

#061

Knockout of two BnaSM1s generated by CRISPR/Cas9-targeted mutagenesis improves plant architecture and increases yield in rapeseed (*Brassica napus* L.)

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Plant height and branching number are essential for construction of rapeseed plant architecture and are directly correlated with its yield. At present, ideotype breeding of rapeseed is in its early stages. Thus, improvement of plant architecture is a major challenge for increasing yield in rapeseed breeding. In this study, we first verified that two BnaSM1 homologs in rapeseed had a redundant function that regulate axillary bud outgrowth. Subsequently, two sgRNAs were designed to edit two BnaSM1 homologs using CRISPR/Cas9 system. The T0 plants were highly efficiently edited in BnaSM1s at the target sites with homozygous or heterozygous mutations, which were heritable to T1 progeny. Simultaneous knockout all four BnaSM1 alleles resulted in semi-dwarf and increased branching phenotypes with higher yield. We also obtained transgene-free lines created by the two sgRNA editing, and no off-target mutations were detected in potential targets. The characteristics of semi-dwarf with increased branching were suitable for construction of a rapeseed ideotype. Significantly, the editing resources of the two different ecotypes obtained in our study would provide desirable germplasm for further high yield breeding in rapeseed.

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PLENARY TALKS

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