

Interactive effects of different Cr³⁺ concentrations and manure on activity of some antioxidant enzymes and accumulation of compatible osmolytes in basil (*Ocimum basilicum* L.)

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Abstract

To study the activity of some antioxidant enzymes and accumulation of compatible osmolytes affected by different concentrations of chromium (Cr³⁺) (0, 5, 10, 15 and 20 mg/kg soil) combined with different levels of manure (0, 10 and 20 ton/ha) in basil (*O. basilicum* L.), a factorial experiment, based on completely randomized design with four replications, was carried out at Research Greenhouse of Zabol University in 2012. Results of this study indicated that increasing the level of Cr³⁺ from 0 to 20 mg/kg soil, when 20 ton/ha manure was applied, decreased the activity of catalase (CAT), ascorbate peroxidase (APX) and glutathione peroxidase (GPX) enzymes decreased from 0.008, 0.537 and 0.081 to 0.006, 0.305 and 0.071 $\mu\text{mol H}_2\text{O}_2/\text{mg protein}$, respectively. This may be caused by the improvement in physiological activities of the plant in the presence of organic compounds. It seems that application of different amounts of manure led to an increase in leaf proline and carbohydrates content, via availability of macro- and- micro nutrients, especially nitrogen, even when different levels of Cr³⁺ heavy metal existed in the growth medium. The obtained correlation coefficients indicated a significant positive relationship between most physiological traits, and the highest correlation coefficient (0.84) was found between proline and soluble carbohydrates. It appears that organic compounds, such as manure, have considerable potential to reduce the harmful effects of Cr³⁺ heavy metal and improve physiological indices of basil.

Keywords: Physiological characteristics, Heavy metals, Organic fertilizer.

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