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Genome Editing for Research on Function of *OsSFq3* Gene during High-Temperature Treatment in Grain Filling Stage of Rice

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[Introduction]

Rice is a major crop that provides energy to the world's population. The increasing temperature caused by climate change negatively affects rice yield and grain quality. Especially, high temperature during grain filling stage of rice reduces spikelet fertility and 1000 grain weight, and causes chalkiness grain. For the stability of yield and quality in global warming, research on gene related to high temperature is inevitable.

[Materials and Methods]

The rice *OsSFq3* gene was identified as a gene that was reported to contribute to grain yield and quality. In this research, the *OsSFq3* gene was selected as a target gene for genome editing. Guide RNAs were designed by the CRISPR RGEN Tools program. The pRGEB32 vector was utilized in the Cas9 vector. After the guide RNAs were integrated into the pRGEB32 vectors, the vectors were amplified through competent cells of *Escherichia coli*. The integrated pRGEB32 vectors were transformed into *Agrobacterium tumefaciens*. Using these transformed *Agrobacterium tumefaciens*, Ilmi calli were infected and co-cultured. After co-cultivation, the calli were inoculated on regeneration media.

[Results and Discussion]

Green spots which indicate pre-stage of regenerated plants were formed. Regenerated plants and shoots were occurred from the green spots. The CRISPR/Cas9 can remove a gene function through targeted mutagenesis. This study suggests that CRISPR/Cas9 can be used to identify function of the *OsSFq3* gene through deletion of the gene function. The identification of the *OsSFq3* gene function can be the solution for global warming by developing the rice breeding technology which improves grain yield and quality below high temperature climate.

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