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Molecular Characterization of a Rice Plant with Mutated Leucine Carboxyl Methyl Transferase Gene

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[Introduction]

Abiotic stress is the main factor negatively affecting crop growth and productivity worldwide. Especially, rice is sensitive to various abiotic stresses. Drought is undoubtedly one of the most important stresses that have a huge impact on crop growth and productivity. An insensitive mutant line would be very useful for breeding program and molecular genetics.

[Materials and Methods]

Growth condition: The germinated seeds of line 200-1217(43) mutant and WT were transferred to plastic box for hydroponic cultivation and grown for 2 weeks with kimura B nutrient solution (pH=5.7). Plants were grown in a chamber with 16h light/8h dark 70% humidity at 30/28°C.

Measurement of insensitivity from the drought stress: 2weeks plants were dehydrated for 8 h and re-watered 7days.

DAB staining: At 2 weeks, 3rd leaves of WT and 200-1217(43) were taken at 0, 30, 60, and 120 min.

Germination rate: 1/2MS, PEG infused medium (-0.25, -0.5, -0.7Mpa).

[Results and Discussion]

Measurement of insensitivity from the drought stress: the mutant line showed higher survival rates and heavier fresh weight than those of WT. In addition, DAB staining and germination rate showed that the mutant line was insensitive to drought stress compared to WT.

Candidate gene analysis: The frameshift of the Os03g56370 gene was found through whole plant genome sequencing, and the frameshift region was identified through partial sequencing. Os03g56370 encoding a leucine carboxyl methyl transferase was selected as candidate. When looking at the expression levels of genes in different tissues, it was confirmed that they were highly expressed in leaf sheath, leaf, and seeds, and then confirmed that they responded to drought through PEG-treated samples.

The mutant lines would be useful for breeding program in improving drought tolerance and for molecular genetics approach.

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