Geospatial Distribution of Selected Heavy Metal Contaminants in Agricultural Soils in Western Kenya

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ABSTRACT

The industrial and technological advancement has resulted in wide distribution of heavy metals in the environment. While arsenic, cadmium (Pb), chromium (Cr), lead (Pb), and mercury (Hg) rank among the priority metals that have high degree of toxicity, essential heavy metals like copper (Cu), zinc (Zn) exert malfunctions in organisms. This study investigated the mean seasonal Pb, Cd, Zn and Cr levels in spatial area in western Kenya in order to ascertain if they were above the recommended background values. The distribution of Pd and Cd on individual farms was also assessed. A total of 25 sites were investigated where an Atomic Absorption Spectrophotometer was used for analysis of the samples. Lead in 11% of soil samples exceeded the range for unpolluted soils of 0.1 to 20 ppm. Soils were found to have optimum to low levels of Cu and Zn, which indicated variability in land use. A positive correlation (r = 0.98, P<0.05) between wet and dry seasons was reported. These findings indicate spatial temporal variation in heavy metals driven by changes in land use patterns and associated changes in climate. While this study has quantified the heavy metal levels in the soil, further studies are required on their bioavailability, environmental and associated health effects.

Key words: Heavy metals; Agriculture; Soils; Environment