MORPHO-METABOLIC CHANGESANDCHEMO-MEDIATED PHYTOEXTRACTIONOF SOILCADMIUMBY MAIZE

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Abstract: Phytoextraction by using fast growing plants with the use of some chelators seems to be a promising technology for rehabilitation of contaminated soil. However, a lack of understanding about biochemical, morphological and physiological mechanisms of metal tolerance prevents further application and optimization of this technique. In order to advance the understanding of these mechanisms,the elucidation of the biological processes of absorption and accumulation ofmetals in the roots and aerial parts of plants is essential. Therefore, to explore some morpho-metabolic characteristics and the phytoextraction potential of maize cultivars when exposed to cadmium stress and chelating effect of different levels of EDTA and citric acid an experimentswere conducted in glazed clay pots (with 35 cm diameter) each containing 13 kg of sandy loam soil upto maturity with two maize cultivars (Sahiwal-2002 and Pak-affgoee), three Cd concentrations (0, 150 and 300 mg/kg soil) with 0.5 g/kg of EDTA (5.38 mM) and citric acid (9.52 mM). Interactive effect of Cd and chelators on growth, gas exchange characteristics, water relations, biochemical parameters like MDA, antioxidant enzymes (CAT, POD and SOD) and ions accumulation (Ca, Mg, K, P, Zn, Fe and Cd) were determined. All these parameters were negatively affected under Cd application except total protein and antioxidants which increased to combat heavy metal stress. Conclusively, Cd had a negative impact on overall health of maize plant while citric acid enhanced the Cd tolerance, nevertheless EDTA improved Cd uptake in maize plants.