

Phytoextraction of Heavy Metals in a Contaminated Site in Assam, India Using Indian Pennywort and Fenugreek: An Experimental Study

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Abstract : Heavy metal contamination is an alarming problem, which poses a serious risk to human health and the surrounding geology. Soils get contaminated with heavy metals due to the un-regularized industrial discharge of the toxic metal-rich effluents. Under such a condition, the remediation of the contaminated sites becomes imperative for a sustainable, safe, and healthy environment. Phytoextraction, which involves the removal of heavy metals from the soil through root absorption and uptake, is a viable remediation technique, which ensures extraction of the toxic inorganic compound available in the soil even at low concentrations. The soil present in the Silghat Region of Assam, India, is mostly contaminated with Zinc (Zn) and Lead (Pb), having concentrations as high as to cause a serious environmental problem if proper measures are not taken. In the present study, an extensive experimental study was carried out to understand the effectiveness of two commonly planted trees in Assam, namely, i) Indian Pennywort and ii) Fenugreek, in the removal of heavy metals from the contaminated soil. The basic characterization of the soil in the contaminated site of the Silghat region was performed and the field concentration of Zn and Pb was recorded. Various long-term laboratory pot tests were carried out by sowing the seeds of Indian Pennywort and Fenugreek in a soil, which was spiked, with a very high dosage of Zn and Pb. The tests were carried out for different concentration of a particular heavy metal and the individual effectiveness in the absorption of the heavy metal by the plants were studied. The concentration of the soil was monitored regularly to assess the rate of depletion and the simultaneous uptake of the heavy metal from the soil to the plant. The amount of heavy metal uptake by the plant was also quantified by analyzing the plant sample at the end of the testing period. Finally, the study throws light on the applicability of the studied plants in the field for effective remediation of the contaminated sites of Assam.

Keywords : phytoextraction, heavy-metals, Indian pennywort, fenugreek

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