

ABSTRACT

In order to compare the morphological and physiological responses of three *salicornia species* to NaCl concentrations, a greenhouse experiment was carried out. The factors was consisted of five levels of NaCl concentrations (5, 100, 200, 400 and 600 mM⁻¹) and three *Salicornia species* (*Salicornia persica* , *Salicornia perspolitana* and *Salicornia bigelovii*). The results showed that, simple effects of salinity and species on proline, glycinebethein, carbohydrates, chlorophyll a, chlorophyll b, relative water content, osmotic potential, dry and fresh weight and antioxidant enzymes CAT,APX and GPX were significant. Also, interaction between salinity and species was significant on proline, glycine betaine, carbohydrates, chlorophyll a, chlorophyll b, osmotic potential, dry and fresh weight and CAT,APX and GPX. Carbohydrates concentration increased to 70-80% up to 400 mM and then decreased from 5% to 13% in 600 mM. Increasing in salt concentration up to 600 mM, increased proline and glycine betaine concentrations. Osmotic potential was also 3 to 4 times higher with increasing salinity levels. The chlorophyll a and chlorophyll b content decreased up to 600 mM. Also, at 200 mM NaCl in all of three species, wet and dry weights were significantly increased 2 to 3 times as control, and in 600 mM, Decreased 60% to 65%. Also, the activity of antioxidant enzymes APX, GPX and PAL increased up to 600 mM, compared to the control by 1.5, 6 and 5.5 times respectively. CAT enzyme activity increased up to 200 mM compared to the control by 1.7 times and then decreased by 42%. In summary, the results showed that, increasing in salt concentrations in the root environment, all three species survived in high salt concentrations with proline and glycine-betaine accumulation and through reduction of osmotic potential that Increased the activity of APX, GPX and PAL enzymes while Eliminate ROS radicals. *S.bigelovii* had the highest Na⁺ accumulation in 600 mM of NaCl and less accumulation of K⁺, Ca²⁺ and Mg²⁺. On the other hand, *S.perspolitana* In 600 mM NaCl concentration had the highest accumulation of potassium, calcium and magnesium, and in terms of antioxidant enzymes activity was higher than other species in salinity levels. The results showed that *S.perspolitana* is the species with higher salinity resistance among the species due to higher photosynthetic capacity retention through high photosynthetic pigments under severe salinity stress and also maintaining higher potassium to sodium ratio. Also, given the higher antioxidant capacity of this species, especially the higher CAT enzyme levels in severe salinity stress, it can be concluded that the resistance of the latter species to salinity had significantly correlated with the increase in antioxidant enzymes.

Keywords: Carbohydrates, Chlorophyll, Osmotic potential, Proline, Relative water content



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