

Effect of Different Fertilizer Practices on Availability of Potentially Toxic Elements (PTEs) in Coconut Growing Soils in Sri Lanka

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Continuous application of organic and inorganic fertilizers can cause environmental risk associated with the pollution of soils with potentially toxic elements (PTEs). Therefore, this study was conducted to assess the effect of different fertilizer practices on availability of PTEs in coconut growing soils in Sri Lanka. A pot experiment and a field survey were conducted. The pot experiment was performed with sandy regosols (20 kg of soil/pot). The treatments were 1) No fertilizer (Control), 2) inorganic fertilizer (IF), 3) cattle manure (CM), 4) goat manure (GM) and 5) poultry manure (PM). Three replicates were used in a completely randomized design. Fertilizers and manures were applied based on the recommendation rates. Pots were maintained at 60% water holding capacity. Soil samples were collected at 2 and 16 weeks after treatment application (WAT). In the field survey, soil samples (at 0-25 cm depth; n=...) were collected from the manure circle of the coconut plantations with different types of organic amendment application history. Soil samples from both studies were analyzed total and EDTA extractable PTEs concentrations (i.e., As, Zn, Cu, Cd, Cr, Pb and Ni). The PM applied soils had significantly higher EDTA extractable Zn (11 ± 0.07 mg/Kg), Cd (0.02 ± 0.00 mg/Kg) and Cu (1.7 ± 0.02 mg/Kg) concentrations compared to other treatments at 16 WAT. Cattle manure has caused high Pb (i.e., 0.36 ± 0.02 mg/Kg) and Ni (i.e., 0.11 ± 0.06 mg/Kg) concentrations at 16 WAT. EDTA extractable Pb concentration (mg/Kg) in PM application has a significant reduction from 2WAT (i.e., 0.37 ± 0.03 mg/Kg) to 16WAT (i.e., 0.32 ± 0.01 mg/Kg). All the PTEs concentrations were below the maximum permissible levels for agricultural soils imposed by the European Union implying that there is no ecological risk of short-term application of organic or inorganic fertilizers for coconut.

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