

1.1. Potential Risks on Field Release

The two main areas of concern for most transgenic plants are possible adverse effects of the expression of the transgene on animals feeding on the plant and spread of the transgene into wild plant species. There is no evidence that the expression of plant viral sequences could be detrimental to man or other animals feeding on transgenic plants; in fact, virus-infected plants have been eaten for millennia. Furthermore, the lack of recognized allergy problems caused by pollen from virus-infected plants indicates that the expression of viral transgenes is unlikely to cause any problems in this area.

The area of concern specific to viral transgenes is the potential risks on any interactions between the viral or virus-related sequences being expressed from the transgene and another virus superinfecting that plant. Three main scenarios are usually considered: synergism, recombination, and heteroencapsidation.

1.2. Synergism

The possible synergistic effect of a viral transgene on a superinfecting virus can have two manifestations. It could enhance the symptoms of the superinfecting virus. Such synergism between viruses is well-known, for instance, between potato virus X (PVX) and various potyviruses in tobacco and tomato (tomato streak). A recent report (*19*), demonstrating a synergistic effect of the expression of the 5' proximal sequence of tobacco vein mottling potyvirus as a transgene on infection with PVX, highlights that this problem has to be kept in mind. An alternative synergistic effect is that the expression of the transgene could mobilize a superinfecting virus that normally would be localized to the site of infection (subliminal infection). At present, there is no evidence of transgenically expressed CP giving any synergistic effect.

No detailed protocol is necessary for detecting synergistic reactions. Transgenic and nontransgenic plant lines should be inoculated with viruses that they are expected to encounter in the field, and the symptoms produced should be compared. More severe symptoms in the transgenic line(s) could be an indication of synergistic effects. However, they may also be caused by somaclonal variation caused by the transformation process.

1.3. Recombination

Three sorts of recombination have been recognized (*20*): homologous with crossovers between related RNAs at precisely matched sites, aberrant homologous with crossovers between related RNAs not at corresponding sites, and nonhomologous with crossovers between unrelated RNAs at noncorresponding sites. There is considerable evidence for extensive recombination in RNA viruses (*see refs. 20 and 21 for details*), and probably all three mechanisms have been involved at one time or another. It is generally considered that