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Primefact

The Asiatic citrus psyllid

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Introduction

The Asiatic (or Asian) citrus psyllid (ACP, *Diaphorina citri*; Figure 1 and Figure 2) is a vector of huánglóngbìng (HLB), which is considered to be one of the most serious diseases of citrus worldwide (Bové 2006; Gottwald 2010). The most widespread and destructive form of HLB is caused by *Candidatus* Liberibacter asiaticus (*C*Las), a bacterium that is transmitted by ACP. HLB-infected trees gradually lose productivity, produce small and misshapen fruit, and eventually decline and die (Figure 3 and Figure 4). In unmanaged orchards, trees can become unproductive within a few years of infection. A characteristic symptom of HLB is an asymmetric blotchy mottle pattern on leaves (Figure 5). However, this symptom is often confused with nutrient deficiencies and can be challenging to recognise, even for experienced observers.

Figure 1. Asiatic citrus psyllid adult. Photo: M Rogers, University of California.

Figure 2. An ovipositing Asiatic citrus psyllid female. Photo: GAC Beattie.

Figure 3. A huanglongbing-infected citrus tree with yellowing leaves. Photo: JM Bove, INRA Centre Des Recherches.

Figure 4. A huanglongbing-infected citrus tree with sparse leaves and dead branches.

All commercial citrus varieties are susceptible to HLB, and there is currently no cure for infected trees. The disease is present in many citrus-producing regions globally, including countries neighbouring Australia such as Indonesia, Timor-Leste and Papua New Guinea. Australia and Mediterranean Europe are among the few citrus production areas currently free of the disease and vector.

Preventing the introduction of ACP and HLB, maintaining effective surveillance systems, and strengthening preparedness for any incursions are priorities for the Australian citrus industry and government agencies.

Figure 5. Asymmetric blotchy mottle on leaves from a huanglongbing-infected tree.

Early detection is critical to maintaining Australia's HLB-free status. A national surveillance network has been established to increase the likelihood of early detection, supported by industry, government agencies and the wider community.

This Primefact aims to support surveillance and preparedness efforts by providing information on ACP identification, alternative hosts, and its biology and ecology.

Identification

Adult ACP are approximately 3–4 mm long. The forewings are widest at the apex and have mottled brown markings (Figure 1). The eyes are red, and the antennae are short, pale brown and tipped with black. One of the most distinctive characteristics of ACP adults is their feeding posture. When feeding, the body is held at an angle of approximately 45° to the leaf surface, with the head close to the plant tissue and the abdomen raised (Hall et al. 2013). This characteristic posture (Figure 6) assists with field identification.

ACP nymphs are yellow to orange (Figure 7) and have prominent wing pads (Figure 8), particularly during the later instars. Nymphs produce abundant white, waxy, string-like honeydew (Figure 9) that is often visible on young flush. Under hot conditions (above 36 °C), the waxy honeydew can soften and form droplets.

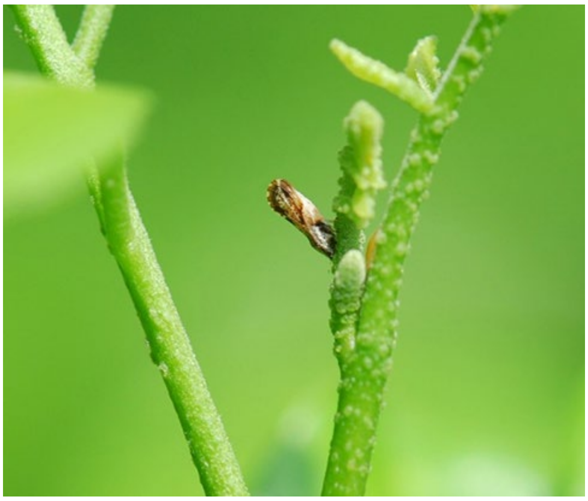

Figure 6. Asiatic citrus psyllid adult feeding with the body at approximately 45° to the leaf surface. Photo: GAC Beattie.

Figure 7. Asiatic citrus psyllid early stage nymphs. Photo: GAC Beattie.

Figure 8. Asiatic citrus psyllid nymphs have prominent wing pads. Photo: Jeffrey W. Lotz, Florida Department of Agriculture and Consumer Services, Bugwood.org.

Figure 9. Asiatic citrus psyllid nymphs produce white, string-like honeydew. Photo: Sandra H Statner, iNaturalist.

ACP eggs are approximately 0.3 mm long, elongated, almond-shaped and tapered towards the distal end (Figure 10). Eggs are usually laid in clusters on young flushing shoots, particularly around developing leaf buds and growing tips. Newly laid eggs are pale yellow, gradually turning bright yellow and then orange before hatching.

No other insects found feeding on Australian citrus resemble ACP adults. Some aphid nymphs look similar to ACP nymphs, but they lack wing pads and do not produce the characteristic string-like honeydew. Most aphids have a pair of upright, tube-like appendages (cornicles or siphunculi) on the back of their abdomen, while ACP nymphs do not. While Australia has no native psyllid species that feed on citrus, many native psyllid species can be found on vegetation such as eucalypts and wattles adjacent to citrus production areas. These native species can be blown by the wind onto nearby citrus trees. Many native psyllids have fully transparent wings in contrast to the pigmented wings of ACP. Some native psyllids, such as the spotted gum psyllid *Eucalyptolyma maideni*, have a similar feeding posture to the ACP (Figure 11). However, adults of most native psyllid species are usually bright green to yellow, whereas ACP adults are mottled brown.

Figure 10. Asiatic citrus psyllid eggs. Photo David Hall, USDA Agricultural Research Service, Bugwood.org.

Figure 11. Spotted gum psyllid (*Eucalyptolyma maideni*). Photo: www.bugguide.net.

Hosts

Most ACP hosts are in the plant family Rutaceae, which includes citrus (Halbert and Manjunath 2004; Hall et al. 2013; Beattie 2020). While ACP uses a range of citrus species and hybrids, including orange, mandarin, grapefruit, lemon, lime, tangelo, kumquat, pomelo, trifoliate orange and native Australian citrus species, its preferred hosts are other members of Rutaceae, particularly orange jasmine/jessamine (*Murraya paniculata*) and curry leaf tree (*Bergera koenigii*).

Orange jasmine and curry leaf trees are commonly grown as ornamental and culinary plants and might support ACP populations outside of commercial citrus production areas. These hosts could be important in surveillance and biosecurity programs, particularly in urban and peri-urban environments. They could also facilitate the establishment and spread of ACP should it enter Australia.

Distribution

ACP is native to South Asia and is now widely distributed throughout tropical and subtropical regions of South and Southeast Asia, West Asia, including the Middle East, Africa, the Americas and parts of Oceania, including New Guinea. Although ACP is the primary vector of HLB, its distribution is broader than that of the disease, and not all countries or regions where ACP occurs have reported HLB. For example, ACP is in countries and regions such as Afghanistan, Macau, Myanmar, Singapore and Tonga, where HLB has not yet been recorded.

According to the EPPO Global Database (accessed June 2026), ACP is currently present in the following countries and regions:

Mediterranean: Cyprus

Africa: Benin, Egypt, Ethiopia, Ghana, Nigeria, Kenya, Mauritius, Réunion and Tanzania.

Asia: Afghanistan, Bangladesh, Bhutan, Cambodia, China, Hong Kong, India, Indonesia, Iran, Israel, Japan, Laos, Macau, Malaysia, Maldives, Myanmar, Nepal, Oman, Pakistan, Philippines, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Thailand, United Arab Emirates, Vietnam and Yemen.

North America: Antigua and Barbuda, Bahamas, Barbados, Belize, Cayman Islands, Costa Rica, Cuba, Dominica, Dominican Republic, Guadeloupe, Haiti, Jamaica, Martinique, Mexico, Puerto Rico, Saint Lucia, Saint Vincent and the Grenadines, US Virgin Islands and the United States.

Oceania: Samoa, Guam, Northern Mariana Islands, New Guinea, Timor-Leste, and Tonga.

South America: Argentina, Brazil, Colombia, Paraguay, Uruguay and Venezuela.

Likely pathways of entry

The movement of infested host plant material presents the greatest risk for the introduction of ACP into Australia. Plant material, including citrus nursery stock, budwood and other propagation material, is considered the highest-risk pathway because it can harbour ACP eggs, nymphs or adults. These materials can also carry the *C*Las bacterium.

Fresh plant products, including curry leaf tree (*Bergera koenigii*) and kaffir lime leaves (*Citrus hystrix*), can also be infested with ACP and therefore represent potential pathways for pest introduction if imported without appropriate biosecurity measures or illegally .

ACP naturally disperses by adult flight (Boina et al. 2009) and with wind-assisted movement (Martini et al. 2014). Long-distance spread has largely been associated with the movement of infested host plants and plant material. ACP can also be transported inadvertently by 'hitch-hiking' on harvested fruit, vehicles, equipment, packaging and other materials moving along transport routes.

Commercially produced citrus fruit that has been washed, brushed and processed through approved packing facilities, with leaves and stems removed, is generally considered a negligible pathway for ACP introduction.

Life cycle

ACP undergoes incomplete metamorphosis (hemimetabolous development) and develops through egg, nymph and adult stages. Eggs are laid in protected sites, including leaf folds, petioles, axillary buds and tender stems, on young flush. Eggs hatch into nymphs, which pass through 5 instars (Figure 12) before becoming adults (Grafton-Cardwell et al. 2013).

Nymphal development is restricted to young flush growth and takes approximately 15 to 47 days from egg to adult, depending on temperature, region and season. Development is influenced by environmental conditions, including relative humidity, as well as host plant species (Halbert and Manjunath 2004). Development is fastest under warm conditions when host flush is continuously available.

Figure 12. Asiatic citrus psyllid developmental stages. Photo: David Hall, USDA Agricultural Research Service, Bugwood.org.

Adults can live for several months under favourable conditions. ACP is multivoltine, with continuous overlapping generations throughout the year. There is no diapause. Up to 10 generations per year are commonly recorded, with up to 16 generations observed under controlled field cage conditions.

Although ACP is most commonly associated with tropical and subtropical climates, adults have survived short periods of sub-zero temperatures, and populations have established in cooler citrus-growing regions such as California. This suggests that winter temperatures in southern Australian citrus-growing regions are not likely to prevent ACP from establishing, although population growth and the number of generations per year are likely to be lower than in warmer regions (Hall et al. 2011; El-Shesheny et al. 2016; Narouei-Khandan et al. 2016; Beattie 2020).

Biology and ecology

Adults start mating soon after emergence. Females oviposit only on actively growing terminal tissues, with the highest egg deposition on unfolding apical 'feather flush' leaves (Halbert and Manjunath 2004). Nymphal instars appear similar but increase in size after each moult, ranging from approximately 0.25 to 1.7 mm long (Grafton-Cardwell et al. 2013). Early instars are pale, becoming more orange–brown as development progresses. Nymphs lack fully developed wings, although non-functional wing pads become prominent in later instars (Hall et al. 2013).

First and second instar nymphs mostly gather and feed inside the folded leaves (Figure 13), on the terminal stem and between the axillary bud and the stem of tender shoots. Young nymphs are quite docile and move only when disturbed or overcrowded. In contrast, third to fifth instars are more mobile, moving to new feeding sites and seeking protected areas to undergo the final moult into adults (Grafton-Cardwell 2005).

Adults are often found resting on the terminal part of the plant, especially on the lower side of the leaves (Figure 14). When disturbed, they readily take flight for a short distance. In citrus, females only oviposit on flush growth. In the absence of suitable host tissue, oviposition ceases temporarily.

ACP acquires the HLB bacterium during its nymphal stages. Older nymphs and adults can transmit the bacterium to healthy host plants; however, adults play the greatest role in disease spread because they can readily move between trees and orchards.

The close association between ACP and HLB highlights the importance of preventing the introduction and spread of both the pest and the disease.

Figure 13. Asiatic citrus psyllid nymphs on young apical leaves. Photo: GAC Beattie.

Figure 14. Asiatic citrus psyllids on the underside of the leaf. Photo: GAC Beattie.

Natural enemies

In its native range, ACP is attacked by a range of natural enemies, including parasitoids, predators and entomopathogenic fungi. The most important parasitoid is a small wasp, *Tamarixia radiata* (Figure 15), which attacks ACP nymphs.

Tamarixia radiata is widely regarded as the most important biological control agent of ACP and has been introduced into several countries for classical biological control programs. However, biological control alone is generally insufficient to prevent HLB spread where the disease is established.

Figure 15. A *Tamarixia radiata* ovipositing in a nymph. Photo: GAC Beattie.

Predatory insects, including the weaver ant, ladybird beetles, hoverfly larvae and pirate bugs, also contribute to ACP suppression. Several naturally occurring fungal pathogens have been reported to infect ACP under favourable environmental conditions.

Management

In regions where HLB is present, management relies on an integrated approach that combines using disease-free planting material, removing infected trees, managing ACP populations and ongoing surveillance.

Synthetic insecticides remain important tools for ACP management; however, repeated use can lead to the development of insecticide resistance. Alternative measures, including horticultural and agricultural mineral oils, kaolin-based products and biological control agents, can form part of effective integrated pest management programs.

Integrated pest management programs commonly combine biological control, cultural practices and selective insecticides to reduce ACP populations while conserving beneficial insects.

In Australia, where ACP and HLB are not established, prevention, surveillance and rapid response remain the primary management strategies. Citrus growers, nursery operators, industry personnel and members of the public play an important role in early detection and reporting.

If ACP is detected, response measures might include movement restrictions, delimiting surveys, destruction of infested host material and targeted control treatments to prevent establishment and spread.

Surveillance and reporting

ACP adults, eggs and nymphs are most commonly found on newly flushing citrus growth and related host plants. Regular inspection of young shoots, particularly during periods of active growth, is important for early detection.

Particular attention should be given to orange jasmine and curry leaf plants in residential, urban and peri-urban areas, as these hosts can support ACP populations outside commercial citrus orchards and can serve as reservoirs for early infestations.

Australia has no known psyllid species that use citrus as a breeding host. Consequently, the discovery of psyllids reproducing on citrus should be reported immediately for investigation, as it might indicate the presence of an exotic pest such as ACP. The African citrus psyllid *Trioza erytreae* is a vector of '*Candidatus* Liberibacter africanus' (*C*Laf), which causes another, less severe, form of HLB (citrus greening). This psyllid is also a recognised exotic surveillance target and should likewise be reported if detected. Refer to the Department of Agriculture, Fisheries and Forestry for further information (https://www.agriculture.gov.au/biosecurity-trade/pests-diseases-weeds/plant/identify/huanglongbing).

Growers, nursery operators and members of the public are encouraged to report any suspected ACP detections or unusual citrus symptoms immediately. If you see or suspect ACP on citrus or other host plants, contact your local biosecurity authority or the **Exotic Plant Pest Hotline on 1800 084 881**.

Do not move plant material potentially infested with ACP. Research has shown that ACP can survive for up to 10 days on detached stems and for 20–30 days on detached stems with fruit attached. Care should therefore be taken when handling, transporting or disposing of potentially infested plant material to avoid inadvertently spreading the pest to new areas.

Early detection and reporting provide the best opportunity for successful eradication and protection of Australia's citrus industry. Preventing the establishment of ACP remains the most effective strategy for protecting Australia from both ACP and HLB, a disease for which there is currently no completely effective management solution once established.

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More information

For more information on huanglongbing (HLB) and vectors, visit the Australian Department of Agriculture, Fisheries and Forestry website (https://www.agriculture.gov.au/biosecurity-trade/pests-diseases-weeds/plant/identify/huanglongbing).

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