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Study Effect of Heavy Metals Contamination on Growth of Earthworm (*Eisenia fetida*) in two Calcareous and Acidic Soils

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Abstract

Heavy metals are entered to environment by mining and by applying sewage sludge and agricultural inputs to soils. These metals have detrimental effects on environment and soil organisms. The potential hazards of environmental pollutants to soil invertebrates have been assessed in recent years by the use of earthworms. To determine The effects of different concentrations of cadmium, copper, lead and zinc on survival, growth and cocoon production of earthworms (*Eisenia fetida*) in an acidic and a calcareous soil amended with 0 and 5% organic matter, two pot experiments were conducted. The concentrations of heavy metals in soils were 0,10,20,40, 60 and 80 mg kg⁻¹ and growth parameters of the earthworms were measured with 15 day intervals over 75 days. The results showed that the toxic effects of heavy metals were higher in the acidic soil compared to the calcareous soil. Addition of organic matter to soils reduced the toxic effects of heavy metals to earthworms. In the soils contaminated with Zn and Cu, the weights of the earthworms increased with increasing the concentrations of these metals up to 60 mg kg⁻¹ and then decreased in higher concentrations. While, in Pb contaminated soils the decline in earthworms, weights occurred in concentrations higher than 40 mg kg⁻¹. Cadmium had the highest negative effects on cocoon production and the weights of earthworm deceased in all concentrations of this metal. The toxic effects of heavy metals on cocoon production in the calcareous and acidic soils were in the orders of Pb> Zn> Cu and Zn> Pb> Cu respectively. The highest earthworm's mortality was recorded in soils contaminated with lead and cadmium and zinc contamination had the least effect on this traits.

Keywords: Earthworm, *Eisenia fetida*, heavy metals, organic matter