

2019–2020 Florida Citrus Production Guide: Exocortis, Cachexia, and Other Viroids¹

O. Batuman, A. Levy and R. H. Brlansky²

Exocortis and cachexia are diseases caused by viroids, which can lead to stunted growth and reduced yields in affected 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 such as Carrizo citrange, Rangpur lime, 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. Rootstocks affected include *Citrus macrophylla*, some mandarins, and sweet lime. Another viroid that occurs commonly in Florida is *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 group III 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 nurserymen are always certified free of viroids through the Bureau of Citrus Budwood Registration.

Recommended Practices

1. Budwood sources used by nurserymen 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. Trees moderately dwarfed by exocortis do not usually decline and do not need to be removed if yields are acceptable.

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2. O. Batuman, assistant professor, Plant Pathology Department, Southwest Florida Research and Education Center; A. Levy, assistant professor, Plant Pathology Department, and R. H. Brlansky, professor emeritus, Plant Pathology Department Citrus Research and Education Center; UF/IFAS Extension, Gainesville, FL 32611.

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4. Although hedging and topping can spread viroids, infection of mature trees with viroids is usually not 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.