

P017 I-SceI-stimulated intrachromosomal homologous recombination in maize

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Genomic modification by homologous recombination (HR) allows the precise modification of any genetic sequence. Genome modification via HR has become an indispensable tool in yeast and mouse, however, this tool is still missing in higher plants since the frequency of HR in plants is too low (10^{-4} to 10^{-5}) compared to the frequency of illegitimate recombination (NHEJ). However, in model plants, induction of a double strand break at the target locus by the expression of the meganuclease I-SceI results in a dramatic stimulation of HR. In collaboration with Collectis (who develop meganuclease technologies) we are applying these results to maize in order to develop an efficient tool for genome modification for a major crop plant.

To demonstrate that a DSB enhances HR in maize, we have generated maize plants that contain a reporter of intrachromosomal HR with and without constitutive I-SceI expression. In this assay the frequency of HR is estimated by the reconstitution by HR, of GUS in pollen. Preliminary data confirms that I-SceI-induced DSBs stimulate intrachromosomal HR in maize and thus that I-SceI can be used as a tool for precise genome modification in maize.