

Article title	Alleviation of cadmium toxicity in common bean (<i>Phaseolus vulgaris</i> L.) plants by the exogenous application of salicylic acid
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Abstract

A two-season pot experiment was conducted on *Phaseolus vulgaris* L. plants to evaluate their response to 1.0 mM salicylic acid (SA) in a growing medium contaminated with 0.25 or 0.50 mM Cd²⁺ ions. Plants were sampled for growth measurements and chemical analyses 45 d after sowing, and to measure the yield of beans at the end of each experiment. Exposing plants to either concentration of Cd²⁺ ions resulted in significant declines in growth, pigment concentrations, relative water content, and nutrient concentrations, and in chlorophyll fluorescence (*Fv/Fm*) and the performance index (PI) of photosynthesis. However, 1.0 mM SA mitigated Cd²⁺ ion stress and significantly improved each of these parameters. Both Cd²⁺ ion treatments increased proline and Cd²⁺ ion concentrations, electrolyte leakage, and lipid peroxidation (measured as malondialdehyde concentration). However, 1.0 mM SA attenuated the adverse effects of Cd²⁺ ions on these characteristics. Cd²⁺ induced increases in the activities of several key antioxidant enzymes such as superoxide dismutase, catalase, ascorbate peroxidase, and glutathione reductase were reduced following the exogenous application of 1.0 mM SA. These results confirm that the application of 1.0 mM SA could be used to reduce the adverse effect of Cd²⁺ ion toxicity in bean plants