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Comparative Analysis of Metal Accumulation in Selected Plants as an Indicator of Environmental Pollution

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Abstract

Harmful pollutants of vehicular emissions contribute to the environmental contamination of heavy metals, leading to adverse effects on plant and animal species. The presence of roadside plants has the potential to absorb significant quantities of heavy metals, presenting a possible solution for mitigating heavy metal pollution. Therefore, the current study was undertaken to comparatively determine the ability of certain plant species commonly growing along roadsides to absorb and accumulate heavy metals. It was aimed to assess the concentrations of the specified metals Pb, Cu, Zn, Mn, and Fe in leaf samples of the species, *Mangifera indica, Polyalthia longifolia, Delonix regia, Cassia fistula*, and *Mesua ferrea*, on the roadside and inside the premises, of the University of Sri Jayewardenepura, Sri Lanka. The analysis was done using AAS and the results were analyzed and compared through one-way ANOVA, using Minitab-21. According to the results, *M. indica* accumulated a significant amount of Pb, Cu, Zn, and Mn. *P. longifolia* accumulated a high level of Mn. A significant Zn accumulation was observed in *C. fistula* and the highest accumulation of Fe was observed in *M. ferrea*. *D. regia* accumulated a comparatively high amount of Cu and Zn. The heavy metal accumulation pattern in all roadside plants was Mn>Fe>Zn>Cu>Pb. From the results, it was observed that the plants alongside roads show bioaccumulation of a substantial quantity of heavy metals than those growing inside the premise, with a lower exposure to vehicular emissions. Since the environmental conditions were similar in both sites, it can be suggested that observed changes in the metal contents may be due to the effect of vehicular emissions. Based on the level of accumulation, each plant species could be considered a hyperaccumulator for the specific heavy metals. From the species analysed, *M. indica* accumulated the highest content of heavy metals, thus it could be considered a suitable accumulator, to be grown on traffic-dense roadsides, and other species could be used in mitigating metal-related pollution in other contaminated areas.

Keywords: Vehicular, pollution, Traffic, Roadside, Biomonitoring