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Effect of long-term salt stress on antioxidative enzyme activities of NyPa Forage (*Distichlis spicata* var. *yensen-4a*) and tall fescue (*Festuca arundinacea* Schreb)

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Key words: salinization, ascorbate peroxidase, superoxide dismutase

Introduction Salinization plays a major role in soil degradation. It affects 19.5% of irrigated and 2.1% of dry agriculture land existing on the globe, including 38.5 million ha that are salt-affected to various degrees in China (FAO, 2000). Na^+ imposes both ionic and osmotic stresses on plants, while the injurious osmotic effects and ionic toxicity lead to the generation of oxidative stress (Hernandez and Almansa, 2002). To escape from the toxicity of activated oxygen species (AOS), plants have developed a complex antioxidative defense system, including antioxidant enzymes such as ascorbate peroxidase (APX), superoxide dismutase (SOD) and catalase (CAT).

Materials and methods Two gramineous plants, NyPa Forage and tall fescue, were grown in plastic pots containing fine, white quartz sand. A half strength Hoagland nutrient solution was added daily. Thirty days later, salinity treatments were conducted by adding nutrient solution with 200 mM NaCl (salt stress treatment) or full-strength nutrient solution (control treatment). Samples were harvested at 0, 5, 10, 15, 20 days after the start of the salt treatment.

Results The increased SOD activity in leaves was more conspicuous in NyPa Forage while its increase in roots was greater in Tall Fescue. APX activity was much greater in leaves of NyPa Forage than in leaves of tall fescue (Figure 1). Activity of CAT in the leaf tissue of tall fescue, was not affected by salt stress throughout the experimental period.

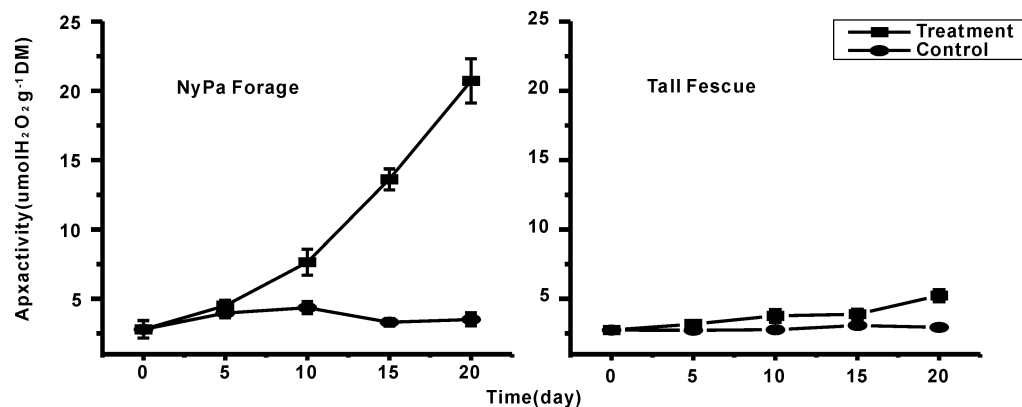


Figure 1 Time course of total APX activity in leaves of NyPa Forage and tall fescue.

Conclusion The present findings have suggested that NyPa Forage responded to NaCl stress by efficiently enhancing its antioxidative capacity in both leaves and roots when compared to tall fescue, and the results showed that the antioxidative enzyme activities of leaves and roots may not coordinate on the effect of salt stress. The antioxidative system in leaves was sensitive to salt stress, and may be an important biochemical trait for salt stress tolerance.

References

FAO. (2000). Global network on integrated soil management for sustainable use of salt-affected soils. <http://www.fao.org/ag/AGL/agll/spush/intro.htm>.