

Ectoine Improves Oxidative Damage on Water Status, Photosynthetic Efficiency and Lipid Peroxidation Induced by Cadmium Treatment in *Zea mays* (Maize) Leaves

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Aim of the study: The problems arise when cells are confronted with an excess of heavy metal that lead o cellular damage. Plants have evolved a variety of adaptive mechanisms to respond to heavy metal stress including cadmium (Cd) stress. One of the main adaptive mechanisms to stress is the accumulation of compatible solutes. Ectoine, is low molecular weight organic solutes, can be considered to be a heterocyclic amino acid or as a partially hydrogenated pyrimidine derivative (1, 4, 5, 6-tetrahydro-2-methyl-4-pyrimidinecarboxylic acid). To get more information on the responses to Cd in plants treated with ectoine, we aim to investigate the effects of hydroponically ectoine application (50 and 100 mM ECT) on the water relationship, compatible compounds and photosynthetic mechanism in maize exposed to 150 and 300 μ M Cd stress.

Results: Stress caused a reduction in water content (RWC), growth (RGR) and chlorophyll fluorescence (Fv/Fm), but it observed an increase in proline content (Pro) and lipid peroxidation (TBARS). When the high Cd concentration was used, the oxidative damage induced by stress was more severe. ECT treatment alone did not have any effect on TBARS content but it showed an increase in RWC, RGR and Pro content of maize leaves compared to the control groups. However, exogenously supplied ECT alleviated the inhibition of growth and water status during Cd stress. The plants treated with ECT showed a much greater reduction in lipid peroxidation than increasing Cd concentrations-treated plants. Besides, ECT might protect leaves against stress and play a role in improved the rate of photosynthesis and water relations by providing increase in Fv/Fm, RWC and Pro content. Taken together, the results of the present study show that ECT enhances the stress tolerance of maize plants.

Keywords: Cadmium, Ectoine, Heavy metal stress, Osmotic adjustment, Proline, *Zea mays*