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Os4bglu18, a Monolignol β -Glucosidase mutates Improve Salt Resistance in Rice

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[Introduction]

Abiotic stress affects many crops worldwide, and rice is sensitive to various abiotic stresses. Among them, salt stress causes inhibition of rice growth and reduced productivity. So, a mutant line was created, and a salt-resistant line was selected.

[Materials and Methods]

Growth condition: The germinated seeds of WT and 300-883(75) mutant were transferred to plastic box for hydroponic cultivation and grown for 7days with kimura B nutrient solution (pH=5.7).

Salt stress resistance measurement : 7day-olds WT and 300-883(75) mutant were treated with 100mM NaCl for 7days. Measure length, weight, chlorophyll, hydrogen peroxide(H₂O₂).

Phloroglucinol-HCL staining : 7day-olds WT and 300-883(75) mutant were sectioned using a vibratome stained with Phloroglucinol-HCL, and observed through a microscope.

Lignin contents measurement : Lignin was extracted by the Acetyl bromide Soluble Lignin Assay.

Relative expression of lignin biosynthesis pathway gene : WT and 300-883(75) mutant shoots, roots were sampled and cDNA was synthesized after RNA extraction.

[Results and Discussion]

There was no difference in length between WT and mutant in the salt resistance experiment, but the mutant showed more fresh weight and chlorophyll contents and low H₂O₂ contents. The frameshift of the LOC_Os04g43410 gene was found through whole plant genome sequencing, and the frameshift region was identified through partial sequencing. LOC_Os04g43410(Os4bglu18) was selected as candidate. As a result of qRT-PCR in the WT and mutant shoot, root samples, the expression of lignin biosynthesis-related genes was generally higher in the mutant than in WT, and the Os4bglu18 gene was lower in the mutant. Due to this, the expression of the Os4bglu18 gene in the mutant is relatively low, which prevents hydrolysis of monolignol and produces more lignin. And to prove this, the WT and mutants were stained with lignin through sections, and when the amount of lignin was extracted and compared, more intense staining and a large amount of lignin were seen in the mutant.

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