

Citrus biosecurity threats

This is the final instalment in our series on citrus biosecurity threats. By CRI Biosecurity Division

Yellow vein clearing disease



Vein clearing and flecking on Eureka lemon

Symptoms

Symptoms are most prominent on lemons. There are foliar symptoms of vein clearing and leaf crinkling, with irregular, elongated chlorotic spots that are predominantly visible on young growth. Veins on the underside of the leaf become water-soaked and turn brown.

Foliar symptoms are accompanied by leaf drop. On other citrus types, irregular ring-spots may be seen on leaves, and mosaic-like patterns on fruit. In severe infections, trees die back and fruit are malformed, causing reduced fruit quality. Symptoms are more visible in the cooler periods of spring and autumn and less noticeable in hot environments. Yellow vein clearing disease can be asymptomatic on some citrus cultivars.

The disease

- Yellow vein clearing disease is caused by citrus yellow vein clearing virus (CYVCV).
- The disease is associated with poor tree vigour, reduced yields and decreased marketability of fruit.
- There is no treatment once trees become infected. Infected trees need to be eradicated.

Can be confused with

Atypical chlorotic ringspot, like those induced by Indian chlorotic ringspot virus (ICRSV), were recorded on 'Kinnow' mandarin and 'Malta' sweet orange.

Host range

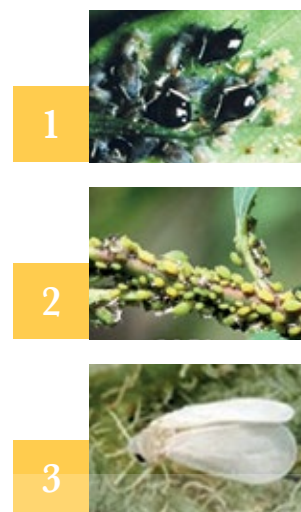
- All *Citrus* spp.
- Severe symptoms are observed on 'Eureka' lemon and sour orange.
- Grapevines and a range of herbaceous plants and weed species.

Current distribution

- Turkey
- China
- India
- Iran
- Pakistan
- California, US
- Republic of Korea
- Italy

Method of spread

- Infected plant propagation material:
 - Citrus propagation material (trees, cuttings, grafts, budwood, rootstock seedlings) and propagation material of other hosts
- Viruliferous insect vectors:
 - Aphids: *Aphis craccivora* on non-citrus hosts, *Aphis spiraecola* on citrus and non-citrus hosts
 - Whitefly: *Dialeurodes citri*
- Not transmitted through fruit or seed.

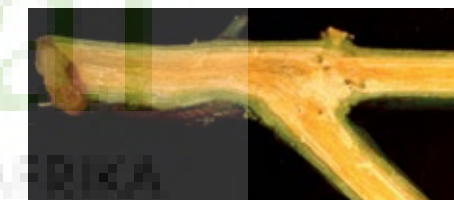


1: *Aphis craccivora*
2: *Aphis spiraecola*
3: *Dialeurodes citri*

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 SA and onto your farm.

Symptoms are more visible in the cooler periods of spring and autumn.



Characteristic salmon-pink discolouration of the wood



Symptoms

A typical symptom is the yellowing and clearing of small veins on leaves. Epinasty (downward-curved growth) 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 spore structures 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, are a tree's common response 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 where the peduncle had been attached.

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 form of the disease that is deadly. Apparently, it is caused by infection in the root or stem, which leads to a systemic invasion of the functional xylem by the pathogen, and sudden wilting of branches or even 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.

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 very difficult to control.

Host range

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

Current distribution

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

A series of fact sheets to increase awareness around these perilous threats. The first feature was in SAFJ Apr/May '24.



Withered twig of lemon with spore structures of *P. tracheiphilus* in ash-grey area of twig

Method of spread

- Infected plant material: Citrus propagation material (trees, cuttings, grafts, budwood, rootstock seedlings).
- Not transmitted via seed.
- Not transmitted via fruit.

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 SA and onto your farm.

These fact sheets were produced by CRI's Biosecurity Division, January 2025: www.citrusres.com.

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

Peach fruit fly

The insect

- *Bactrocera zonata* is one of the most harmful species of Tephritidae.
- Economic impacts may result from direct yield losses due to infested fruit, market access loss and quarantine restrictions.
- The pest can easily spread, adapt to temperate conditions, and establish outside tropical climates.

Description

Adults are about 6 mm long, and red-brown with yellowish thoracic markings. Wing patterns of the peach fruit fly are in general reduced and mostly yellowish or brownish.

Signs of presence

Fruit flies may be detected as eggs or larvae in fruit, or as adults caught in traps. Infested fruit have tiny oviposition punctures. In juicy fruit, fluid exudes from the oviposition puncture in the form of a droplet that later dries up, leaving a brown, resinous deposit. Larvae bore tunnels inside the fruit, leading to its deterioration and rotting.

Host range

The peach fruit fly is a polyphagous species attacking about 40 species of fruit, including peach, mango, guava and some citrus types.



1



2

Current distribution

- Asia
- Cyprus
- Mauritius and Réunion
- In Africa it is present in Egypt, Libya, Sudan.

Method of spread

- Natural flight:
 - The peach fruit fly is a strong flier and highly mobile. It naturally spreads by means of adult flight.
- Movement of infested fruit:
 - The transport of infested fruit, via trade and travellers, is the main means of long-distance dispersal.
- Host plants with roots
- Packaging:
 - The peach fruit fly can also spread if present on fruit packaging material.

Preventative actions

- Quarantine procedures for importation of citrus fruit and other hosts.
- Host plants transported with roots should be free from soil, or the soil should be treated against puparia.
- Awareness and surveillance to ensure early detection and rapid implementation of control measures.
- Do not bring illegal plant material into SA and onto your farm.

1. Fruit fly eggs
2. Fruit fly larvae are white and in general have a cylindrical maggot-shape, 5–15 mm in length
3. Adult peach fruit fly



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