonly known as water thyme.



3. CONCLUSIONS

Phytoremediation is the eco-friendly cost-effective technology for the decontamination of polluted wastewater, in this article various Indian species we are focused on the metal interaction of various Indian phytoplant and their percentage removal efficiency. In the detailed review, it has been stated that the species (*Eichhornia Crassipes*) found more efficient as compared to *Canna indica* and *Cyperus rotundus* when it comes to remediating Fe, Cr, Cu, Zn, Pb. And *Hydrilla verticillate* is more efficient to remediate fluoride as compared to *Lanoltia Punctata*.

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