

Prediction of Metals Available to Maize Seedlings in Crude Oil Contaminated Soil

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Abstract : The study assessed the effect of crude oil applied at rates, 0, 2, 5, and 10% on the fractional chemical forms and availability of some metals in soils from Usen, Edo State, with no known crude oil contamination and soil from a crude oil spill site in Ubeji, Delta State, Nigeria. Three methods were used to determine the bioavailability of metals in the soils: maize (*Zea mays*) plant, EDTA and BCR sequential extraction. The sequential extract acid soluble fraction of the BCR extraction (most labile fraction of the soils, normally associated with bioavailability) were compared with total metal concentration in maize seedlings as a means to compare the chemical and biological measures of bioavailability. Total Fe was higher in comparison to other metals for the crude oil contaminated soils. The metal concentrations were below the limits of 4.7% Fe, 190mg/kg Cu and 720mg/kg Zn intervention values and 36mg/kg Cu and 140mg/kg Zn target values for soils provided by the Department of Petroleum Resources (DPR) guidelines. The concentration of the metals in maize seedlings increased with increasing rates of crude oil contamination. Comparison of the metal concentrations in maize seedlings with EDTA extractable concentrations showed that EDTA extracted more metals than maize plant.

Keywords : availability, crude oil contamination, EDTA, maize, metals

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