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Arsenic and heavy metal concentrations in agricultural soils in South Savo province

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Abstract

Increasing concentrations of arsenic and heavy metals in agricultural soils are becoming a growing problem in industrialized countries. These harmful elements represent the problems in the food chain, and are a potential hazard for animal and human health. It is therefore important to gauge their absolute and relative concentrations in soils that are used for agricultural production. In this study the arsenic and heavy metal concentrations in 274 mineral soil samples and 38 organogenic soil samples taken from South Savo province in 2000 were determined using the aqua regia extraction technique. The soil samples were collected from 23 farms. The elements analyzed were arsenic, cadmium, chromium, copper, mercury, nickel, lead, manganese, and zinc. The median concentrations in the mineral soils were: As 2.90 mg kg⁻¹, Cd 0.084 mg kg⁻¹, Cr 17.0 mg kg⁻¹, Cu 13.0 mg kg⁻¹, Hg 0.060 mg kg⁻¹, Ni 5.4 mg kg⁻¹, Pb 11.0 mg kg⁻¹, Mn 36.5 mg kg⁻¹. The corresponding values in the organogenic soils were: As 2.80 mg kg⁻¹, Cd 0.265 mg kg⁻¹, Cr 15.0 mg kg⁻¹, Cu 29.0 mg kg⁻¹, Hg 0.200 mg kg⁻¹, Pb 11.0 mg kg⁻¹, Zn 25.5 mg kg⁻¹. The results indicated that cadmium and mercury concentrations in the mineral and organogenic soils differed. Some of the mercury concentrations exceeded the normative values but did not exceed limit values. Most of the agricultural fields in South Savo province contained only small amounts of heavy metals and could be classified as "Clean Soil". A draft for the target values of arsenic and heavy metal concentrations in "Clean Soil" is presented.

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