[P4] Crop Genetics and Physiology

Thu. Sep 9, 2021 12:15 PM - 2:00 PM Room 4 (Poster) (Crop Genetics and Physiology)

1:15 PM - 2:00 PM

[P4-42]CRISPR/Cas9 — Based Genome Editing of *GCN5*, a Histone Acetyltransferase Gene, in Rice (*Oryza sativa* L.)

*Nominated for Presentation Awards

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Nitrogen is a primary component of plant substances. The expression of Rubisco genes is enhanced in response to nitrogen supply. Histone acetylation regulates gene expression in diverse biological processes, but histone acetylation events regulating the expression of Rubisco genes are not well understood. In this study, to examine whether the rice histone acetyltransferase GENERAL CONTROL NON-REPRESSED PROTEINS (GCN5) regulates the expression of Rubisco genes, we produced *GCN5* knockout rices using the CRISPR/Cas9 system. We choosed two guide RNA spacer sequences corresponding to nucleotides 65-83 and 203-221 of the *GCN5* coding region. The two sequences were inserted into CRISPR/Cas9 expression vector pRGEB32 and designed as *KO1-GCN5* plasmid and *KO2-GCN5* plasmid, respectively. The plasmids were introduced into rice calluses through *Agrobacterium tumefaciens* (strain EHA105). Fourteen (6.4%) of 218 calluses infected with the Agrobacterium harbored the *KO1-GCN5* plasmid redifferentiated. Eight (57%) of the 14 redifferentiated individuals had mutations in the *GCN5* gene. The mutations included deletions of one to 159 bases and insertions of one or two bases. Five individuals (62.5%) of the eight mutants had frameshift mutations in one *GCN5* allele, and one individual (12.5%) had frameshift mutations in both *GCN5* alleles. The same results were obtained in calluses introduced the *KO2-GCN5* plasmid. There was no obvious phenotypic difference between the heterozygous knockout rice and the wild-type rice. Tiller number of the homozygous knockout rice was fewer than that of the wild-type rice. The homozygous knockout rice was smaller than the wild-type rice, suggesting that GCN5 regulates the growth of rice.