Biolife
AN INTERNATIONAL QUARTERLY JOURNAL OF BIOLOGY & LIFE SCIENCES
3(1):117-118
ISSN (online): 2320-4257
www.biolifejournals.com
BIOLIFE RESEARCH ARTICLE

Natural heavy metal purification from water by domestic plants

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ABSTRACT

The present paper deals with removal of heavy metal namely Manganese from polluted water using plant species *Oscimum* and *Mint.* The experiment was divided into 2 groups. Group I as control and group II treated as experimental which received 4ppm of Manganese. In the experimental plants were exposed to 4ppm Mn for 24 and 48 hrs and the amount of Mn depleted from water was analyzed. From the experiment it is evident that the Mn from water was utilized by the plants was more during 48 hrs than in 24 hr.

Keywords : *Oscimum, Mint,* Manganese, Heavy metal

INTRODUCTION

Biological approaches of remediation include use of microorganisms to detoxify the metals by valence transformation, extracellular chemical precipitation use of special type of plants to decontaminate soil or water by inactivating metals in the rhizosphere or translocating them in the aerial parts. This approach is called phytoremediation, which is considered as a new and highly promising technology for the reclamation of polluted sites and cheaper than physicochemical approaches (Garbisu and Alkorta, 2001; McGrath et al., 2001; Raskin et al., 1997). Phytoremediation, also referred as botanical bioremediation (Chaney et al., 1997), involves the use of green plants to decontaminate soils, water and air. It is an emerging technology that can be applied to both organic and inorganic pollutants present in the soil, water or air (Salt et al., 1998).

Phytoremediation is a technology that uses plants for cleanup of contaminated environment. The concept of using plants to cleanup of contaminated environment is not new practice. About 300 year ago plants where used for treatment of waste water. These plants accumulate high levels of pollutants and metals. For example plants like mint and, *Oscimum* are commonly used for phytoremediation of metals like zinc, copper, manganese etc.

MATERIALS AND METHOD

Estimation of Manganese was carried by Standard Methods (APHA, 1998). Wastewater and water properties. *Oscimum* and *Mentha* saplings of same age are collected and exposed to 4 ppm (group II) Manganese solution for 24 and 48 hours. A control is also maintained simultaneously. After stipulated period of exposure the water from group I and II are analysed for Manganese levels for which 50 ml of water sample is collected and to it 2 drops of Euriochromic indicator and 10 ml of Ammonium buffer is added. The colour of the sample turns vine red colour then sample is titrated against EDTA. If the sample turns to blue it indicates presence of Manganese if not Manganese is considered to be absorbed or used by plant.

RESULTS AND DISCUSSION

From the results it is evident that after 24 and 48 hours of exposure, the levels of Mn in water sample was depleted more in 48 hrs exposure than in 24 hrs. Mint plants absorbed more amount of Mn than *Oscimum* (Table-1).

Rhizofiltration is the removal of pollutants from the contaminated waters by accumulation into plant biomass. Several aquatic species have been identified and tested for the phytoremediation of heavy metals from the polluted water. The roots of Indian mustard are found to be effective in the removal of Cd, Cr, Cu, Ni, Pb and Zn, and sunflower can remove Pb, U, Cs-137 and Sr-90 from hydroponic solutions (Manjusha Wath et al, 2014; Zaranyika and Ndapwadza, 1995; Wang et al., 2002; Prasad and Freitas, 2003).

This study aims to verify the possibility of using fast growing plants to decontaminate water with high Mn contamination levels and to test its hyperaccumulating performances. Decrease in the levels of Mn in water sample indicates plant accumulated the metal. To date the available methods for the recovery of heavy metals from plant biomass of hyperaccumulators are still limited. Traditional disposal approaches such as burning and ashing are not applicable to volatile metals; therefore, investigations are needed to develop new methods for effective recovery of metals from the hyperaccumulatior plant biomass.

Table1. The amount of Manganese absorbed by plant

S. No.	Name of the plant	24hrs	48hrs	control
1	*Mintha piperita*	1.90 ppm	2.40ppm	4ppm
2	*Oscimum*	1.25	1.88	4ppm

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DOI: https://dx.doi.org/10.5281/zenodo.7251497
Received: 2 January 2015;
Accepted; 15 February 2015;
Available online : 3 March 2015