

RESEARCH ARTICLE

Heavy metal concentrations in soil and morphological changes in *Zea mays* (maize) exposed to crude oil

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Abstract

The complex process of germination occurs when non-dormant seeds find themselves in favourable environmental conditions. Maize seed is important as staple food and source of proteins and vitamins all over the world. Crude oil toxicity has been identified as a cause of oxidative stress in some plants. However, there is a dearth in information on the morphological changes that may occur in maize seedlings. The aim of this study was to investigate heavy metal levels and morphological changes in the roots of maize seedlings under crude oil stress. Maize seeds were planted in polythene bags containing 500g of sandy loam soil treated with 0%, 2%, 5%, 10% crude oil fractions [whole crude (WC), water soluble fraction (WSF) and water insoluble fraction (WIF)] and soils from a crude oil spill site in Ubeji Community in Delta State. The experiment lasted for 21 days post germination. Experiments carried out in equal amounts of developing roots after 7, 14, and 21 days post germination (DPG) were performed to determine plant height, radicle/root length and percentage germination. The contamination/pollution index calculated reveals that Ubeji soil was very slightly contaminated with Pb, slightly contaminated with Cu and moderately contaminated with Zn. Copper, Pb and Zn showed evidence of transfer from the soil to the plant and the transfer factor varies from one metal to the other. Plant height revealed reduced growth and development while radicle/roots displayed different morphological changes, revealing the complex nature of crude oil exposure.

Key words: Contamination/pollution index, Crude oil, Heavy metal, Maize, Soil