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Research Article

Strategies of heavy metal uptake by plants growing under urban environment

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Summary

Total concentration of iron, manganese , zinc, lead , copper , cadmium and chromium have been estimated in soil of residential, traffic and tannery sites at two depths (0-20 cm and 20-40 cm) and in leaves of plant species *Azadirachta indica*, *Pongamia glabra* and *Delonix regia* growing at traffic and industrial site in urban town of Dindigul. The metal concentrations were found to be higher at traffic and tannery sites compared to residential area. The heavy metal concentrations were found to be higher at 0-20 cm depth compared to (20-40 cm) depth. *Delonix regia* had higher concentration of Fe, Mn, Cu and Cr at traffic and tannery sites (318.4 mg/kg, 375.2 mg/kg, 71.6 mg/kg, 85.3 mg/kg and 290.2 mg/kg, 41.0 mg/kg and 1.25 mg/kg, 1.93 mg/kg, respectively). *Pongamia glabra* showed the higher concentration of Zn and Cd at traffic and tannery site (75.8 mg/kg, 40.2 mg/kg and 2.28 mg/kg and 4.60 mg/kg, respectively). The concentration of Pb was higher for *Azadirachta indica* at traffic and *Pongamia glabra* at tannery site. The enrichment data indicated Cd was enriched in the soil compared to other elements. Cr was enriched more in the tannery site.The Enrichment factor of plants for heavy metals such as Mn, Zn, Cu, Pb and Cd has the EF value greater than 2 except for Fe and Cr. Mobility ratio for heavy metals was found to be greater than 2 except for chromium. Soil plant transfer data indicated that plant was enhanced with anthropogenic activities. Therefore, *Azadirachta indica, Pongamia glabra and Delonix regia* could be considered a more suitable to biomonitor the environmental pollution in the examined area. These plant species had potential use as a low cost tool in ecological restoration. Since they are tolerant to most of the pollutant in the area studied.

Key words : Anthropogenic, Enrichment factor, Mobility ratio, Heavy metal, Atomic absorption spectroscopy, Industrial, Traffic, Tannery, Accumulator, Bioaccumulation

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Introduction

Plants growing in the nearby zone of industrial areas display increased concentration of heavy metals, serving in many cases as biomonitor of pollution loads. Plants take up large quantities of pollutants and translocate them into vegetative and generative organs at various rate (Kovacs *et al*., 1993) giving understanding about the quality of the environment multi element plant chemistry data sets collected from multi medium materials under the same conditions allow understanding the sources and fates of chemical elements in the environment (Reimann and De caritat, 2005; Thambavani and Prathipa, 2012). In relation to the plants, Market (1992) proposed to use an artificial reference plant with an average chemical composition as a tool to compare the chemistry of different plants. Other authors established reference toxic and normal values for different elements (Pendias and Pendias, 1992; Adriano, 2011; Market, 1996; Pais and Benton Jones, 1997). Lower plants, especially mosses and lichens, in view of their high capacity for metal accumulation, are probably the organisms most frequently used for monitoring metal pollutants in urban environments (Market 1993; A1-Shayeb *et al.*, 1995). The past few decades have seen an increase in the use of higher plant leaves as biomonitors of heavy metal pollution in the terrestrial environment (Al-Shayeb *et al.*, 1995; Thambavani and Prathipa, 2012).

Heavy metal contents in the urban soil tend to increase with vehicular emissions, industrial residues the atmospheric