

CITRUS VIROIDS

1 PATHOLOGICAL PROFILE

1.1 Distribution and status

The citrus exocortis viroid (CEV) induces a disease called exocortis which causes bark-scaling on the stems of sensitive rootstocks, e.g., trifoliate orange, citranges and Rangpur lime, and stunting of the scion. In Australia this disease is referred to as “scaly butt”. The causal agent is present in many of the old line orchards on rough lemon rootstock in southern Africa. These trees on rough lemon are symptomless carriers of this disease and serve as a source of infection to new plantings on susceptible rootstocks.

Cachexia is a disease affecting mandarins, tangelos, tangors, sweet lime and *Citrus macrophylla* grown as scions or rootstocks. The causal agent is the Group IIb citrus viroid.

Gum pocket disease is caused by variants of Group III citrus viroids and affects trifoliate orange and citrange rootstocks. Canopies of trees on infected rootstocks are stunted but less so than trees affected by CEV.

1.2 Description

CEV is one of three groups of citrus viroids (CVd) found which are pathogenic to citrus. The other two groups cause cachexia (CVd IIb) and gum pocket (CVd III). In many instances CEV and CVd III occur together in trees.

The causal organisms of these diseases differ from other plant viruses in that they consist of naked circular single-stranded RNA molecules. Citrus viroids are highly resistant to heat inactivation and to many chemicals used to inactivate viruses. Implements such as pruning secateurs, hedging equipment, harvesting clippers etc. can remain infectious for more than 12 months.

1.3 Symptoms

The presence of CEV in citrus on sensitive rootstocks is revealed by bark cracking and sealing on the rootstock accompanied by stunting of the scion canopy. Bark cracking

can be observed at soil-level when trees are only two years old. Bark scaling usually appears later when trees are 4-8 years of age. Fruit quality remains unaffected. The disease is more severe under hot, humid conditions.

Gum pocket disease is characterized by gum pockets in the bark and wood tissues of trifoliate orange rootstocks and severe stunting of affected sweet orange scions.

The diagnostic symptoms for cachexia are phloem (bark) discoloration by gumming, undulating stem pitting or bumps and projections on the bark, which fit into depressions in the wood. Gum spots are usually prominent in the bark and are readily seen by slicing sections through the bark with a knife.

1.4 Transmission

Citrus viroids are graft transmissible and they are readily transmitted mechanically as a contaminant on pruning secateurs, budding knives, harvesting clippers, slashers and hedging equipment. Transmission via natural root grafting in high-density plantings can also occur

1.5 Seasonal occurrence

Many old line orchards on rough lemon are infected with CVd. These trees are all symptomless carriers of the diseases and serve as sources of infection to new plantings on sensitive rootstocks, e.g., trifoliate orange, citranges, trifoliate hybrids (X639, Minneola x trifoliate) and Rangpur lime. Swingle citrumelo appears to be tolerant to CEV but not to CVd III. CVd can spread to these adjacent plantings once harvesting and pruning operations commence in these orchards. The rate of spread can be as high as 70% within 14 years. The younger the trees are when they become infected the more severe the effect on growth and yield.

2 MANAGEMENT ASPECTS

2.1 Disease assessment

Trees on susceptible rootstocks that have become infected in the nursery either through use of contaminated budding knives or

uncertified budwood can exhibit symptoms two years after planting in the field. These symptoms take on the form of bark cracking at soil-level; tree height does not appear to be significantly affected at first, but canopy volume is severely affected. The reaction is more severe on trifoliolate orange than on its hybrids, e.g. X639 and the citranges. Trees on Swingle citrumelo appear tolerant. The symptoms of bark scaling appear after 4-6 years and stunting becomes very apparent. Where infected uncertified budwood is used to propagate nursery trees the orchards never become economically productive and should be removed. Productivity can be reduced by more than 60% when trees become infected in their pre-bearing years.

Trees that become infected after 10 years of age by means of contaminated implements will probably not exhibit these severe symptoms as systemic infection in large trees by CVd is not as rapid as with other virus diseases.

Mandarins and tangelos on CEV-tolerant rootstocks e.g., rough lemon, are sensitive to cachexia (CVd IIb) which can accompany CEV and gum pocket in old line citrus. This disease can cause the demise of these trees.

2.2 Control options

2.2.1 Cultural

- Growers should only purchase trees from CIP-accredited nurseries who make use of certified budwood supplied by the Citrus Foundation Block.
- Growers should disinfect the cutting edges of all the pruning, hedging and harvesting implements before moving from an old line orchard on rough lemon to an orchard on a CVd sensitive rootstocks.

When pruning within an orchard on a sensitive rootstock, disinfect the implements after each tree has been pruned.

Disinfect implements with a 30% Jik solution (5% sodium hypochlorite) by dipping the cutting edges into the disinfectant or applying the disinfectant

with a hand spray. To reduce corrosion caused by the sodium hypochlorite, the blades can be treated with the following solution at the end of each day: 1 part spray oil: 10 parts vinegar: 39 parts water.

- Remove all obviously stunted trees and trees exhibiting bark cracking or scaling on sensitive rootstocks.

2.2.2 Plant protection products

None available.