Efficient Soybean Transformation and Regeneration Using Half-Seed Explants

APPLICATION AREAS
Soybean transformation

ABSTRACT
Commonly used methods for soybean transformation such as the cotyledonary node ("coty node") or embryogenic callus ("callus") method have various disadvantages. For example, the coty node method requires precise wounding of seedlings to introduce genetic material and in vitro germination that can result in low transformation efficiencies, poor reproducibility and non-germline transformation. The callus method—in which embryonic tissue is bombarded with DNA-coated carrier particles—has the drawbacks of requiring a prolonged tissue culture period, and can also result in the complex insertion of genes into the plant genome and may result in the regeneration of sterile plants. To overcome these disadvantages, ISU researchers have developed a method for efficient soybean transformation and regeneration using half-seed explants. In this method, half-seed explants (separated cotyledonous tissues derived from mature soybeans) are infected with Agrobacterium tumefaciens carrying a transgene of interest and regenerated in vitro using tissue culture medium. Transgenic plants can be obtained within 9-10 months, and any suitable genotype of soybean can be used with this method. Because this approach does not require technical precision or prolonged tissue culture, it is more efficient and robust than other soybean transformation methods.

BENEFITS
- Efficient (transformation efficiency of 2.4 - 7.8% compared to 0.3 – 2.8% for the coty node method has been demonstrated)
- Simple (The half-seed method is easy to prepare and does not require a prolonged tissue culture period when compared to the callus culture system)
- Reproducible (does not require precise wounding or particle bombardment, so gene insertion events and transformation are more reliable)

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REFERENCE:

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