

# Managing lemon scab in citrus

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Scab is a serious disease of all lemon varieties on the coast. The disease also affects Rangpur lime, and rough lemon rootstocks. Scab is caused by the fungus *Elsinoe fawcettii*.

**Symptoms**

Citrus scab attacks the fruit, leaves and twigs, producing slightly raised, irregular scabby or wart-like outgrowths. The scabs are grey or pinkish at first and become darker with age. They are more common on lemon fruits than leaves. The raised lumps associated with scab can be confused with symptoms caused by the disease botrytis or with windrub abrasions.

**Disease source and spread**

Spores of the fungus are readily produced on the surface of scab lesions on young fruits and leaves throughout the year. The Rough lemon rootstock is also very susceptible to scab and can act as a source of the fungal inoculum. Spores of the fungus are spread in the orchard by rain, overhead irrigation and during spraying operations (Whiteside 1975). Dew may also cause the spores to be liberated from the lesions but due to the limited splashing action, there would only be localised dispersal (Whiteside 1975). Some dry spores can also be spread by winds in excess of 2 m/s (Whiteside 1975, 1980).

**Infection periods**

Leaves are most susceptible to infection just as they emerge from the bud up until they are 25% expanded and become resistant before reaching full size. Immature lemon fruits are susceptible to infection from half petal-fall to about 12 weeks later (or 3–4 cm in diameter).

For germination and infection to occur the scab spores need a wetting period from rain, overhead irrigation or spraying of at least 4 hours continuously or 1–2 hours followed by 3–4 hours within the next 24 hours. Brief wetting of foliage by non-fungicidal spray treatments has also been found to promote infection (Whiteside 1975). Temperature does not appear to have a major impact on the disease but spores germinate quicker at higher temperatures.

The severity of infection by citrus scab depends on the spore load in the trees and the amount and frequency of wetting periods, whilst the growth flush and fruit rind are susceptible to attack (Whiteside 1975). The extended bloom period in lemons makes accurate timing of sprays difficult.



## Control

Protective copper sprays are the only products registered to control scab in citrus. Since copper is a protectant fungicide the entire fruit surface needs to have a continuous coating of copper in order to be protected from infection by the fungal spores. This protective copper coating does not expand as the fruit grows so unprotected gaps on the fruit surface will occur and these areas will be susceptible to infection (if conditions are conducive). Therefore the protective copper layer may need to be reapplied to the growing fruit during the susceptible stage.

Another problem with controlling scab in lemons is the extended flowering and multiple cropping habit of these trees in warmer areas and the decision of when to apply the protective sprays. In areas where there is only one main crop a year a control strategy is simpler to implement. Overall control is a combination of both management practices and protective copper sprays.

Trees need to be regularly pruned to keep them open and free of deadwood. This will help to reduce the source of disease spores, allowing for better air movement within the tree and better spray coverage inside the tree. In coastal areas if trees are not regularly pruned then they should be replaced after 10–12 years because of the amount of dead wood and subsequent disease load in the trees.

The fruit surface needs to be protected until fruit is 3–4 cm in diameter (9–12 weeks). The recommendation for timing of copper sprays has traditionally been at the main flowering in spring at quarter to half petal fall and then to apply a second copper spray 6–8 weeks later. However, due to the habit of lemon trees producing multiple crops, copper sprays may need to be applied at other times of the year to protect the spring and summer crops. Obviously it is highly unlikely that the first spray would protect the fruit continuously for 6 weeks in wet conditions.

The best control strategy is to get the first spray on at the right time (quarter to half petal fall). The timing of your next spray will be variable depending



on weather conditions. For example, if the weather conditions are generally dry after the first spray and rainfall events are unlikely to cause a spore release then a second spray at 6 weeks may be all that is required. However if the weather is rainy and it is likely to trigger an infection then the second spray may need to be applied earlier.

In the end there is no hard and fast rule; it is a choice of which crop needs protecting and putting the sprays on at the right time and then finetuning the program according to local weather conditions. On the Central Coast of NSW based on weather data collected locally it appears that the spring and summer crop lemons are more prone to lemon scab than the winter crop, due to the annual rainfall patterns.

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).

## References

Whiteside, JO 1975, 'Biological characteristics of *Elsinoe fawcettii* pertaining to the epidemiology of sour orange scab', *Phytopathology* 65: 1170-1177

Whiteside, JO 1980, 'Epidemiology and control of citrus scab in Florida', *Proceedings of the International Society of Citriculture, Griffith, Australia*. Florida Agricultural Experiment Station Journal Series 1270, University of Florida, Gainesville, United States, pp 200-204.

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ISSN 1832-6668

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Job number 8556