

ALLEVIATION OF SALT STRESS-INDUCED DAMAGES IN RICE PLANTS WITH FOLIAR SPRAY OF PROLINE AND GLYCINE BETAINE

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Extended Summary

This study investigates the roles of exogenous Proline (Pro, 5 mM) and glycine betaine (GB, 5 mM) in improving salt stress tolerance in salt sensitive (BRRI dhan 49) and salt tolerant (BRRI dhan 54) rice (*Oryza sativa* L.) varieties. Salt stresses (150 and 300 mM NaCl for 48h) significantly reduced leaf relative water content (RWC) and chlorophyll (chl) content, increased endogenous Pro, lipoxygenase (LOX) activity, lipid peroxidation (MDA) and H₂O₂ in both cultivars. Ascorbate (AsA), glutathione (GSH) and GSH/GSSG (glutathione disulfide), ascorbate peroxidase (APX), monodehydroascorbate reductase (MDHAR), dehydroascorbate reductase (DHAR), glutathione reductase (GR), glutathione peroxidase (GPX), catalase (CAT), glyoxalase I (Gly I) activities were reduced in sensitive variety and these were increased in tolerant variety due to salt stress. The glyoxalase II (Gly II), glutathione 'S'-transferase (GST) and superoxide dismutase (SOD) activities were increased in both cultivars by salt stress. Exogenous Pro and GB application with salt stress improved physiological parameters, reduced LOX activity and oxidative damage in both cultivars where BRRI dhan54 showed better tolerance, activities of all antioxidant (except SOD) and glyoxalase enzymes were improved by these protectants where these were higher in tolerant variety compared to sensitive one. Ascorbate content of sensitive variety was not improved by GB under severe stress; GSH and GSH/GSSG was not restored by GB at any stress level of stress. The result suggests that exogenous application of Pro and GB increased rice seedlings' tolerance to salt-induced oxidative damage by up-regulating their water content, photosynthetic pigment, antioxidant defense system where these protectants rendered better performance to BRRI dhan54 and Pro can be considered as better protectant than GB.

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