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Research Article

A study of heavy metal contamination in the urban soil of Dindigul town, Tamil Nadu

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Summary

Levels of iron, manganese, zinc, copper, lead, cadmium and chromium were determined by Atomic Absorption Spectroscopy to assess the heavy metal contamination of urban soil of Dindigul town. Soil samples were collected from the residential site, traffic site and industrial site at the depth of 0-20 cm, 20-40 cm and 40-60 cm, respectively. A comparison of heavy metal concentrations between polluted and control site exhibited significantly higher concentration at the polluted sites. The mean concentration of Fe,Mn,Zn,Cu,Pb,Cd and Cr at the industrial site were 9.087 mg/kg ,10.443 mg/kg, 2.49 mg/kg, 8.657 mg/kg, 0.072 mg/kg, 2.85 mg/kg, respectively. Soil profile samples showed that Fe, Mn, Zn, Cu, Pb, Cd and Cr concentration were higher in the top soil of (0-20 cm), but decreased with increase in depth. Correlation co-efficient of all the heavy metals showed significant correlation except Mn. Heavy Metal Index (HMI) for the control, traffic and industrial sites were 14.27, 21.13 and 24.39, respectively. Traffic and industrial sites were found to be highly polluted. Comparing heavy metal concentration in soils of different sampling sites show that urban soil was affected by the human impact. However, the heavy metal content in the soil compared with international standards do not give cause for the concern but continued urbanization and industrialization will ultimately place human health and environmental targets at risk.

Key words : Heavy metal index (HMI), Load representative supply (LRS), Heavy metals, Atomic absorption spectroscopy(AAS), Contaminated, Highly polluted, Industrialization, Urbanization, Human impact

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Introduction

Atmospheric deposition of anthropogenic derived chemicals is an important source of environmental pollution. It contributes to the load of pollutants in urban run off (James *et al.*, 1990 and Jaffe *et al.*, 1993). In some areas, the atmospheric deposition of pollutants has reached levels which are toxic to human and organisms. Soil constitutes part of vital environmental, ecological and agricultural resources that have to be protected from further degradation as an adequate supply of healthy food needed for the world's increasing population. Heavy metals can affect both the yield of crops and their composition. Thus, determination of the elemental status of a cultivated land has to be made in order to identify yield limiting deficiencies of essential micronutrients of plants grown in polluted soils (Elsokkary *et al.*,1980 and Alloway, 1990). Although heavy metals are naturally present in soils, contamination comes from many local sources: industry, agriculture, combustion of fossil fuels, road traffic Simon *et al.*,2011 Thambavani and Prathipa (2011).

Studies have shown that urban soils can receive large inputs of trace metals from different anthropogenic sources but especially from automobile emission (Garcia and Millan, 1998). Plants growing in contaminated environments can accumulate trace elements at high concentrations causing a serious health risk to consumers (Alloway, 1990; Kabata and Pendias, 1984, 1992 and Thambavani and Prathipa, 2012). Traced metals may enter the human body through inhalation of dust, consumption of contaminated drinking water, direct ingestion of soil and consumption of food plants grown in metals contaminated soil (Cambra *et al.*, 1999; Dudka and Miller, 1999). Among other sources, lead (Pb) particles in the