Agrobacterium-mediated targeted mutagenesis in the potato cultivar Désirée

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In today's world, due to the rapidly increasing world population, scarcity of resources and climate change, plant breeding is more important than ever, and it needs to be future-oriented and continue to enhance its methods. It has already been presented for several plant species that using the new tool, the CRISPR/Cas9 system, it is relatively simple to create site-specific mutations in one or more target genes if the desired trait have selectable or visible phenotype or an antibiotic resistance marker is used for selection. This marker, however, is a transgene that has to be eliminated together with *Cas9* from the plants bred for commercial purposes. Self-pollination or outcrossing is a common technique to get rid of the transgene. Nevertheless, some important crops and cultivars as for example, most of the potato varieties, cannot be self-pollinated. Furthermore, crossing with other cultivars/lines results in a series of alterations, which have to be eradicated by backcrosses. To solve this problem a vector suitable for *Agrobacterium*-mediated transformation with transient expression of *Cas9* and *nptII* providing resistance to the antibiotic kanamycin was developed. To test the efficiency of the new vector, designated PROGED, sgRNA of *PHYTOENE DESATURASE* (*PDS*) was introduced into it and the restriction enzyme site loss method was applied for detection of mutations in the *PDS* gene of the potato cultivar Désirée.