

Comparative effect of activated carbon, pressmud and poultry manure on immobilization and concentration of metals in maize (*Zea mays*) grown on contaminated soil

ABSTRACT

Metal contamination of the soils is a widespread problem and immobilization of metals with organic amendments is one of the different remediation technologies. We investigated the effect of activated carbon, poultry manure and pressmud on immobilization of nickel, manganese, copper, zinc, iron and lead in the contaminated soil, plant growth and metal concentrations in maize shoots. The amendments were applied to the soil at the rate of 4% on dry weight basis. Amendments significantly ($P < 0.001$) affected shoot dry weight and concentrations of all metals in maize shoots as compared to the control. The maximum shoot dry weight (4.54 g pot⁻¹) was recorded with pressmud, while it was minimum with the control (2.22 g pot⁻¹). Maize shoots contained the minimum nickel (3.54 mg kg⁻¹) with activated carbon and the minimum concentrations of manganese (11.02 mg kg⁻¹), zinc (48.06 mg kg⁻¹) and iron (104.66 mg kg⁻¹) were recorded with pressmud. Maize shoots contained the minimum concentrations of copper (25.41 mg kg⁻¹) and lead (53.40 mg kg⁻¹) with poultry manure and control, respectively. Amendments significantly ($P < 0.001$) decreased ammonium bicarbonate-diethylene triamine penta acetic acid (AB-DTPA) extractable concentrations of metals except lead. Activated carbon treated pots had minimum AB-DTPA extractable concentrations of all the metals except iron and lead. Activated carbon was most effective in immobilization of Ni, Mn, Zn and Cu decreasing AB-DTPA extractable Ni in the soil, while Fe and Pb was increased due to application of other amendments.

Keyword: Amendments; Metals; Immobilization; Concentration; Maize