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Balance between catalase expression and ascorbate-glutathione redox state is essential to oxidative protection in cashew under salinity

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In the current work oxidative changes were evaluated in leaves of *Anacardium occidentale*, a semi-arid adapted species, subjected to a wide range of salinity in order to verify the role of the superoxide dismutase (SOD), ascorbate peroxidase (APX), catalase (CAT) activities and of the ascorbate/glutathione redox balance in the oxidative protection. Cashew nuts of the CCP 06 genotype were sown in vermiculite into 0.8 L plastic pots at greenhouse conditions. During germination and initial growth, the substrate humidity was maintained at the field capacity by frequent irrigation with distilled water. After 35 days, plants showing eight fully expanded leaves were submitted to increasing NaCl concentrations (0, 50, 100, 150, and 200 mM) in nutrient solution during 15 days. Low level of salinity (50 mM NaCl) did not alter both protein carbonylation and tissue K⁺ leakage but high NaCl levels (100, 150, and 200 mM) similarly increased these stress indicators. Salt treatments did not change both the H₂O₂ concentration and total SOD activity in spite of the activities of the Cu/Zn-SOD isoforms have exhibited slight decrease under high salinity. APX activity was decreased from 100 mM NaCl whereas CAT activity was strongly up-regulated until 150 mM NaCl level. The enhancement of the CAT activity coincided non-linearly with the overexpression of a 68 kDa subunit-containing CAT isoform, as showed by immunoblot assay. The ascorbate-glutathione balance showed alterations in its redox state only under the highest salt levels which are compatible with its direct utilization in H₂O₂ scavenging under conditions of low CAT and APX activities. Cashew leaves have an efficient antioxidative mechanism of protection against the salt-induced oxidative stress able to avoid H₂O₂ accumulation and significant oxidative stress. This protection is



associated mainly with huge upregulation of CAT activity and under very high salinity it involves the non enzymatic ascorbate-glutathione antioxidant system.

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