

CITRUS BIOSECURITY THREAT: Mal Secco

Symptoms

Typical symptom is the yellowing and clearing of small veins on leaves. Epinasty of young leaves is followed by wilting, drying up and leaf shedding.

In spring, shoot chlorosis is followed by dieback of twigs and branches. On the affected twigs, immersed, flask-shaped or spherical fruiting bodies appear as black points within lead-grey or ash-grey areas on withered twigs. Growth of sprouts from the base of the affected branches, and suckers from the rootstock, is a common response of the tree to mal secco. Initially, individual branches or sectors may be infected. Gradually, the infection moves downwards from shoots to the limbs, trunk and roots, affecting the entire tree, which eventually dies.

Upon cutting into the infected twigs, or after peeling off the bark of the branches or the trunk of the infected trees, typical salmon-pink or orange-red discolouration of the wood can be observed. This internal symptom is associated with gum production within the xylem vessels. On fruit, browning of vascular bundles can be observed in the area of insertion of the peduncle.

Although most of the symptoms of mal secco are not specific, the syndrome of the disease is quite characteristic. In addition to the more common form of mal secco, two different forms of the disease can be distinguished. "Mal fulminante" is a rapid fatal form of the disease apparently caused by root or stem infection, which leads to a systemic invasion of the functional xylem by the pathogen, and sudden wilting of branches or the whole tree. "Mal nero" is a result of chronic infection of mature trees, most likely originating from the roots, leading to browning of the heartwood without any external symptoms at first. However, when the pathogen invades the outer functional xylem, infected trees collapse suddenly.



Migheli *et al.*, Plant Disease (2009)

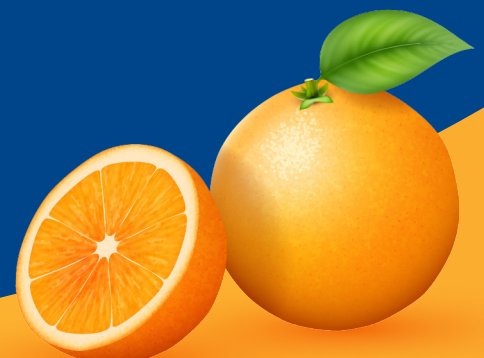
Characteristic salmon-pink discolouration of the wood



Ercan Canihos

The disease

- Mal secco is caused by the fungus *Plenodomus tracheiphilus*.
- It is a destructive vascular disease of citrus, and the most destructive fungal disease of lemons in the Mediterranean and the Black Sea region.
- Up to 100% of trees in a lemon orchard can be affected, and yield losses of more than 60% have been reported.
- The disease reduces the quantity and quality of lemon production due to reduction of canopy volume or death of the tree.
- Mal secco is difficult to control.





Migheli *et al.*, Plant Disease (2009)

“Mal nero” - chronic infection leads to browning of heartwood



Migheli *et al.*, Plant Disease (2009)

Vein clearing and chlorosis of lemon leaves affected by mal secco disease



Migheli *et al.*, Plant Disease (2009)

Withered twig of lemon with fruiting bodies of *P. tracheiphilus* in ash-grey area of twig

Host range

- Almost all *Citrus* spp. are susceptible, but lemon (*Citrus limon*) is the most affected
- Rootstocks affected include Rough Lemon and Carrizo and Troyer citranges
- Elm (*Ulmus* sp.), Kumquats (*Fortunella*), trifoliolate orange (*Poncirus*, *Poncirus trifoliata*), x *Citrofortunella microcarpa*

Current distribution

- Europe (around the Mediterranean Basin and the Black Sea)
- Asia
- Countries in Africa (Algeria, Egypt, Libya, Tunisia, Uganda)
- Canada

Method of spread

- **Infected plant material**
Citrus propagation material (trees, cuttings, grafts, budwood, rootstock seedlings)
- **NOT seed transmitted**
- **NOT fruit transmitted**

Preventative actions

- Quarantine procedures for importation of citrus propagation material and other hosts
- Plant certified disease-free citrus trees
- Awareness and surveillance to ensure early detection and rapid implementation of control measures
- Do not bring illegal plant material into South Africa and onto your farm!



For more information on this disease, or if you find anything unusual, contact Wayne Kirkman from CRI's Biosecurity Division: waynek@cri.co.za, 084 458 0349

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