Conventional Control for plant virus

INTRODUCTION

The use of fungicidal chemicals to protect crop plants from infection or minimise invasion is an important method for the control of many fungal diseases. No such direct method for the control of virus diseases is yet available. Most of the procedures that can be used effectively involve measures designed to reduce sources of infection inside and outside the crop, to limit spread by vectors, and to minimise the effect of infection on yield.

Correct identification of the virus or viruses infecting a particular crop is essential for effective control measures to be applied.

The three major approaches to conventional control of plant viruses are the removal or **avoidance of sources of infection**, **protecting plants from systemic infection**, and **deployment of resistance**.

**AVOIDING INFECTION**

A. **Removal of Sources of Infection** It is obvious that there will not be a virus problem if the crop is free of virus when planted and when there is no source of infection near enough to allow it to spread into the crop.

**B. Virus-Free Seed**

Where a virus is transmitted through the seed, such transmission may be an important source of infection, since it introduces the virus into the crop at a very early stage, allowing infection to be spread to other plants while they are still young. Where seed infection is the main or only source of virus, and where the crop can be grown in reasonable isolation from outside sources of infection, virus-free seed may provide a very effective means for control of a disease.

Lettuce mosaic virus is a good example of controlling a virus problem through clean seed.

**C. Virus-Free Vegetative Stocks**

For many vegetatively propagated plants, the main source of virus is chronic infection in the plant itself. With such crops, one of the most successful forms of control has involved the development of virus-free clones—that is, clones free of the particular virus under consideration.

**D. Modified Agronomic Practices**

Virus infection can be reduced by modifying agronomic practices such as breaking the infection where one major susceptible annual crop or group of related crops is grown in an area and where these are the main hosts for a virus in that area by ensuring that there is a period when none of the crop is grown.

**E. Quarantine Regulations**

Most agriculturally advanced countries have regulations controlling the entry of plant material to prevent the introduction of diseases and pests not already present. Many countries now have regulations aimed at excluding specific viruses and their vectors, sometimes from specific countries or areas.

**STOPPING THE VECTOR**

plant viruses are usually transmitted by arthropod vectors, but some are transmitted by fungal vectors, and others, particularly Tobacco mosaic virus (TMV).

**A. Air-Borne Vectors**

Before control of virus spread by air-borne vectors can be attempted, it is necessary to identify the vector. This information has sometimes been difficult to obtain.

**1. Insecticides**

The application of insecticides is currently one of the main ways of controlling insect pests of plants. To prevent an insect from causing direct damage to a crop, it is necessary only to reduce the population below a damaging level.

**2. Insect Deterrents**

The application of various chemicals or materials can deter aphids from landing on or feeding on crop plants. Spraying mineral oils on plants affects the feeding behaviour of aphids and leafhoppers and can give some protection against non-persistent viruses. Laying aluminium strips on the ground between crop rows repels aphids coming into the crop through reflecting UV light.

**3. Agronomic Techniques**

A tall cover crop will sometimes protect an under sown crop from insect-borne viruses. For example, cucurbits are sometimes grown intermixed with maize. It is thought that incoming aphids land on the barrier crops, feed briefly, and either stay there or fly away.

**B. Soil-Borne Vectors**

Most work on the control of viruses transmitted by nematodes and fungi has centred on the use of soil sterilization with chemicals.

**PROTECTING THE PLANT**

Even if sources of infection are available and the vectors are active, a third kind of control measure is available: protecting inoculated plants from developing systemic disease. There are essentially three approaches that have been used to protect plants, using a mild strain of the virus (termed cross-protection or mild strain protection), the use of chemicals, and genetic protection (conventional resistance and transgenic resistance).

**A. Protection by a Plant Pathogen**

Inoculation of plants with either a mild virus strain or with satellite RNA (termed cross protection) has been used to protect against severe virus strains-. Infection of a plant with a strain of virus causing only

**B. Antiviral Chemicals**

Considerable effort has gone into a search for inhibitors of virus infection and multiplication that could be used to give direct protection to a crop against virus infection in the way.

**TYPES OF RE S I S T ANCE TO A PLANT VIRUS**

There are three main types of resistance and immunity to a particular virus:

1. Immunity involves every individual of the species; little is known about the basis for immunity, but it is related to the question of

the host range of viruses.

2. Cultivar resistance describes the situation where one or more cultivars or breeding lines within a species show resistance, whereas others do not.

3. Acquired or induced resistance is present where resistance is conferred on otherwise susceptible individual plants following inoculation with a virus.