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Differential regulation of anti-oxidative gene expressions in response to salt stress in rice

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Rice (*Oryza sativa L.*) is one of the most important crops because it is a nutritional source of more than one-third of the world population. Soil salinity is one of the most important abiotic stress factors that affect plant growth and productivity adversely. Rice growth and yield is also affected by salinity and at the seedling stage although it is known to be susceptible to salinity. Reactive oxygen species are induced by salt stress and some responsive mechanisms are evolved against to the detrimental effects caused by salt stress. Salinity response is especially controlled by obtaining homeostasis between antioxidative mechanisms and accumulation of reactive oxygen species (ROS) produced as a result of oxidative stress caused by salinity. It is known that combined expression profiles of antioxidative system enzymes may provide increased tolerance capacity. Therefore, the expression profiles of antioxidative enzymes in two different rice cultivars which have different salt sensitivities at four different salt stress conditions were determined. Salinity responses of two different rice varieties were investigated at seedling stage. Four different salinity treatments were then applied using Yoshida solution containing 0, 30, 90, 150 and 210 mM NaCl to the nutrient solution for seven days. At the end of the seven days, the leaves were harvested and stored at -20°C for further experiments. The salt stress responsive gene specific primers were amplified by designed primers due to the 3'-UTR regions of each of the following genes by aligning all available related genes in the databases of NCBI and KOME: Mn-SOD, Cu/Zn-SOD, Fe-SOD, Cytosolic APX, Thylakoid-bound APX, stromal APX, Cytosolic GR and CatA. Mn-SOD was consisted with the trend of variation in SOD activities of rice varieties. The expression patternof CAT A gene was markedly decreased compared to control in both rice varieties. Str-APX gene expression was up-regulated during salt stress treatments in both rice varieties. Transcript levels of Cyt-APX and Thy-APX were up-regulated in accordance with increasing salt stress in Osmancık-97 variety. The expression pattern of gene encoding enzyme Cyt-GR1 showed a gradual up-regulation as a response to subjected increasing NaCl stress in Mevlütbey variety while only after 90 mM treatment, an up-regulation was observed for Osmancık variety. These data indicated that the antioxidative responses of salt tolerant and salt sensitive rice varieties are differentially regulated.

Biography

Ozge Celik has received her PhD degree from Istanbul University (Istanbul, Turkey) in 2010. She is working on mutation breeding, abiotic stress tolerance, molecular marker analysis and plant molecular biology. She is currently an Associate Professor of Molecular Biology and Genetics Department at the Istanbul Kultur University. She has authored more than 35 publications in the fields of plant stress tolerance and molecular biology and has been serving as an Editorial Board Member of repute. She has published one scientific book and a chapter in a reputed book in the field of Plant Science.

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