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Salinity Tolerance of Pigmented Rice

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Rice (*Oryza sativa* L.) has a high sensitivity to salinity stress and it would induce a decrease in the total plant production. Seed priming is strategy to induce the tolerance of salinity stress. In this research used halo priming technique by combining NaCl, CaCl2, KCl, KNO3, and H2O2 to induce salinity tolerance in Cv. Cempo ireng pendek (black rice) and Cv. Merah Kalimantan Selatan (red rice), Pokkali, and IR 64. The experiment was designed in a split plot design with three replications. The treatment details are (i) non-primed (NP) and non-stressed; (ii) non-primed and stressed with 200 mM NaCl solution; (iii) primed (P) and non-stressed, and (iv) primed and stressed with 200 mM NaCl solution for each rice cultivars. Four cultivars were screened for salinity tolerance at seedling stage based on visual salt stress symptoms were assessed according to the standard evaluation system (SES) and physiological parameters including chlorophyll content, relative water content, growth and ion concentration and transporter gene relative expression. The result represented that seed halo priming increased the level of salinity tolerance significantly in salinity-susceptible rice, IR 64 and moderate tolerant rice, Merah Kalsel. After seed priming treatment, IR 64 and Merah Kalsel seedling survived under salinity stress with 200 mM NaCl. Otherwise, seed halo priming decrease the SES value in salinity tolerant rice, Pokkali and CI pendek, but not affected in the level of salinity tolerant. 10 plants for each rice cultivars were harvested from the pots after completion of the experiment. The root length and plant height were measured subsequently, root biomass and shoot biomass were determined after drying the samples at 70°C for 72 hr. Soil salinity is a global problem that affects along 20% of the irrigated land and reduces crop yields significantly, and it is estimated that every year about 10 million hectare of land becomes degradation. In this study, quantitative RT-PCR analyses showed that the expression of *OsSOS1* and *OsNHX1* induced in leaves after seed priming treatment. In the other hand, the expression of *OsHKT1* induced seed priming techniques have been widely used to improve plant performances especially in unfavorable conditions. It is a controlled hydration process followed by re-drying that allows pre-germination metabolic activities, two proceed rapidly. The beneficial effects of priming are more evident under stress condition rather than normal conditions. The leaves chlorophyll content in each plant rice cultivar increased after seed priming treatment. Then they were decreased due to salt stress compared with control both in un-primed and primed seedling. The enhancement of photosynthetic pigments under hydro- and halo priming in all the three rice varieties points out towards the role of seed priming in positively influencing the synthesis of chlorophylls and carotenoids in the seedlings raised from primed seeds. Earlier it was reported that seed priming in rice caused increase in chlorophyll and carotenoid contents under NaCl stress.

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