Where it has been measured, mild strains have often been shown to cause a loss of yield of 5–10% ***(37,41)***, but this is considered acceptable if there is a high chance of a much greater loss caused by severe strain infection of unprotected plants.

The isolation of crossprotecting isolates may be difficult. Mild-strain (attenuated) isolates do appear to occur naturally in agriculture or wild plants ***(23)***, but their selection and matching to host genotype for optimum performance can be time-consuming. In other cases, it has been necessary to produce mild strains by mutagenesis with nitrous acid or UV light, or by high- or low-temperature treatment of infected plants. A deeper understanding of the molecular basis of attenuation ***(54,55)*** should aid in the construction of designed mild isolates.

Production of adequate amounts of inoculum of the crossprotecting isolate may also be difficult, because reduction in symptom severity and effects on host-plant growth can be associated with low virus multiplication. There is also an important need for quality control of the inoculum, in order to check that the virus has not produced more severe mutants during multiplication. This factor applies also to infection in the protected crop plants, although there seem to have been very few reports of these eventually developing severe infection as a result of changes in the protecting strain.

Inoculation of crops with the protecting strain can be a logistical problem and would clearly pose difficulties for direct-drilled, field-grown crops. Plants that are propagated in modules, then transplanted to the final growing site, such as tomatoes and cucurbits, can be conveniently inoculated at the seedling stage by spray gun and abrasive. Perennial crops, such as those propagated by budding and grafting, can be inoculated during the propagation process.

Concern has been expressed that the crossprotecting virus might interact with other unrelated viral infections of the crop to produce synergistic damaging effects. There do not appear to have been reports of this, and presumably the interaction could be checked experimentally.

There is also concern that a virus introduced in one crop for crossprotection may spread to other species and possibly cause severe damage there. Given the variable interaction between attenuated strains and different host genetic backgrounds ***(23)***, this is a concern that needs to be taken seriously, especially for viruses such as tomato spotted wilt, which have a very wide host range. The problem is perhaps less serious for those viruses, such as papaya ringspot, which have very restricted ranges ***(31)***.

The various problems associated with the use of crossprotection tend to emphasize the attractiveness of the alternative approach, of developing transgenic plants expressing the CP gene to confer virus resistance. This route raises ecological, risk assessment, and regulatory issues in its own right ***(56,57)***, but