NaCl-primed Sorghum Plants Display Improved Salt Tolerance Through Powerfully Enzymatic Antioxidant System and Reduced Oxidative Damage

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INTRODUCTION: Salt stress has been widely known to promote oxidative damages in plant tissues, which in turn severely reduces plant growth and development. **OBJECTIVE:** In this study, we tested the hypothesis that pretreatment with NaCl mitigates salt-induced oxidative damages by upregulating enzymatic antioxidant system in sorghum plants. **MATERIAL AND METHODS:** *Sorghum bicolor* seeds were sown in vermiculite moistened with distilled water during four days. Thereafter, uniform seedlings were transferred to Hoagland's nutrient solutions, primed with NaCl at 0 (control) and 10 mM for seven days, and then subjected to 80 mM NaCl-salt stress. **RESULTS AND DISCUSSION:** After five and ten days of salinity, lipid peroxidation was found to be drastically improved in roots and shoots of sorghum plants; however, the increase was more severe in non-primed stressed plants. The lower oxidative damage in NaCl-primed stressed plants positively correlated with higher activity of catalase (CAT), dismutase superoxide (SOD), ascorbate peroxidase (APX), guaiacol peroxidase (GPX) enzymes under salinity. In general, CAT was the most responsive enzyme to NaCl pretreatment, with enhanced activity in both organs and analyzed time-point, while SOD, APX and GPX were responsive only after onset of salinity (five days) and/or in a single plant organ. As a result, although salt stress reduced the dry mass and leaf area of sorghum plants, the NaCl pretreatment significantly improved the growth of salt stressed plants. **CONCLUSION:** Our findings suggest that NaCl priming is capable to activate an efficient antioxidant system, reduce oxidative damage caused by ROS, and improve salt tolerance of *S. bicolor* plants.

Keywords: Antioxidative enzymes; Salt stress; *Sorghum bicolor*; Priming

Acknowledgements: CNPq, INCTSal and UFC