Effect of salinity levels and lead and cadmium heavy metals on growth, photosynthetic pigments and sodium and potassium content in spinach

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Abstract

Heavy metals (HMs) are hazardous environmental pollutants which by entering the food chain cause harm to humans, plants and other organisms. In order to study the effects of salinity and lead (Pb) and cadmium (Cd) HMs on spinach plant, a factorial, pot experiment, based on complete randomized blocks design, was carried out in 2013 in College of Agriculture, Shahrood University of Technology. Treatments consisted of three levels of salinity (0, 4 and 8 dS/m) as factor A and HMs at four levels (control, Cd, Pb and Cd+Pb) as Factor B. results revealed that salinity had no significant effect on fresh and dry weight of spinach; but HMs treatment caused significant changes in these traits. Minimum and maximum fresh and dry weights were obtained in the Cd and Cd+Pb treatments, respectively. Besides photosynthetic pigments of flavonoids and anthocyanin, salinity had significant effect only on chlorophyll *a*, chlorophyll *b*, cartenoid contents and reduced them at 8 dS/m level. Salinity treatment, without affecting potassium content, increased sodium and soluble carbohydrates in spinach leaves. Interaction between salinity and HMs was only significant for carbohydrate, chlorophyll *a* and chlorophyll *b*. The highest amount of carbohydrate was obtained in the Cd+Pb and 8 dS/m treatment and the highest amount of chlorophyll *a* and chlorophyll *b* was obtained in the no salinity (control) and Pb treatment.

Keywords: Salinity stress, Physiological traits, Heavy metals.

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