

## History of Coat Protein-Mediated Protection

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### 1. Introduction

Since the first demonstration by Powell-Abel et al. (1) that plants engineered to express the tobacco mosaic virus (TMV) coat protein (CP) gene can resist corresponding viral infection, a decade of research on CP-mediated protection (CPMP) has produced transgenic plants resistant to a multitude of different plant viruses. This field rapidly progressed from testing resistance in model plant systems under growth chamber conditions to conducting field trials on agronomically significant crops such as tomato, potato, sugarbeets, melons, cucumber, tobacco, and rice. In addition, this approach to protection has been extended by expression of other viral sequences corresponding to satellite RNAs, antisense transcripts, sense transcripts, defective interfering sequences, nonstructural genes, portions of genes, and mutated genes in transgenic plants.

The general process for development of protected plants is similar in all cases: cloning of the appropriate viral gene, transformation of selected host and identification of primary transformants, and testing for protection against infection. Although the features and extent of protection conferred in each case differ, the overwhelming conclusion is that accumulation of CP and/or CP transcripts expressed in transgenic plants inhibits the normal course of challenge virus infection.

### 2. Overview of Early Experiments

Early experiments on TMV (1,2), alfalfa mosaic virus (AIMV) (3,4), potato virus X (PVX) (5), and cucumber mosaic virus (CMV) (6) demonstrated that plants expressing easily detectable levels of the respective CP were protected against infection. Generally, transgenic plants were assayed for CP by Western analysis and expressors were utilized in protection tests. Protection tests usu-