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Stem-End Rot[1]

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The fungus *Diaporthe citri* Wolf causes stem-end rot. Stem-end rot occurs as a postharvest decay in the fresh market trade where long-term handling, storing, and transporting are involved. Stem-end rot of fruit occurs 10-20 days after harvest during storage or transit most commonly in the latter part of the harvest season (January - June). Because fruit intended for processing is usually not held for more than one week, stem-end rot is of little consequence on fruit processing. Stem-end rot is of consequence only for fresh market citrus.

FACTORS NECESSARY FOR INFECTION

For infection by the fungus to occur, there must be recently killed young twigs in the tree canopy to support spore production. Temperature and rainfall conditions regulate disease severity. After a spore lands on susceptible tissue, a period of 10-12 hours of moisture is required for infection at 77° F (25° C) while at 59° F (15° C) 18-24 hours of wetness are necessary for infection. Thus extended wet periods resulting from afternoon rain showers plus dew periods in May and June coupled with warmer temperatures during these months create favorable weather for infection. In contrast, rainfall prior to May in central and south Florida is associated with fast-moving cold fronts that are quickly followed by temperatures that are less favorable (too cool) for infection. Also, winds behind the front quickly dry surface moisture on plant tissue.

SEASONAL DEVELOPMENT

The fungus *Diaporthe citri* produces spores called ascospores (sexually produced) and pycnidiospores (asexually produced). This latter spore type is the part of the life cycle that provides most of the inoculum for disease and often is referred to as *Phomopsis citri*. Ascospores are formed within a vesicle-like structure on decaying wood on the soil or on dead branches remaining on the tree or in brush sites. These spores are produced in relatively small numbers and contribute slightly to disease potential in a grove. Their main contribution to disease development relates to spread of the fungus over long distances because ascospores are windborne.

Pycnidiospores, on the other hand, are produced abundantly on dead branches within a flask-shaped structure (pycnidium). They provide for short distance spread within a tree or from one tree to an adjacent tree by rain splash. Even more restricted movement of these spores can occur by rain or irrigation water washing over infected branches and dripping onto lower leaves, fruit, or live branch tissue of the tree canopy. Therefore, freeze-damaged citrus trees, older groves, and poorly maintained groves with much dead

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wood should be considered high stem end rot incidence areas. All types of citrus are susceptible. Other hosts for this fungus have not been identified.

Temperature and moisture conditions after May during the summer months are favorable for spore production and infection. Pycnidiospores of the fungus carried in water to immature fruit germinate on necrotic tissue of the calyx surface, and the fungus remains quiescent until after mature fruit are harvested. Stem end rot develops when hyphae (growth filaments) of the fungus grow from necrotic tissue through the abscission area into the base of the fruit.

Warm temperatures associated with ethylene degreening after harvest are more favorable for development of *Diplodia natalensis*, the other stem-end rot fungus, than for growth of Phomopsis. Phomopsis becomes more prevalent than Diplodia later in the season from January to June when naturally colored fruit do not require degreening.

STEM-END ROT SYMPTOMS

Symptoms of stem-end rot usually begin to appear 10 days after harvest. The infected area is soft, tan or brown. The internal core of the fruit becomes infected and turns dark. Later season fruit are more apt to have stem-end rot than early season fruit.

CONTROL RECOMMENDATIONS

Stem-end rot is reduced by using control measures in the field during production and additional measures during postharvest handling periods. Because the calyx of immature fruit on the tree is also infected during periods of melanose infection, fungicide sprays and removal of dead wood (source of spores) for melanose control will contribute to Phomopsis stem-end rot control. Such beneficial effects may not show up until the fruit is harvested (possibly months later) and stored at cooler temperatures.

See the *Florida Citrus Pest Management Guide*: Postharvest Decay - Stem-End Rot and Green Mold for current commercial fungicide recommendations. In the packinghouse, the use of fungicides in a postharvest application are necessary regardless of prior control measures. Application of fungicides with water is superior to the incorporation of fungicides in the wax. Throughout harvest and postharvest periods, fruit should not be handled in a rough fashion.