



## Changes in gene expression and catalase activity in *Oryza sativa* L. under abiotic stress

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**ABSTRACT.** Different rice (*Oryza sativa* L.) genotypes were subjected to high salinity and low temperature (150 mM NaCl and 13°C, respectively) for 0, 6, 24, 48, or 72 h. We evaluated the simultaneous expression of the genes *OsCATA*, *OsCATB*, and *OsCATC*, correlated gene expression with enzyme activity, and verified the regulation of these genes through identification of *cis*-elements in the promoter region. The hydrogen peroxide content increased in a tolerant genotype and decreased in a sensitive genotype under both stress conditions. Lipid peroxidation increased in the tolerant genotype when exposed to cold, and in the sensitive genotype when exposed to high salinity. Catalase activity significantly increased in both genotypes when subjected to 13°C. In the tolerant genotype, *OsCATA* and *OsCATB* were the most responsive to high salinity and cold, while in the sensitive genotype, *OsCATA* and *OsCATC* responded positively to saline stress,

as did *OsCATA* and *OsCATB* to low temperature. *Cis*-element analysis identified different regulatory sequences in the catalase promoter region of each genotype. The sensitive genotype maintained a better balance between hydrogen oxyacid levels, catalase activity, and lipid peroxidation under low temperature than the resistant genotype. *OsCATA* and *OsCATB* were the most responsive in the salt-tolerant genotype to cold, *OsCATA* and *OsCATC* were the most responsive to saline stress, and *OsCATA* and *OsCATB* were the most responsive to chilling stress in the sensitive genotype. There were positive correlations between catalase activity and *OsCATB* expression in the tolerant genotype under saline stress and in the sensitive genotype under cold stress.

**Key words:** *Oryza sativa* L.; Salinity; Low temperature; *Cis*-elements; Reactive oxygen species; Differential expression