

Acetic Acid Assisted Phytoextraction of Chromium (Cr) by Energy Crop (*Arundo donax* L.) in Cr Contaminated Soils

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Abstract : Soil pollution with chromium (Cr) has become one of the most important concerns due to its toxicity for humans. To date, various remediation approaches have been employed for the remediation and management of Cr contaminated soils. Phytoextraction is an eco-friendly and emerging remediation approach which has gained attention due to several advantages over conventional remediation approach. The use of energy crops for phytoremediation is an emerging trend worldwide. These energy crops have high tolerance against various environmental stresses, the potential to grow in diverse ecosystems and high biomass production make them a suitable candidate for phytoremediation of contaminated soils. The removal efficiency of plants in phytoextraction depends upon several soil and plant factors including solubility, bioavailability and metal speciation in soils. A pot scale experiment was conducted to evaluate the phytoextraction potential of *Arundo donax* L. with the application of acetic acid (A.A) in Cr contaminated soils. Plants were grown in pots filled with 5 kg soils for 90 days. After 30 days plants acclimatization in pot conditions, plants were treated with various levels of Cr (2.5 mM, 5 mM, 7.5 mM, 10 mM) and A.A (Cr 2.5 mM + A.A 2.5 mM, Cr 5 mM + A.A 2.5 mM, Cr 7.5 mM + A.A 2.5 mM, Cr 10 mM + A.A 2.5 mM). The application of A.A significantly increased metal uptake and in roots and shoots of *A. donax*. This increase was observed at Cr 7.5 mM + A.A 2.5 mM but at high concentrations, visual symptoms of Cr toxicity were observed on leaves. Similarly, A.A applications also affect the activities of key enzymes including catalase (CAT), superoxidase dismutase (SOD), and ascorbate peroxidase (APX) in leaves of *A. donax*. Based on results it is concluded that the applications of A.A acid for phytoextraction is an alternative approach for the management of Cr affected soils and synthetic chelators should be replaced with organic acids.

Keywords : acetic acid, *A. donax*, chromium, energy crop, phytoextraction

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