



Method for genetic engineering of legume species (2019-351, Dr. Daniel Voytas, Dr. Feng Zhang)

A method to genetically modify a variety of legume species that is efficient, fast and doesn't require technical skills such as traditional tissue culture.

Technology No. 2019-351

IP Status: Pending US Patent; **Application #:** 16/913,478

Applications

- Expedited genetic engineering of legumes to introduce desirable traits
- Basic research of legumes
- Improvement of commercial crops

Key Benefits & Differentiators

- **Efficient transformation:** Greater than two-fold improvement in soybean transformation to produce genetically altered shoots.
- **Simple and expedited procedure:** Approach creates transformed shoots on non-meristematic tissues and does not require the use of highly technical skills such as traditional plant tissue culture, cutting imbibed seeds in half, or isolating plant embryos.
- **Widely applicable:** Approach can be used in a variety of legumes including commercial elite lines and those recalcitrant to transformation. These include beans, soybeans, peas, chickpea, cowpea, pigeon pea, peanut, ground nuts, lentil, green gram and black gram.

Finicky legumes

Legumes are extensively used in agriculture for human consumption, livestock forage, and soil-enhancing green manure. While extensive efforts have been made to improve important traits in legumes, progress has been slow since many legume species are recalcitrant to genetic transformation. The few techniques developed to genetically engineer legumes are inefficient, slow and require a significant amount of technical skill. Collaborative research efforts at the University of Minnesota have developed a method using developmental

regulators alongside gene-editing reagents to produce gene-edited legumes that is efficient, expedited, and bypasses the need for highly technical expertise.

Transforming beans

The developed approach introduces specific developmental regulators and gene editing reagents to non-meristematic tissues of the plant, resulting in new plant shoots that are genetically transformed. Genetically altered seeds can subsequently be harvested from these shoots in order to acquire whole plants. Furthermore, the approach does not require challenging technical skills (i.e. traditional tissue culture) and it can be used to transform non-meristematic tissues of a wide variety of legume species. This method has already been successfully applied to achieve expedited genetic transformation in soybean plants, the most valuable legume crop.

Phase of Development

Proof of concept. Successful induction of genetically transformed shoots on soybean plants..

Researchers

Feng Zhang, PhD

Assistant Professor, College of Biological Studies

[External Link](https://cbs.umn.edu/) (cbs.umn.edu)

Robert Stupar, PhD

Professor, Department of Agronomy and Plant Genetics

[External Link](https://agronomy.cfans.umn.edu/) (agronomy.cfans.umn.edu)

Daniel Voytas, PhD

Professor, Department of Genetics, Cell Biology and Development

[External Link](https://cbs.umn.edu/) (cbs.umn.edu)

Ready for Licensing

This technology is now available for license! The University is excited to partner with industry to see this innovation reach its potential. Please contact us to share your business' needs and your licensing interests in this technology. The license is for the sale, manufacture or use of products claimed by the patents.

<https://license.umn.edu/product/method-for-genetic-engineering-of-legume-species>