Physiological Characteristics of Maize under Chelators Induced Phytoextraction of Cadmium

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Abstract

Phytoextraction by using plants for accumulating contaminant metals in the aboveground parts is a cost-effective and environmentally safe method of soil remediation. The present study was conducted to determine the effect of Cd contamination in soil, with and without adding EDTA and citric acid on the physiological parameters of maize plant. For this, pot experiment was conducted using two maize varieties, two Cd levels (150 and 300 mg/kg) were applied at the time of sowing and EDTA and citric acid (1 mM each) applied after 10 days of germination. Results indicated that Cd contamination in the growth medium influenced a number of metabolic processes in maize such as reduction in chlorophyll contents, photosynthesis, transpiration rate, stomatal conductance and water use efficiency. This reduction was more significant by increasing Cd level and also by adding EDTA in growth medium. Trend of reduction was Cd+EDTA > Cd > citric acid+Cd > citric acid. Similarly water potential, osmotic and turgor potential also reduced by Cd stress. Plants growing under Cd+EDTA and Cd+citric acid showed higher reduction in water and osmotic potential than Cd alone. 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, addition of EDTA in the growth medium produced more detrimental effects as compared to Cd alone.

Keywords: Cadmium, Phytoextraction, Photosynthesis, Pigments, Water relation.