

Viroids in Australian citrus

Viroid infection can lead to stunting and tree decline

Graft-transmissible viroids are a serious economic threat to citrus production. Viroid diseases can cause stunting, yield loss and even the death of particular scion and rootstock combinations – yet other varieties may be symptomless carriers.

Symptoms will not be seen in nursery trees, they will appear a few years later in the orchard. By this time, the disease is likely to have spread to surrounding trees through the use of cutting tools or potentially by root grafting. Nothing can be done to rid infected trees of viroids; infected trees need to be pulled out and replanted. The only way to be sure of the health of your budwood is to purchase it from a tested source such as Auscitrus.

Eight viroids are known to infect citrus around the world and there are different viroid strains within each of those viroid types. Citrus exocortis viroid, citrus bent leaf viroid, hop stunt viroid, citrus dwarfing viroid, and citrus viroids V, VI and VII are found in Australia.

Viroids that are known to be most devastating to citrus production are **exocortis** and a strain of hop stunt viroid that causes **cachexia**. Citrus bark cracking viroid is a minor pathogen of citrus.

Exocortis infection has been found to reduce yields by nearly 50% on citrange and 69% on *Citrus (Poncirus) trifoliata* rootstock during the first 8 years.

Viroid diseases have NO CURE

Prevention is the ONLY OPTION

Be sure to use healthy budwood from Auscitrus

There is no cure for viroid infections; management is through the use of pathogen-free budwood from the Auscitrus propagation scheme. The small cost for using Auscitrus-tested material is negligible when compared to the cost of orchard establishment.

Viroids can be spread via infected buds, on cutting tools (like budding knives, secateurs or hedging machines) and by root grafts between trees in the orchard. The only disinfectant recommended for treating cutting tools is chlorine bleach (1.25% or 12,500 ppm sodium hypochlorite solution). Viroids have been known to survive on cutting tools for 12 months when left untreated.

Sterilise cutting tools with bleach to kill viroids

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Cachexia affects some mandarins, tangelos, kumquats and Rangpur lime. Many citrus species are symptomless hosts. Infection leads to severe stunting and tree decline, with characteristic gumming and pitting.



Healthy (L) and cachexia-infected (R) trees



Symptoms of gumming (L) and pitting (R) on trees infected with cachexia

Exocortis disease symptoms develop when infected budwood is grown on susceptible rootstocks such as trifoliata, citrange, Swingle citrumelo and Rangpur lime. This disease can infect all varieties of citrus but is symptomless in many hosts. Affected trees can exhibit stunting and decline; and bark scaling may be observed on trifoliata rootstocks.



Bark scaling on *Citrus trifoliata* rootstock caused by exocortis infection



Exocortis-infected tree showing stunting (L) and a healthy uninfected tree (R)

Viroid dwarfing: Viroids that induce mild to moderate dwarfing in trees without a negative impact on yield or quality can be used to create high density plantings, and a strain of viroid III that induces mild dwarfing is used commercially in Australia, mainly for oranges. Graft-transmissible dwarfing requires a high level of management. If trees are stressed or poorly managed, the dwarfing effect is increased and could result in undersized trees which do not fill their allotted space, reducing the overall production of the block.