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Genome editing in soybean using the CRISPR/Cas9 system

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The clustered regularly interspersed short palindromic repeats (CRISPR)/Cas9 system has been employed in targeted genome editing in different species. Here, we describe the efficient genome engineering in soybean. To value the genome editing efficiency in soybean, silencing vectors were introduced into a GUS-expressing soybean line via *Agrobacterium rhizogenes* to produce hairy roots. Targeted DNA mutations were detected in 50% of the transgenic hairy roots analyzed. In addition, on the basis of establishment of efficient soybean transformation system, we obtained transgenic soybean via CRISPR/Cas9 system targeting *GmPDS* and *GmGA2*. Two copies of *GmPDS* on chromosome 11 and 18 were mutagenized with frequencies of 31% and 50%, respectively. *GmGA2* on chromosome 11 and 18 were both mutagenized with frequencies of 20%. Furthermore, the CRISPR/Cas9 system was also successfully applied to make a mutation for functional genomic studies.