

2021–2022 Florida Citrus Production Guide: Exocortis, Cachexia, and Other Viroids¹

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Exocortis and cachexia are diseases caused by viroids and can lead to stunted growth and reduced yields in infected plants. Viroids are small, infectious circular-RNA molecules. Exocortis causes dwarfing and bark scaling on rootstocks such as trifoliolate orange and many of its hybrids, including Rangpur lime, Carrizo citrange, and others.

Stunting is usually severe on trifoliolate orange rootstock, less severe on citranges and Rangpur lime, and mild on Swingle citrumelo. Swingle citrumelo does not usually show bark scaling. Cachexia, also called xyloporosis, causes severe pitting and gumming in the bark and wood of the trunks and branches on some tangerines and their hybrids. Orlando tangelo is especially sensitive. Affected rootstocks include *Citrus macrophylla*, some mandarins, and sweet lime. Another viroid that occurs commonly in Florida is citrus dwarfing viroid (formerly citrus viroid III), which affects the same rootstocks as citrus exocortis viroid and causes stunting but no scaling.

Viroids are transmitted primarily by the introduction and propagation of infected budwood. There is a constant risk that symptomless budwood is actually carrying viroids and will spread them without showing any disease symptoms. Viroids will also spread mechanically from tree to tree on pruning equipment, budding knives, and hedging and topping equipment if they are not disinfected. Viroids can be detected by indexing on sensitive biological indicators,

such as Etrog citron for exocortis and dwarfing viroids, and Parson's Special mandarin for cachexia. Biological indexing on Etrog citron requires 3–6 months, and indexing on Parson's Special mandarin for cachexia requires at least one year. In the laboratory, detection is much more rapid by sensitive laboratory procedures, such as several PCR or hybridization techniques. In Florida, the decrease in the incidence of viroid diseases is because budwood sources used by nurseries are always certified free of viroids through the [Bureau of Citrus Budwood Registration](#).

Recommended Practices

1. Budwood sources used by nurseries should be certified free of viroids, especially if the rootstock or cultivars employed are sensitive to these viroids. Growers should only purchase trees propagated from certified sources.
2. Knives and pruning tools in the nursery should be disinfested with a *fresh* solution of bleach (1% free chlorine) when moving from one budwood source to another.
3. Groves suffering from severe stunting caused by exocortis or from cachexia should be removed and replaced with healthy trees.
4. Although hedging and topping can spread viroids, infection of mature trees with viroids is usually not

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detrimental to productivity. It is recommended to disinfect equipment when using sensitive rootstock varieties.

5. Extra cautions are needed when using newly released citrus rootstock varieties, whose sensitivity to viroids is still unknown.