

The effect of zinc and potassium on reduction of cadmium concentration in different parts of tomato (*Lycopersicon esculentum* L.) in soilless culture

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Abstract

To study the effects of potassium (K) and zinc (Zn) with cadmium (Cd) in roots, stem, leaves and fruits of tomato plants, a greenhouse experiment was conducted as factorial based on complete random blocks design. The first factor was Zn at three levels (88.8, 177.6 and 355.2 µg/L) and the second factor was K at three levels (255, 510 and 1020 mg/L). In this experiment, the basic nutrition solution (Hoagland) contained 20 µM Cd in all the treatments. At the second harvest period, the concentration of Cd, K and Zn was measured in different organs of the plants including roots, stem, leaves and fruits. Results indicated that increasing Zn concentration in nutrition solution had no significant effect on concentration of Cd and K in roots; but, it increased Zn concentration in roots. In stem, application of Zn increased concentration of Cd and Zn; but had no effect on K concentration. In leaves, concentration of K and Cd was increased; but no effect was observed on Zn concentration. In fruits, the concentration of Zn, K and Cd was not affected by increasing Zn concentration in nutrition solution. Increasing K concentration in nutrition solution had no significant effect on concentration of Cd, Zn and K in roots. In stem, only the concentration of Zn was increased. But in leaves, Cd reduced and K increased concentration of K. In fruits, it caused an increase in concentration of Zn. Interaction of K and Zn was significant on concentration of K in roots and Zn in fruits. In general, under the conditions of the present research, in tomato plant, Zn and Cd have synergistic effect and K and Cd have antagonistic effect.

Keywords: Heavy metals, Nutrient elements, Synergistic effect, Antagonistic effect.

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