

**Virus Resistant Transgenic Plants Expressing Disassembly Deficient Viral Coat Proteins**

**The Challenge:** Viral diseases of crop plants are much more difficult to control than those caused by insects and fungus and result in substantial shortages in food, fodder and fiber throughout the world. It is estimated that the losses caused by plant viral diseases are about \$2 billion per year. Control of the viral diseases through traditional means include; 1. Plant cultural practices, 2. Herbicide and pesticide applications to eradicate the host plants and vectors, respectively, 3. Selective breeding for viral resistance. Of these methods, breeding for resistance is probably the most economical, ecologically friendly and practical method available. Unfortunately, for some plant-virus systems, virus resistant plants are not available, so traditional breeding techniques cannot be applied. With the recent advances in molecular biology and gene manipulation techniques, it is now possible to integrate new disease resistance factors across species into crop plants where no resistance existed before.

**UMBI Solution:** UMBI scientists have developed a general method for protecting plants against infection by pathogenic viruses. More specifically, they have developed transgenic plants that express the mutant coat proteins of the pathogenic virus, where the amino acids having carboxylate side chains are replaced with uncharged amino acids. Such mutant coat proteins displace the wild type coat proteins of a wild type virus. Such uncharged mutant coat proteins inhibit the ability of the wild type virus to disassemble inside the plant cell, thus inhibiting an essential step in the viral multiplication process. These transgenic plants are immune to viral infection.

**Commercial Applications:** Method for mass production of transgenic crop plants those that are resistant to pathogenic viruses.

**Advantages:**

- Effective method for protecting plants against infection by different pathogenic viruses.
- Method can be broadly applied to any plant virus preparation.

**Patent Status:** Issued US Patent no. 5,723,750.

**Stage of Development:** Reduced to practice.

**Licensing Potential:** UMBI is seeking exclusive or non-exclusive licensees to part or all of this technology. The UMBI inventors would welcome the opportunity to collaborate with any licensee to further refine this invention or extend its capabilities.

**Inventors & UMBI Reference:** Culver, 95-016.

**Relevant Publications:**

1. Lu B, Taraporewala F, Stubbs G, Culver JN, “ Intersubunit interactions allowing a carboxylate mutant coat protein to inhibit tobamovirus disassembly”, *Virology*. 1998 Apr 25; 244(1):13-9.
2. Lu B, Stubbs G, Culver JN, “Carboxylate interactions involved in the disassembly of tobacco mosaic tobamovirus”, *Virology*. 1996 Nov 1; 225(1):11-20.
3. Culver JN, Dawson WO, Plonk K, Stubbs G, “Site-directed mutagenesis confirms the involvement of carboxylate groups in the disassembly of tobacco mosaic virus”. *Virology*. 1995 Jan 10; 206(1):724-30.

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