GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Diaphorina citri***

Diaphorina citri **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Insecta	Hemiptera	Psyllidae

Common name Asiatic citrus psyllid (English), Psilideo de l'aranjeira (Portuguese), Oriental citrus psyllid (English), Citrus psylla (English), Asian citrus psyllid (English), Psylle de l'oranger (French)

Synonym *Euphalerus citri* , Crawford

Similar species *Diaphorina amoena, Diaphorina auberti, Diaphorina communis, Diaphorina murrayi, Diaphorina punctulata, Diaphorina zebrana*

Summary *Diaphorina citri* or Asian citrus psyllid is one of the most serious pests of citrus in the world. It causes damage through direct feeding and its toxic saliva, leading to leaf distortion and curling in young tender growth. In addition the copious amounts of honeydew it excretes causes sooty molds to grow which blemish leaves and reduce photosynthesis. However it is the ability of *D. citri* to vector the Asian and American forms of the huanglongbing (HLB) disease which makes this so damaging. HLB is caused by phloem-restricted bacteria in the genus *Candidatus Liberibacter*. HLB causes chlorosis resembling zinc deficiency, twig dieback, stunting of growth and reduced fruit size and quality. Trees usually die after several years and entire orchards may be devastated. HLB seriously threatens citrus industries worldwide. At present there are no curative methods for trees infected with the bacteria, so control methods have focused on reducing *D. citri* populations. Control is achieved through a combination of physical, chemical and biological methods.

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Species Description
Adults are 3 to 4 mm long with a general mottled brown coloured body and a light brown head. The abdomen is black dorsally and greenish white ventrally (EPPO 2005a). Their forewings are broadest at the apical half and are mottled in colour with a brown band that extends around the outer half of the wing and interrupted near the apex (Mead 2008). Hind wings are long and slender with length three times as long as width. Hind wings are 0.9 times as long as forewings (EPPO 2005a). Antennae have black tips with two small light brown spots on the middle segments. The entire insect is usually covered with a whitish, waxy secretion making it appear dusty (Mead 2008).
Please follow this link to PaDIL (Pests and Diseases Image Library) Species Content Page Bugs: Asiatic citrus psyllid *Diaphorina citri* Kuwayana (Hemiptera: Psylloidea: Psyllidae) for high quality diagnostic and overview images.

Lifecycle Stages
Diaphorina citri has three developmental stages: egg, 5 nymphal instars and adult. \"The eggs are orange-coloured and almond-shaped, 0.31 (long)–0.15 (wide) mm. Eggs are laid singly inside half-folded leaves of the buds, in leaf axils and other suitable places on theyoung tender parts of the tree. The nymphs pass through five instars. They are light-yellow to dark-brown, bearing well-developed wing pods. Nymphs will move away when disturbed but normally lead a sedentary existence clustered in groups. Adults are 2.5 mm long with yellowish-brown body and greyish-brown legs. Wings are transparent with white spots or light-brown with a broad, beige, longitudinal band in the centre. Adults are very active and jump on the slightest disturbance\" (EPPO 2005a).

Habitat Description
Diaphorina citri is confined to the plant family Rutaceae, occurring on wild hosts as well as on Citrus, especially lemon and lime (EPPO 2005a). A preferred host is *Murraya paniculata*, an ornamental that is widely grown in southern Florida. Populations on this plant can be extremely high and therefore inspection of this plant may be the best way to survey for Asian citrus psyllids (Halbert 2006). Host preference is influenced by season, variety, flush morphology, abundance, frequency and duration of flushing (Beattie and Barkley 2009).

Reproduction
Adults live for about one to two months and their lifespan is influenced by temperature and host plant (Liu and Tsai 2000 in Grafton-Cardwell *et al*. 2006). The abudomen of a female becomes bright yellow-orange after she becomes gravid. Number of eggs laid depends on host plant. A female may lay up to 800 eggs in her lifetime (Halbert and Manjunath 2004). At a temperature of 25°C eggs hatch after about 4 days, and take about 16 to 17 days to become an adult (Tsai and Liu 2000 in Grafton-Cardwell *et al*. 2006).

Nutrition
Diaphorina citri feeds on the sap of plants in the Rutaceae family.

General Impacts
Asian citrus psyllids feed on citrus and other closely related plants of the Rutaceae family (Arakelian 2008). They consume large amounts of sap from the plant as they feed, and excrete copious amounts of sugary honeydew. Honeydew coats trees and causes sooty mold to grow. Sooty mold fungi can lead to blemishing of leaves and fruit and reduction in photosynthesis (Wang *et al*. 2001 in Yang *et al*. 2006).
\nAs they feed psyllids inject a salivary toxin that inhibits terminal elongation and causes malformation of leaves and shoots. Grafton-Cardwell *et al*. (2006) report that "A single psyllid nymph feeding for less than 24 hours on a citrus leaf causes permanent malformation of the leaf. Overwintering adults aggregate on newly forming citrus leaf buds where they feed and mate. Often, initial infestations of Asian citrus psyllids are highly aggregated on individual trees within citrus orchards. This aggregation and feeding causes distortion of the leaf buds that provides improved oviposition sites. Citrus flush is often severely damaged, resulting in the abscission of leaves and shoots (Halbert and Manjunath 2004) or malformed mature leaves. Mature trees can tolerate this damage since the loss of leaves or shoots is only a small portion of the total tree canopy. Nursery trees and new plantings may require chemical protection."
By itself *D. citri* is a relatively minor pest (Halbert and Manjunath 2006). The most serious aspect of *D. citri* is its ability to vector Asiatic (*Candidatus Liberibacter asiaticus*) and American (*Candidatus Liberbacter americanus*) forms of huanglongbing (HLB). HLB or citrus greening disease is an extremely destructive disease of citrus (Halbert and Manjunath 2006; Bove 2006). The symptoms of HLB include yellowing of shoots and mottling and chlorosis of leaves that resembles zinc deficiency. Infected trees are often stunted and sparsely foliated. Fruit fail to color properly, have a bitter taste and are small, lopsided and hard (Grafton-Cardwell *et al*. 2006). The tree usually dies within 5 to 8 years, and entire orchards can be devastated after just a few years (Yang *et al*. 2006).
HLB affects almost all citrus cultivars, and causes substantial economic losses to the citrus industry by shortening the lifespan of trees and making fruit inedible (Das *et al*. 2007). Gottwald *et al*. (2007) report that "almost 100 million trees have been affected and destroyed in many countries of South and Southeast Asia, Indonesia, Philippines, India, Arabian Peninsula, and South Africa, compromising the local citriculture (Aubert *et al*. 1985; Bove 1986; Halbert and Manjunath 2004; Toorawa 1998). Since 2004, more than 500 thousand trees were officially eliminated in Brazil due to HLB and it is estimated that an additional 300 to 400 thousand trees were unofficially eliminated by commercial citrus growers."
Interactions between *D. citri* and the HLB bacteria are not well characterized, but the psyllid is thought to acquire the bacterium after around 30 minutes of feeding (Roistacher 1991 in Halbert 2006). HLB is thought to multiply in the vector, and adults are able to transmit the pathogen after an 8-12 day latent period (Roistacher 1991 in Halbert 2006). There are conflicting results on whether HLB is able to be transmitted transovarially [transmission from mother to egg/larvae] (Buitendag and von Broembsen 1993; Roistacher 1991; van den Berg *et al*. 1992 in Halbert 2006).

Management Info
The European and Mediterranean Plant Protection Organization (EPPO) has run a European Panel on diagnostics, which has developed regional standards on diagnostic protocols. The protocols support detection and identification procedures worldwide in the diagnostics for regulated pests.
Please follw this link for the Diagnostic Protocol for *Diaphorina citri* EPPO Bulletin.
Please follow this link for detailed information on the management and control of Asian citrus psyllid, *Diaphorina citri* prepared by the IUCN SSC Invasive Species Specialist Group.

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