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Nitrogenase and antioxidant enzyme activities in *Phaseolus vulgaris* nodules formed by *Rhizobium tropici* isogenic strains with varying tolerance to salt stress

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Summary

Common bean plants inoculated with salt-tolerant *Rhizobium tropici* wild-type strain CIAT899 formed a more active symbiosis than did its decreased salt-tolerance (DST) mutant derivatives (HB8, HB10, HB12 and HB13). The mutants formed partially effective (HB10, HB12) or almost ineffective (HB8, HB13) nodules (Fix^d) under non-saline conditions. The DST mutant formed nodules that accumulated more proline than did the wild-type nodules, while soluble sugars were accumulated mainly in ineffective nodules. Under salt stress, plant growth, nitrogen fixation, and the activities of the antioxidant defense enzymes of nodules were affected in all symbioses tested. Overall, mutant nodules showed lower antioxidant enzyme activities than wild-type nodules. Levels of nodule catalase appeared to correlate with symbiotic nitrogen-fixing efficiency. Superoxide dismutase and dehydroascorbate reductase seem to function in the molecular mechanisms underlying the tolerance of nodules to salinity.

Key words: Antioxidant enzymatic defenses – common bean root nodules – oxidative stress – *Phaseolus vulgaris* – salt stress

Abbreviations: AOS = activated oxygen species. – APX = ascorbate peroxidase. – ARA = acetylene reduction activity. – ASC = ascorbate. – ASC-GSH cycle = ascorbate-glutathione cycle. – CAT = catalase. – DHA = dehydroascorbate. – DST = decreased salt tolerance. – DR = dehydroascorbate reductase. – GR = glutathione reductase. – GSSG = oxidized glutathione. – MDHA = monodehydroascorbate. – MR = monodehydroascorbate reductase. – SOD = superoxide dismutase. – TSS = total soluble sugars

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