



ABSTRACT

“Permanent genome modifications in plant cells by transient viral vectors”

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The ability to modify genome sequences in plant cells is fundamental to modern agriculture. Naturally occurring and artificial rare-cutting endonucleases (i.e. zinc finger nuclease, homing endonuclease or TAL effector nuclease) have been used for targeted mutagenesis in model and crop species. However, stable transformation is the preferred method for gene expression in plant species, and nuclease-expressing transgenic plants have been used for recovery of mutants that are likely to be classified as transgenic due to the use of direct gene-transfer methods into the target cells. We developed an alternative, non-transgenic approach for nuclease delivery and production of mutant plants using a novel Tobacco rattle virus (TRV)-based expression system for indirect transient delivery of nucleases into a variety of tissues and cells of intact plants. Since viral vectors can spread into the growing and developing tissues of infected plants, the novel approach of genome-editing provides a unique opportunity to bypass the regeneration step that is often required in direct gene-transfer methods.