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Seed Priming Improves the Salinity tolerance of Pigmented Rice During Seedling Stage

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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 H_2O_2 to induce salinity tolerance in Cv. Cempo ireng pendek (black rice) and Cv. Merah Kalimantan Selatan (red 25rice), Pokkali, and IR. 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. We purified color pigment of red rice bran and identified a proanthocyanidin which enhances hepatic ACOX1 expression leading to cytosolic lipid β-oxidation. The structure was 3- to 10-mer of catechins and/or epicatchins including a 3,4-*cis* configuration, more C4-C8 than C4-C6 linkages, and the existence of a B-ring bearing three hydroxy groups with/without a methyl moiety. Soil salinity is a global problem that affects along 20% of the irrigated land and reduces crop yields 3significantly, and it is estimated that every year about 10 million hectare of land becomes degradation. Seed priming techniques have been widely used to improve plant performance 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. In this study, we compared between salinity-tolerant rice (Pokkali), salinity-susceptible rice (IR 64), 11two pigmented rice cultivars indicated salinity-tolerant(CI pendek) and moderate-tolerant (Merah 12 kalsel) to elucidate their mode of adaptations to salinity stress through physiological and 13transcriptional analysis after seed priming treatment. The screening index used in this study would 14be useful to identify the level of salinity-tolerance rapidly by investigating differences in physiological 15characteristics in rice. The level of salinity tolerance in some tolerant rice cultivars, Pokkali and Merah kalsel increased slightly, but decreased in CI pendek after seed priming treatment.

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