Effect of potassium and zinc on growth and physiological parameters of tomato under cadmium stress in soilless system

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(Received : 23 October 2010 ; Accepted : 7 March 2011)

Abstract

To study the effects of potassium and zinc on decreasing the cadmium (Cd) toxicity on growth and physiological parameters of tomato (*Lycopersicon esculentum* Mill.) a greenhouse experiment was conducted in a soilless system with complete randomized block factorial design. Zinc (Zn) was applied in three levels: 88.8, 177.6 and 355.2 μg L^{-1} as the first factor. The second factor was potassium (K) with three levels of 255, 510 and 1020 mg L^{-1}. The base solution (Hoagland solution) contained 20 mM cadmium in all the treatments. The results showed that Zn treatments had significant effect on some growth indices including RGR, RLGR, LWR, LWCA, dry weight of aerial parts and soluble sugar content. Increasing the Zn level caused 7.7, 7.7, 3.3, 4 and 31.3% decrease in RGR, RLGR, LWR, LWCA and sugar content, respectively. The K treatments had significant effects on LAR, SLA, LWR, LWCA, NAR and root fresh weight. The LAR, SLA and LWR were increased 7.7, 15.3 and 6.9%, respectively. It was concluded that Zn had synergistic effect with Cd in tomato, and therefore co-existence of Zn and Cd reduced crop growth. Whereas, K application had antagonistic effect with Cd, and caused an increase in LAR and SLA. Interaction of K and Zn was not significantly effective on the measured parameters.

Keywords: Heavy metals, Mineral nutrients, Tomato, Physiological parameters, Growth.

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