

Managing melanose in citrus

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In coastal orchards one of the major factors contributing to fruit blemish is the disease melanose, caused by the fungus, *Diaporthe citri*. All citrus varieties are susceptible to melanose infection. Melanose can affect trees at any age and damages fruit, leaves, twigs, branches, and in some circumstances, the main trunk of the tree.

Symptoms

Damage is superficial and does not affect internal fruit quality. On the fruit, leaves and small twigs, small, dark brown to black spots are produced which are raised and rough to touch. The spots are superficial and can be removed with your fingernail. The incidence of melanose usually increases as trees age and the amount of dead wood in the canopy increases.

The melanose fungus also causes a wood rot which occurs when trees are stressed, such as by drought. It causes a cinnamon brown discolouration of bark with a well defined margin between healthy and diseased tissue, often with streaks of yellow gum. The melanose fungus also causes one form of stem end rot of fruit (phomopsis stem end rot).

Infection periods

Spores of the melanose fungus arise from fruiting structures (pycnidia) that develop in dead citrus tissue, particularly small twigs that have recently died. The spores are released by rainfall and splashed



Mudcake melanose

onto the fruit. At 25°C periods of continuous wetness exceeding 9 to 12 hours are required for spore germination and penetration of the tissue. Much longer periods of wetting are required for infection if the temperature drops below 20°C.

Susceptibility of citrus tissue

Melanose attacks the foliage, fruit and twigs when they are immature. As the tissues mature they become more resistant to infection. Immediately after petal-fall the young developing fruit are very susceptible to infection and if wet conditions prevail for several days at this stage, serious disfigurement of fruit will occur. After several weeks the rind becomes more resistant to infection, so that by eight or nine weeks after petal fall, no further infection of fruit can occur (Kiely, 1973). The symptoms of melanose on fruit can differ according to the time and level of infection. 'Mud cake' melanose develops when the

rind is heavily infected shortly after petal fall, mostly on late bloom fruit. Infection towards the end of the period of susceptibility produces small spots referred to as flyspeck melanose (Whiteside, 1976).

A leaf remains susceptible to melanose infection for only about a week after unfolding from the bud. Although immature leaf growth can be infected in the early spring it is not usual for melanose to be active in August to September. However, the late summer leaf flush is often badly infected. Serious defoliation and death of shoots can adversely affect the productivity of trees. This applies particularly to Washington navel oranges (Kiely, 1973).

Disease severity is greatly affected by tree vigour. Young vigorous trees need precautionary spraying in early years. But as dead wood increases, routine spraying against melanose is essential to produce fruit of satisfactory external appearance for the fresh market.

Control

Obviously prevention is better than cure, but the cleaning out and removal of dead wood to remove inoculum of the melanose fungus is important, especially in older trees.

Protectant copper sprays are the only product registered for melanose control. Timing of spray applications is very important. With Washington navel and Valencia oranges the spray should be applied at full petal fall. With lemons where lemon scab is also a problem, the initial application should be made at half petal fall (Kiely, 1973).



Melanose symptoms around the stem end of fruit highlights how the spores have travelled in water down the stem and onto the fruit.



Flyspeck melanose

In wet weather, especially if melanose is serious (particularly in older trees which contain a lot of dead wood), a follow-up spray should be applied 6–8 weeks after the initial spray.

In Florida, Whiteside (1985) considered it impossible for one treatment to protect the fruit for the whole 9–12 week period of fruit susceptibility. If a treatment is applied at petal fall, the fruit will be too small to retain much fungicide and what little material is retained will soon be dissipated through fruit enlargement, if not by rainfall or irrigation.

With the petal fall treatment, only 3–4 weeks protection against melanose can be expected in wet conditions, leaving another 6 weeks for the fruit to be attacked. The copper sprays act as protectants, preventing infection of the young developing fruit. The melanose fungus harbored in the dead wood throughout the framework of the tree is little affected by these sprays and they do not reduce the inoculum available from the dead wood.

Where melanose leaf infections are likely to be serious on foliage in late summer, a further protectant copper spray should be applied.

For more information on using copper sprays in citrus refer to the Citrus Fact Sheet *Using copper sprays to control diseases in citrus* (NSW Department of Primary Industries, October 2004).

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