

Effect of silicon nutrition on alleviating cadmium toxicity-induced damage on cucumber (*Cucumis sativus* L.) at vegetative stage

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Abstract

Silicon (Si) is a beneficial nutrient for growth of crops such as cucumber. It seems that Si improves antioxidant capacity of plants and reduces damages induced by environmental stresses and metal toxicity. This research aimed to investigate the interaction of Si and cadmium (Cd) on growth, dry matter yield and catalase (CAT) activity, as an antioxidant enzyme, in cucumber. This hydroponic experiment was carried out at the greenhouse of Soilless Culture Research Centre, Isfahan University of Technology, Isfahan, Iran, and was set up in a completely randomized factorial design in triplicates. Treatments consisted of two Cd levels (0 and 5 μM), two Si levels (0 and 1 mM) and two cucumber cultivars (greenhouse cultivar called Negin and field cultivar called Super Dominus). Cadmium had no significant effect on the fresh and dry weight of shoots in both studied cucumber cultivars, while significantly decreased the root fresh and dry weights. Effect of Si on shoot dry weight differed in cultivars. Si nutrition significantly increased shoot dry weight of Super Dominus cultivar, but was not effective on shoot dry weight of Negin cultivar. Catalase activity was affected by the presence of Si and Cd, such that Cd reduced the activity of CAT in both cucumber cultivars. In contrast, CAT activity in Negin cultivar was increased by addition of Si to the nutrient solution. It seems that addition of Si to cucumber growth media can improve antioxidant capacity of plant under Cd toxicity, although this effect is cultivar-dependent.

Keywords: Beneficial nutrients, Heavy metals, Antioxidant, Catalase.

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