



Citrus psyllid (*Diaphorina citri*) and “*Candidatus Liberibacter asiaticus*”, cause of citrus huanglongbing (ex-greening) disease, detected in Papua New Guinea

The devastating bacterial disease, citrus huanglongbing (HLB, previously known as greening) and its vector, the Asian citrus psyllid *Diaphorina citri* (Hemiptera: Psyllidae), have been detected for the first time in PNG. The findings were made on a joint quarantine survey by Australian and PNG scientists along PNG's border with Indonesia in September 2002. The disease was confirmed in one citrus tree in the town of Vanimo, Sandaun Province and the psyllids were found on this and several other trees in and near Vanimo. Before the Vanimo discovery, both the disease and the vector were known to be present in the north of the Indonesian province of Papua (previously Irian Jaya) which occupies the western half of the island of New Guinea. The closest confirmed records being from near the town of Jayapura, less than 100km to the west of Vanimo, where the psyllid was first found in 1992, the disease in 1999. HLB destroys trees, has no cure, and affects all of the main types of citrus, making it a major new quarantine threat to the Pacific region.

The name of the disease was recently changed from greening to the Chinese word, huanglongbing (the disease was first discovered in China). Huanglongbing is Chinese for 'yellow dragon disease', a description used because infected trees go yellow, usually starting from one branch or one part of the tree, before they die (as if attacked by a 'yellow dragon').

HLB is a serious problem in Africa and Asia, including those countries closest to PNG (Malaysia, Vietnam, the Philippines and Indonesia). It does not occur in Australia, the Oceanic Pacific or the Americas. A report that the disease was found in the Fiji Islands, Samoa, Tonga and Palau in the mid 1990s is regarded by most HLB researchers as untrue because the detection method used in that study was not reliable.



Figure 1: *Diaphorina citri* – close up of posture. Photo by Andrew Beattie

Adult psyllids are brown mottled insects of 3.4 mm in length. Nymphs are smaller and generally yellowish-orange in colour. Psyllids are often confused with aphids, which are of similar size and are common on young tender citrus leaves. The main difference is that aphids move slowly whereas adult psyllids are active insects which jump when disturbed and may fly a short distance. Adult psyllids also hold an unusual posture on the leaf: head down, almost touching the surface, rear end pointing up, at an angle of up to 30 degrees (Figure 1).

The citrus psyllid is found on buds and young leaves of citrus trees. They feed by sucking the sap and this causes some leaf distortion and curling. Far more important though, is their ability to spread HLB. There are two forms of the bacterium which causes HLB, both found only in the tree's food conducting tissues (phloem vessels). The Asian form (known as “*Candidatus Liberibacter asiaticus*”) was the one found in PNG.

PNG's National Agricultural Quarantine and Inspection Authority (NAQIA) responded to the outbreak by destroying the infected tree discovered and spraying psyllid infested trees with an insecticide. A team of scientists then conducted a delimiting survey to find out if other trees were infected. During the course of this survey, it was found that the psyllids were more widespread than originally known, occurring in high numbers in Vanimo as well as in several nearby villages to the east and the west of the town. Samples collected from citrus trees were sent to specialist laboratories in Australia and France. Test results show that the disease is also more widespread than first thought. Two more infected trees were found very close to the first detection, plus another one some distance away in Vanimo and another in a neighbouring village, several kilometers away.

It is very important to prevent further spread of HLB in PNG and beyond to other countries in the Pacific. Generally, the arrival of the psyllid in a new region has been followed within a few years by an outbreak of the disease. This is what appears to have happened in northern Papua in the 1980s-1990s. The psyllids do not fly long distances and are

usually transported from place to place by people moving infested plants. They are spread on citrus and also on certain ornamentals, especially mock orange (*Murraya paniculata*), curry bush (*Murraya koenigii*) and possibly other *Murraya* species. HLB is also mostly spread to new areas in infected planting material, especially in marcotts taken from diseased trees. Citrus or *Murraya* planting material should not be moved out of Sandaun Province to other parts of PNG (or from Papua into PNG).

Some symptoms of HLB are similar to those of nutrient deficiencies, making early detection difficult, especially when trees are not well looked after. However, a yellowing of only one branch or sector of the canopy that later spreads, is characteristic of HLB and this would be clearly seen in an otherwise healthy tree (Figure 2). Other symptoms are:

- A blotchy mottle (diffuse yellowing) plus zinc deficiency symptoms (green on yellow vein banding and islands of green tissue) together on the same branch (after time, the mottling reduces, leaving only zinc deficiency symptoms)
- Thin, yellow, upright new growth leaves
- Fruit ripens at the stalk end first (though the colour change may not occur in many citrus fruits in warm climates), columella is curved (distorting fruit shape), and seeds abort (Figure 3).



Figure 2: A yellowing of one part of the tree that later spreads is a key early sign of HLB. *Photo by Pat.*

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For further information, contact the PNG National Agricultural Quarantine and Inspection Authority (NAQIA), Phone (675) 325 9977, Fax: (675) 325 9310, E-mail: naqia@dg.com.pg or Richard Davis, Plant pathologist (virologist), SPC Plant Protection Service, Phone: (679) 337 0733 (ext. 224), Fax: (679) 3386 326, E-mail: richardd@spc.int The Northern Australia Quarantine Strategy (NAQS), a programme of the Australian Quarantine and Inspection Service (AQIS) is gratefully thanked for their assistance. NAQS undertook the original survey in collaboration with the Government of PNG. Following this, their molecular diagnostic laboratory in Mareeba tested the majority of samples collected during the delimiting survey

The pathogen can be reliably diagnosed using the tools of molecular biology.

If HLB is suspected, leaves showing symptoms (include leaf stalks) should be sent to a suitable laboratory (contact SPC for details).



Figure 3 Huanglongbing can cause a distorted fruit shape due to curving of the columella tissue inside

Communications of pest and disease incidents of interest to the Pacific region should be sent to: Plant Protection Service, Secretariat of the Pacific Community, Private Mail Bag, Suva, Fiji Islands. Tel: (+679) 3370 733; Fax: (+679) 3386 326; email: pps@spc.int