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Overexpression of Some Plant Genes Potentiate Agrobacterium-mediated Transformation

Increasing the expression of certain plant genes significantly improves the efficiency of genetic engineering via Agrobacterium, a key tool for developing new crop varieties.

Researchers at Purdue University have identified proteins that when overexpressed induce agrobacterium mediated transformation (AMT). AMT is a core technology utilized for generating transgenic plant organisms, however, only a few molecular drivers for AMT are known, limiting the usefulness of AMT to generate transgenic plants needed for agricultural purposes and food production.

â€‹Purdue University researchers have discovered a number of proteins that drive AMT. A proteomics study was conducted after a protein known to drive AMT was induced in Arabidopsis thaliana plants by addition of agrobacterium. Proteins associated with defense response and transformation susceptibility were found to be overexpressed in the roots of the plants 12 hours post induction. Knockout and overexpression lines of these genes exhibited altered transformation phenotypes, suggesting that these proteins play a pivotal role in transformation efficacy. This technology will allow for increased efficiency of AMT driven transgenic plants.

Advantages:

-Increased Transformation Efficiency

-Increases AMT Usefulness

Potential Applications:

-Agrobacterium-Mediated Transformation

-Plant Genetic Engineering

Technology Validation:

Technology ID
2020-GELV-68841

Category
Agriculture, Nutrition, & AgTech/Crop Genetics & Breeding
Biotechnology & Life Sciences/Synthetic Biology & Genetic Engineering

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This technology has been validated by expressing an inducible virE2 gene in Arabidopsis and performing a time course proteomics study looking at proteins that overexpress in comparison to non-induced cells. Then, a transgenic line of A. thaliana that constitutively overexpress selected these selected genes showed statistically significant increases in transformation efficiency, indicating that these genes are somehow involved in the transformation machinery.

TRL: 3

Intellectual Property:

Provisional-Patent, 2019-10-18, United States | Provisional-Gov. Funding, 2020-10-16, United States | Utility-Gov. Funding, 2021-10-11, United States

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