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Antioxidant Capacity and Damages Caused by Salinity Stress in Apical and Basal Regions of Rice Leaf

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Abstract: We investigated the mechanisms of increased sensitivity to Na⁺ in the apical and basal regions of the rice leaf under salinity. Three-week-old plants were treated with 200 mM NaCl in hydroponic culture for 3 d. Segments 6 cm in length were obtained from the apical and basal regions of the fully expanded uppermost leaves (6th leaf blades) as old and young tissues, respectively. In the plants exposed to 200 mM NaCl, Nitro blue tetrazolium (NBT) reducing activity, and H₂O₂ and Malondialdehyde (MDA) contents significantly increased, accompanied by the swelling of thylakoids and destruction of thylakoid membranes in the apical regions. However, no indication of oxidative damages was observed in the basal region, even though the Na⁺ content in the basal region was comparable to that in the apical region. In the apical region, the capacity to scavenge H₂O₂ was lower than that in the basal region due to decrease in the constitutive levels of ascorbate peroxidase and guaiacol peroxidase. In addition, the activities of antioxidant enzymes except superoxide dismutase and guaiacol peroxidase decreased drastically after 48 hr of exposure to NaCl. By contrast, the activities of catalase and glutathione reductase in the basal region increased compared with those in the control, and other antioxidant enzymes did not decrease under salinity during the experimental period. These results suggest that the capacity to scavenge reactive oxygen species decreased with age, and thus the apical region of the leaf blade suffered severer damage by Na⁺ than the basal region.

Keywords: [Age](#), [Antioxidant enzyme](#), [NaCl](#), [Reactive oxygen species](#), [Rice](#)

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