**Agrobacterium-mediated Transformation of Cacao and Production of Transgenic Cocoa Plants via Somatic Embryogenesis**

**Disclosure Number**

* 1743

**Patents Issued**

* [6150587](http://www.google.com/patents/US6150587)

**For Licensing Information**

Matthew Smith
Sr. Technology Licensing Officer
Office of Technology Management
mds126@psu.edu
Phone: 814-863-1122
Fax: 814-865-3591

The subject invention represents protocols for somatic embryogenesis of cacao, the transformation of these somatic embryos, and the production of transgenic cacao embryos using non-tumorigenic strains of A. tumefaciens. This process provides a new procedure for the introduction of foreign genes into cacao, and an alternative approach for the incorporation of novel mechanisms of resistance to viruses, fungi and insect pests.

**Background**

Cacao is the second most important agricultural commodity in the international trade from tropical regions. Since the majority of commercially cultivated cacao derives from a few varieties collected fifty to sixty years ago, having a narrow genetic base, cacao remains extremely vulnerable to diseases and other abiotic stresses. Up to 30% of world cacao crop production is lost each year due to diseases and to insect pests. The development of a reliable transformation system for cacao has become critical for the successful utilization of biotechnology for cacao tree improvement.

**Invention Description**

Genetic transformation of plant cells offers a unique method to modify the plant genome and thus expedite the introduction of valuable agronomic traits into existing genotypes. The subject invention represents protocols for somatic embryogenesis of cacao, the transformation of these somatic embryos, and the production of transgenic cacao embryos using non-tumorigenic strains of A. tumefaciens. Mature transgenic cacao embryos have produced roots and are being converted into plantlets at this time.

This process provides a new procedure for the introduction of foreign genes into cacao, and an alternative approach for the incorporation of novel mechanisms of resistance to viruses, fungi, and insect pests. In addition, this technology may enable the development of transgenic cacao varieties with improved agronomic performance characteristics, and also be useful in providing a new experimental system for the study of gene expression and function in cacao. The use of cacao varieties improved via the utilization of transformation technology may also facilitate the implementation of sustainable agricultural practices in cacao cultivation, and eventually help to maintain a healthy tropical forest ecosystem.

**Advantages**

* Unique method for modifying the plant genome to introduce valuable agronomic traits
* Could produce insect-, fungi-, and virus-resistant plants, as well as increase genetic diversity within the tropic ecosystem