

Diplodia Stem-End Rot¹

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CAUSAL ORGANISM AND DISEASE CYCLE

Diplodia stem-end rot is caused by the fungus *Diplodia natalensis*. It is a major decay of citrus fruit produced in warm, humid climates typical of Florida. Spores of the fungus are produced in specialized structures called pycnidia, which are formed on the surface of deadwood present in the tree canopy. Initial infection of deadwood is caused by airborne spores that are produced on debris found in the soil. Fruit infections occur, however, mostly from the localized dispersal of large numbers of waterborne spores produced in the deadwood. Spores are dispersed to the fruit during the warm, rainy, summer months. The fungus colonizes dead tissue on the surface of the button, and remains quiescent until after harvest. The disease is rarely observed on normal mature fruit attached to the tree. After harvest, the fungus invades the stem-end of the fruit when the button abscises and provides a temporary natural opening for penetration. Ethylene degreening, which is used to improve rind color when natural color break is delayed by persistent high field temperatures, significantly enhances stem-end rot because of the stimulation of abscission by ethylene.

The temperature (85°F) and relative humidities (92-96%) used in degreening also favor fungal growth and disease development. Sporulation rarely occurs on infected fruit, and thus, contamination of handling and packing equipment by the fungus is not a major problem like that with green mold.



Diplodia stem-end rot.

SYMPTOMATOLOGY

Initial symptoms of *Diplodia* stem-end rot are similar to those of *Phomopsis* and *Alternaria* stem-end rots because lesions originate at the stem-end of the fruit. However, shortly after development the lesion often proceeds unevenly down the side of the fruit along the carpel walls forming finger-like projections of brown tissue. The

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fungus progresses rapidly through the fruit core, usually reaching the stylar-end much sooner by this route than through the rind. Typically, decay is formed at both ends of the fruit before involving the entire fruit. There usually is a sour, fermented odor and sometimes the fruit will become quite black. Decayed tissue is initially firm and later becomes wet and mushy. Surface mycelium appears only in advanced stages of infection at high relative humidity levels. The decay does not spread from infected to healthy fruit in packed containers. Symptoms often appear within 7 to 10 days of harvest at ambient temperatures. Occasionally, the decay develops at injuries on the side or stylar-end of the fruit.

CONTROL

Good cultural practices that produce thrifty trees with minimal amounts of deadwood or removal of deadwood by pruning can aid in the control of Diplodia stem-end rot. Harvesting by pulling rather than clipping will reduce the decay because some of the buttons that contain the inoculum will be removed. Proper ethylene concentrations of 5-10ppm needed for degreening should be maintained, because higher levels will not enhance degreening, but will significantly increase the incidence of Diplodia stem-end rot. Spot picking, or delayed harvest for better natural fruit color development, will reduce the time of degreening required, and the occurrence of decay. Immediate cooling to at least 50°F after packing will effectively retard stem-end rot development. Chemical fungicide treatments approved for control of Diplodia stem-end rot are discussed in Circular 359-A, Postharvest Decay Control Recommendations for Florida Citrus Fruit. Treatments applied before degreening are much more effective than ones applied following degreening.