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“Host-pathogen interactions inspire efficient methods for engineering plant genomes”

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The ability to precisely alter DNA sequences in living cells makes possible detailed functional analyses of genes and genetic pathways. In plants, targeted genome modification has applications ranging from understanding gene function to developing crops with new traits of value. We have enabled efficient methods for targeted modification of plant genomes using sequence-specific nucleases. DNA targeting is achieved with either reagents derived from proteins that make plant pathogens more effective in colonizing their hosts (i.e. the transcription activator-like effectors of *Xanthomonas*) or adaptive immune systems of bacteria (clustered regularly interspaced short palindromic repeats/cas). The DNA targeting reagents introduce chromosome breaks at precise genomic locations, and their repair can be directed to achieve targeted gene knockouts, replacements and insertions at high efficiency. Current work is focused on optimizing the delivery of nucleases and donor DNA molecules to plant cells to more efficiently achieve targeted genetic alterations.