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Tobacco Transformation

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1. Introduction

The generation of genetically transformed plants is central to, and has indeed revolutionized, plant molecular biology. This is true for studies at both the fundamental and more applied levels of research. For researchers interested in unraveling the roles of specific genes in particular pathways of growth and development, the introduction into plants of foreign genes and gene promoters linked to reporter genes allows the detailed study of the temporal, spatial, and quantitative expression of plant genes and the activities of associated regulatory sequences.

It is not yet possible to transform many of the important crop species, and therefore so-called model plants species are used widely in transgenic research. A model plant species, for use in such studies, can be defined as one that can be efficiently and simply transformed with foreign DNA. Furthermore, the transformed cells or tissues must then be able to regenerate to produce fertile mature plants that produce transgenic seed.

Over the years, one particular dicot species that has emerged as an excellent model plant for transgenic studies is *Nicotiana tabacum* (Tobacco). One tobacco cultivar commonly used is *N. tabacum* cv. Petit Havana SR1 (commonly abbreviated to SR1); the methods described here are specifically for this variety. However, the methods are also applicable to other cultivars, such as Samsun and Xanthi. The most efficient and technically most simple method of transforming tobacco is to infect leaf explants with disarmed strains of the naturally occurring soil-borne bacterium *Agrobacterium tumefaciens*, which contains a disabled (nononcogenic) Ti plasmid ***(1)***. The gene construct to be transferred is integrated between the T-DNA borders of a binary vector ***(2)***, which is introduced into the *Agrobacterium*. Following inoculation, and under

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