

## Citrus stubborn disease

### What is Citrus stubborn disease?

Citrus stubborn disease is a serious disease of citrus that leads to reduced fruit quality and yield. It is caused by the bacteria *Spiroplasma citri*. The disease gets its name from the persistence of infection when a tree is 'top-worked' with healthy budwood. All citrus can be infected by the disease, however, grapefruit, lemon, orange, mandarin and tangelo are most susceptible. There are numerous alternative hosts including many ornamentals and brassicaceous plants. Stubborn is transmitted by leafhopper vectors, and although none of the recorded vectors are present in Australia, it is possible that local leafhoppers could transmit the disease.



Stunted growth of infected citrus tree (right)

Jack Kelly Clark, University of California Statewide IPM Project



Infected tree carries fruit at all stages of development

J.M. Bové, INRA Centre de Recherches de Bordeaux, Bugwood.org



Abnormal fruit development and uneven rind distribution

J.M. Bové, INRA Centre de Recherches de Bordeaux, Bugwood.org

### What should I look for?

Symptoms are variable and include short, broad leaves that are cup shaped and sit abnormally upright. Under very hot conditions, leaves on some shoots may have misshaped, blunted or heart shaped yellow tips. Leaves also show yellow mottling, similar to nutritional deficiencies and have shortened internodes leading to bunched type growth. Trees may also flower out of season and carry fruit at all stages of development. Fruit produced by the plant may prematurely drop and can be lopsided or acorn-shaped, due to a thicker rind at the base and thinner rind at the tip. Fruit colouration may be inverted, lopsided or uneven. Severely affected trees are stunted with thin canopies, tip dieback, bitter tasting fruit and aborted seeds.

### What can it be confused with?

Symptoms of Citrus stubborn disease can somewhat resemble the symptoms of huanglongbing, as well as nutrient deficiencies, frost damage and insect damage. However, the combined occurrence of several of the disease symptoms will provide a significant degree of confidence that Citrus stubborn disease is present.



## How does it spread?

Citrus stubborn disease spreads via feeding activities of leafhopper vectors and over longer distances through the transportation of infected plant material, such as budwood.

## Where is it now?

Citrus stubborn disease is more prevalent in hot, dry conditions but can still be present in cold climates. It is found in a number of countries, particularly the Mediterranean basin and the Middle East. It has also been detected in parts of the USA, South America and northern Africa.

## How can I protect my orchard from Citrus stubborn disease?

Ensure propagation material is purchased from suppliers that source their budwood from Auscitrus. Check your orchard frequently for the presence of new pests and investigate any sick citrus plants for unusual symptoms. Make sure you are familiar with common citrus pests so you can tell if you see something different. Keep records of anything unusual and ensure all staff and visitors adhere to orchard biosecurity and hygiene practices.

**If you see anything unusual, call the Exotic Plant Pest Hotline**



Normal citrus seeds (top) and partially or fully aborted seeds (bottom)



Infected fruit are coloured unevenly and remain small

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