Evaluation of Pb tolerance in petunia (*Petunia hybrid* L.) using eco-physiological traits

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Abstract

Presence of heavy metals (such as lead, Pb) in plants is one of the major environmental stresses that decrease plant growth. Therefore, it is essential to determine the threshold of the plants' tolerance to these elements. In this regard, to evaluate the effect of different concentrations of Pb on eco-physiological traits of petunia plant, an experiment was carried out in the hydroponics greenhouse of Tabriz University, Tabriz, Iran, as a completely randomized design with 8 treatments and 4 replications. Treatments consisted of different concentrations of Pb (0, 0.25, 0.5, 0.75, 1, 1.5, 2 and 4 mg/L as $Pb(NO_3)_2$). After applying the treatments, at the end of the growing season, the eco-physiological indices including photosynthesis, transpiration, stomatal conductance, stomatal resistance and leaf temperature were measured. Results showed that concentrations higher than 0.75 mg/L $Pb(NO_3)_2$ reduced the rate of photosynthesis, transpiration and stomatal conductance as compared to control. The highest stomatal resistance (8.754 $M/m^2.s$) was observed in 4 mg/L treatment; though it didn't have significant difference with 1.0, 1.5 and 2 mg/L treatments. The lowest stomatal resistance (7.285 $M/m^2.s$) was seen in 0.25 mg/L treatment, which had no significant difference with control. The highest leaf temperature (33.26 ℃) was observed in 2 mg/L treatment; though it didn't have significant difference with 1.5 and 4 mg/L treatments. The lowest leaf temperature (26.19 ℃) was obtained in the control treatment. After 0.75 mg/L, the increase in leaf temperature was sensible. Based on the results, it appears that in soils having Pb concentration of ≤ 0.75 mg/L, petunia plants are recommendable for cultivation in landscapes, accumulation of Pb, and phytoremediation.

Keywords: Environmental stresses, Heavy metals, Phytoremediation.

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