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RESEARCH ARTICLE

Studies on phytoremediation potential of *Azadirachta indica* and *Acacia nilotica*

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SUMMARY

An experiment was conducted in the pot culture house to study the phytoremediation potential of *Azadirachta indica* and *Acacia nilotica*. The tree species were raised in dune sand treated with heavy metals (Cd 10 and 20 ppm, Ni 50 and 100 ppm, Pb 50 and 100 ppm). The physiological stress indices like relative membrane injury (%) and chlorophyll content were studied to determine the tolerance of the two woody species to heavy metal stress. Keekar was found to be more tolerant in terms of relative membrane injury and chlorophyll content as compared to Neem. Among the heavy metals studied Ni was most toxic in terms of relative membrane injury. The accumulation of heavy metals in the two woody species and in their different parts varied. Cd accumulation was higher in Neem as compared to Keekar. Maximum accumulation of Cd was in the roots followed by leaves and minimum in stem. A 5-6 fold higher Ni accumulation was observed in Keekar roots as compared to Neem roots. However, in the stem and leaves Neem accumulated more Ni than Keekar. Pb accumulated mainly in leaves followed by roots and minimum in the stem. Pb accumulation was higher in Keekar. Thus it can be concluded that in terms of physiological tolerance and Pb and Ni accumulation, *Acacia nilotica* can be used for phtoremediation purposes.

Key Words : *Acacia nilotica*, *Azadirachta indica*, Chlorophyll, Heavy metals, Membrane injury, Phytoremediation

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Phytoremediation is an environmental clean-up strategy in which selected green plants are employed to remove, contain or render environmentally toxic contaminants harmless. This is an emerging biotechnological application and operates on the principles of biogeochemical cycling (Prasad, 2004). This remediation approach is attracting attention from various governments as a cost-effective and environment-friendly green technique to clean-up heavy metal polluted soil using hyperaccumulators. Over the past 10 years, woody plants have been shown to be excellent candidates for phytoremediation, due to rapid growth, high biomass, profuse root apparatus and low impact on the food chain and human health (Salt *et al*., 1998; Pilon-Smits, 2005; Yadav *et al.*, 2010). Most of the hyperaccumulator plants so far identified have a small biomass for eg *Thalspi* (Prasad and Freitas, 2003). Plants with higher biomass production such as trees are of more interest in soil phytoremediation (Lanberg and Greger, 1996) and has the added advantage that it can be harvested for the production of biomass energy. Majority of such work concerns accumulation capacity and biomass production of woody plants as a response to high concentration of pollutants (Pulford and Watson, 2004). Phytoremediation using trees provides a potential opportunity to extract or stabilize metals. It involves the use of trees that readily transport targeted metals from soil to plant organs, which allows removal of metal by harvesting from the plant. This process takes longer time but helps in the greening of the land and in reducing pollution (Pulford and Dickinson, 2006).

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