Citrus huanglongbing factsheet

Causal agents

Citrus huanglongbing (HLB), also known as citrus greening, is caused by three phloem limited species of the a-Proteobacteria, '*Candidatus* Liberibacter asiaticus', '*Candidatus* Liberibacter africanus' and '*Candidatus* Liberibacter americanus'.

Importance

HLB is regarded as one of the most important threats to the citrus industry in the world. It is estimated that tens of million of citrus trees have been destroyed by HLB (Crop Protection Compendium 2007).

Distribution

The disease occurs in Africa, Central and South America, and South and South-East Asia, including Indonesia, Papua New Guinea and Timor Leste (East Timor) (Crop Protection Compendium 2007). Neither the disease nor its psyllid vectors are known to occur in Australia.

Symptoms

The symptoms are similar to nutrients deficiencies and other disorders and the disease can be even more difficult to detect in unthrifty trees. A yellowing of one entire branch or one part of the canopy (sectoral chlorosis) in the early stages is the clearest indication of HLB. Chlorotic blotching of leaves and swollen or corky leaf veins are two key visual guides, especially when they occur in combination. However, after time, the chlorotic blotching can become less obvious and zinc deficiency- like symptoms (yellow on green vein banding) become more prominent. In a period of one year infected trees can decline noticeably, with extensive yellowing of foliage and little or no fruit set. If the infection occurs soon after the propagation, the whole tree can show symptoms, otherwise, the pathogen and the symptoms are often partially confined at the branch where the infection took place. The fruits are often small, lopsided and poorly coloured and often contain aborted seeds. The juice is abnormally bitter. Chronically infected trees are sparsely foliated and show extensive twig dieback (Davis & Liberato 2008, Crop Protection Compendium 2007).

Symptoms of HLB on sweet orange in Swaziland (source H.D. Catling, Bugwood.org)

HLB-affected sweet orange showing yellow shoot symptoms (source: J.M. Bové, INRA Centre de Recherches de Bordeaux, Bugwood.org)

Dissemination

'*Ca*. L. asiaticus' and *Ca* L. africanus' are transmitted by the insects Asian citrus psyllid (*Diaphorina citri*) and African citrus psyllid (*Trioza erytreae*), respectively. Long-distance spread occurs usually via infected and infested plant material. Infected psyllids can be transported long distances by wind.

Asian citrus psyllid

The adult Asian citrus psyllids are brownish and sit at a characteristic 45 degree angle. They usually feed on underside of leaf and jump or fly short distance when disturbed. The eggs are bright yellow-orange, almond-shaped and are laid on tips of growing shoots or in crevices of unfolded flush leaves. The nymphs are yellowish-orange, feed exclusively on new growth and produce waxy tubules to direct honeydew away from their bodies.

Symptoms

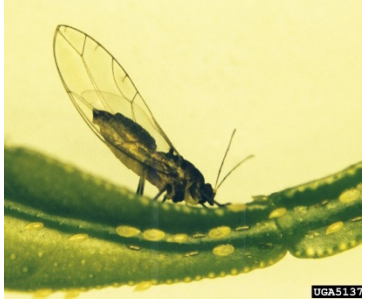
Symptoms of Asian citrus psyllid feeding are twisted tips of new growth (a single psyllid feeding for less than 24 hrs on a citrus leaf causes permanent malformation of that leaf), abscission of leaves and shoots, malformation of leaves and shoots, honey dew and sooty mould and accumulation of waxy secretions on leaves.

Asian citrus psyllid adult and nymphs, showing the waxy secretions they produce (source M. E. Rogers, University of Florida)

Damage to new leaves as a result of feeding by Asian citrus psyllid nymphs (source M. E. Rogers, University of Florida)

African Citrus Psyllid

The adult African citrus psyllid adults are light brown, about 4 mm in length, with large wings and clearly outlined veins. While this species can transmit the disease it is less likely to be found in Australia than the Asian citrus psyllid.



An adult African citrus psyllid (source S.P. van Vuuren, Citrus Research International, Bugwood.org).[i]

[i] References:

Davis RI & Liberato JR (2008) Citrus huanglongbing (‘*Candidatus Liberibacter* spp.’) Pest and Diseases Image Library. Updated on 5/1/2008. Available online: http://www.padil.gov.au

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http://entomology.ifas.ufl.edu/creatures/citrus/acpsyllid.htm University of California. http://anrcatalog.ucdavis.edu/pdf/8205.pdf

Crop Protection Compendium 2007 Edition. Citrus huanglongbing (greening) disease. CAB International, Wallingford, UK.

Forestry Images. http://www.forestryimages.org/browse/invdiseases.cfm

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