



The Asian Citrus Psyllid and the Citrus Disease Huanglongbing

Psyllid



Huanglongbing



The psyllid (pronounced síl - lid) is a small insect, about the size of an aphid

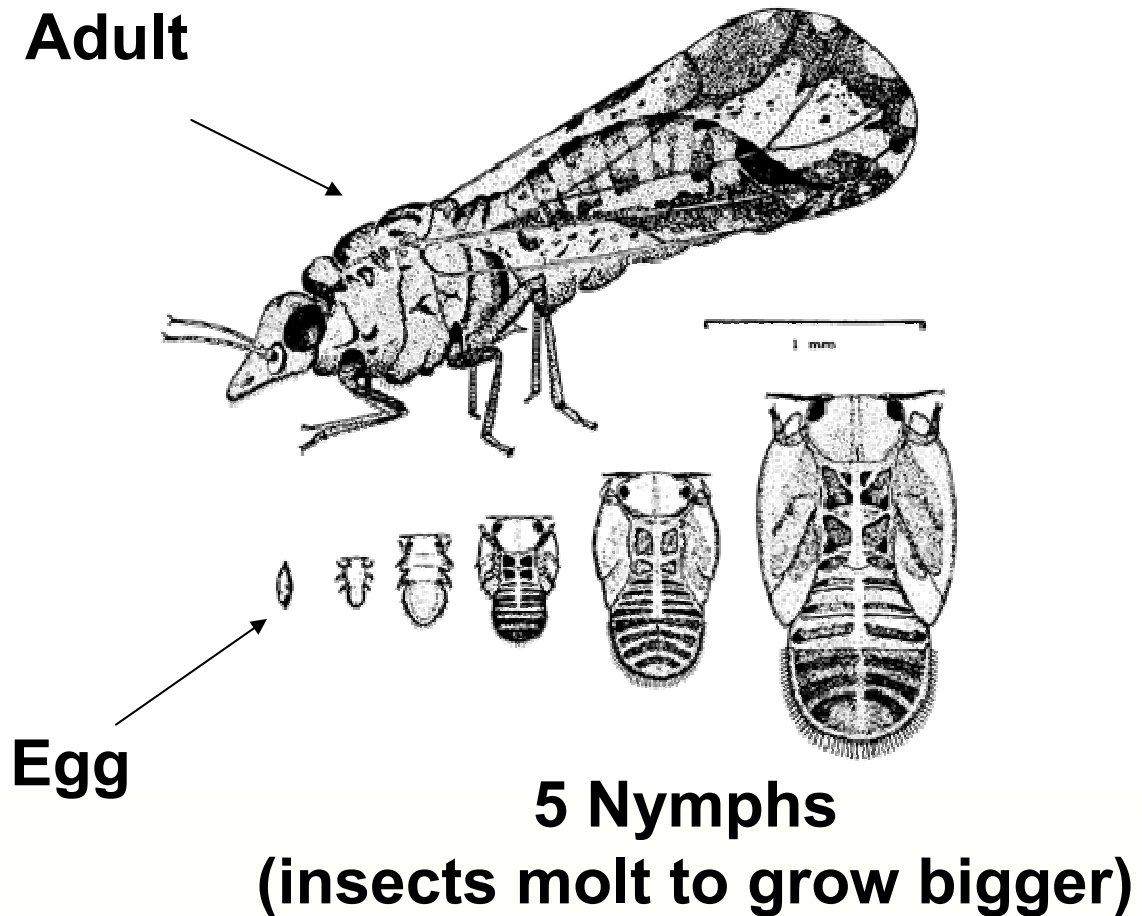
**The
pest
insect**

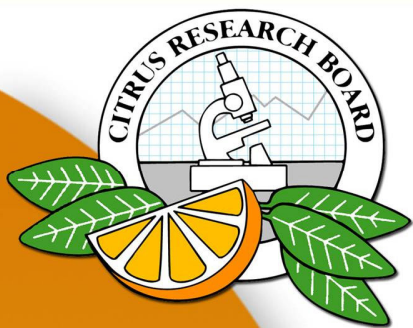




**It has an egg stage,
5 wingless intermediate stages called
nymphs, and winged adults**

**The
pest
insect**



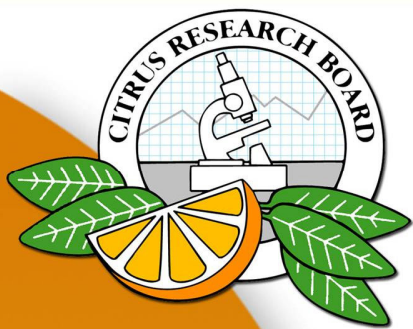


**Adult psyllids usually feed on the underside of leaves and can feed on either young or mature leaves.
This allows adults to survive year-round.**

**The
pest
insect**



When feeding, the adult leans forward on its elbows and tips its rear end up in a very characteristic 45° angle.



The eggs are yellow-orange, tucked into the tips of tiny new leaves, and they are difficult to see because they are so small

**The
pest
insect**





The nymphs produce waxy tubules that direct the honeydew away from their bodies. These waxy tubules are unique and easy to recognize.

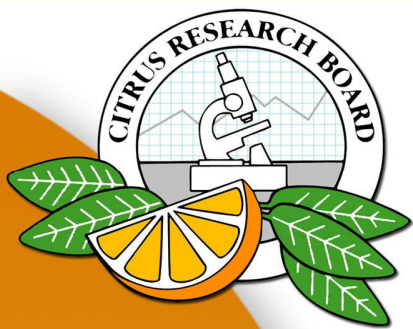
**The
pest
insect**



Nymphs can only survive by living on young, tender leaves and stems.

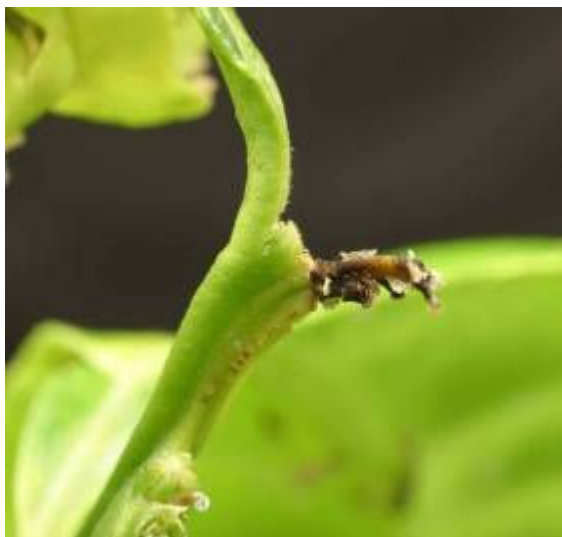
Thus, nymphs are found only when the plant is producing new leaves.





As Asian citrus psyllid feeds, it injects a salivary toxin that causes the tips of new leaves to easily break off. If the leaf survives, then it twists as it grows.

**The
pest
insect**



Twisted leaves can be a sign that the psyllid has been there.





What plants can the psyllid attack? All types of citrus and closely related plants in the Rutaceae family

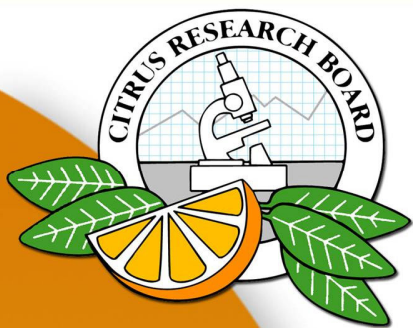
- *Citrus* (limes, lemons, oranges, grapefruit, mandarins...)
- *Fortunella* (kumquats)
- *Citropsis* (cherry orange)
- *Murraya paniculata* (orange jasmine)
- *Bergera koenigii* (Indian curry leaf)
- *Severinia buxifolia* (Chinese box orange)
- *Triphasia trifolia* (limeberry)
- *Clausena indica* (wampey)
- *Microcitrus papuana* (desert-lime)
- Others.....

**Plants
affected**



Calamondin





Asian citrus psyllid feeds and reproduces on plants that we don't think of as citrus: like the ornamental orange jasmine

Plants affected



This orange jasmine plant, *Murraya paniculata*, is grown throughout Florida as a bush, tree or hedge and is a preferred host for the psyllid because it produces new leaves continuously. It is not a common plant in California.





Asian citrus psyllid feeds and reproduces on Indian Curry Leaf

This Indian curry leaf, *Bergera koenigii*, is grown in Hawaii and the leaves are shipped to California for use in restaurants. It is a favorite host of the psyllid and infested leaves shipped in boxes have been intercepted at airports.

Plants affected





Another example of a plant that is a home for the psyllid:

Chinese box orange
or Box thorn, *Severinia
buxifolia*



Plants
affected



Why are we so worried about this psyllid?
The Asian citrus psyllid can pick up the bacterium that causes Huanglongbing (HLB) disease and move the disease from citrus tree to citrus tree as it feeds

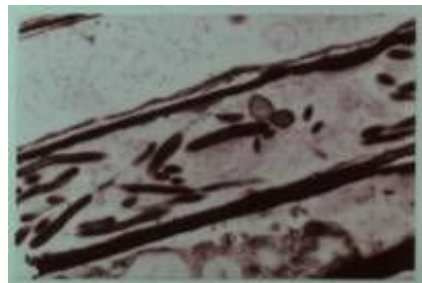
**The
bacterial
disease**

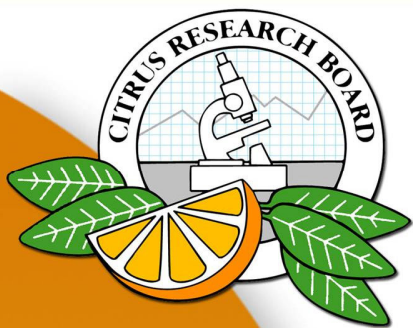
Huanglongbing means “yellow shoot disease” in Chinese.

It causes branches of citrus trees to turn yellow.

Bacterium: *Candidatus Liberibacter asiaticus*

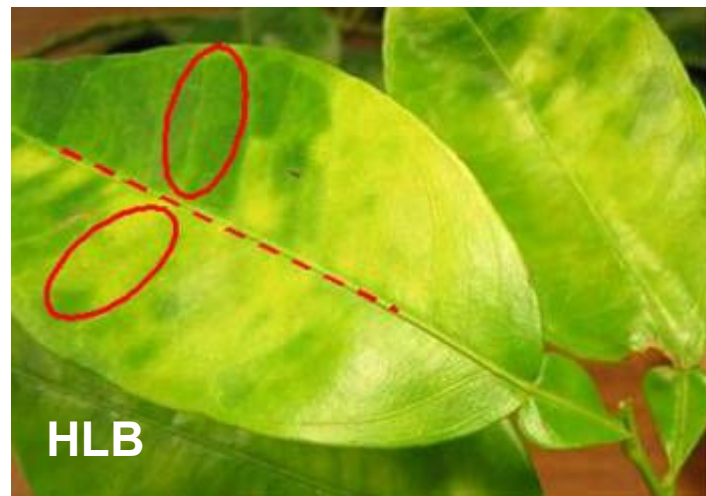
*Researchers think that both a bacteria and a phytoplasma may be required to produce symptoms





An early sign of the disease is uneven (asymmetrical) yellowing of the leaves

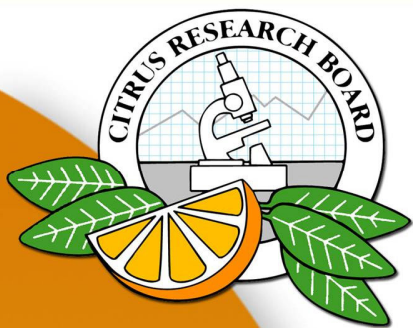
Leaves with HLB disease have a blotchy mottled yellow pattern that is not the same on both sides of the leaf.



Leaves with nutrient deficiencies (Zinc is an example) have the same yellow pattern on both sides of the leaf.



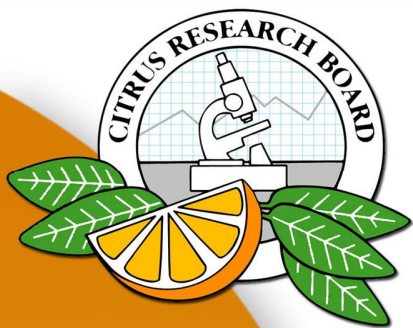
**The
bacterial
disease**



HLB leaf symptoms can range from slight to nearly completely yellow



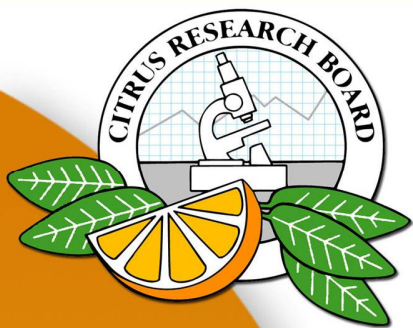
**The
bacterial
disease**



**Symptoms may not show up in the tree until
1-2 years after it becomes infected**

**The
bacterial
disease**





HLB disease prevents the fruit from coloring properly

The lower half of the fruit may remain green, which is why this disease is also sometimes called citrus greening.



**The
bacterial
disease**



Even more devastating, HLB causes the fruit to be small and oddly shaped with aborted seeds and off-tasting juice

**The
bacterial
disease**

**The fruit grows
crookedly,
forming uneven
segments**





Within 3-5 years after infection, the tree stops bearing fruit and eventually dies. There is no cure for the disease.

The bacterial disease

This citrus tree in a backyard in Florida is obviously very sick, with few leaves and no fruit.

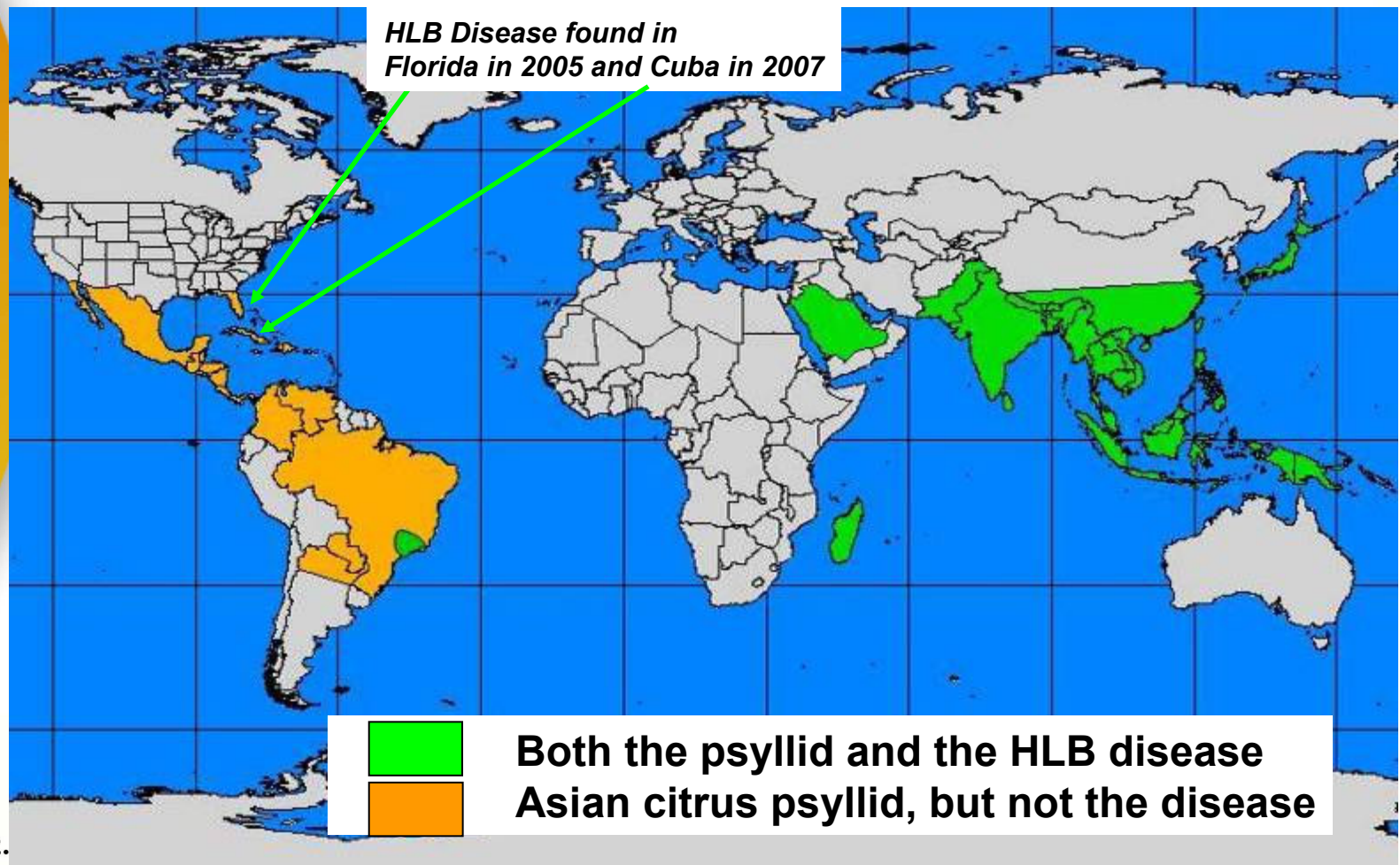




Where did Asian citrus psyllid and the HLB disease come from?

Most likely ACP and HLB came from India or Asia. Both the psyllid and disease are affecting citrus production in Brazil, Cuba and Florida. **California has the psyllid in 6 counties in southern California but does not yet have the disease.**

Distribution of the pest and disease

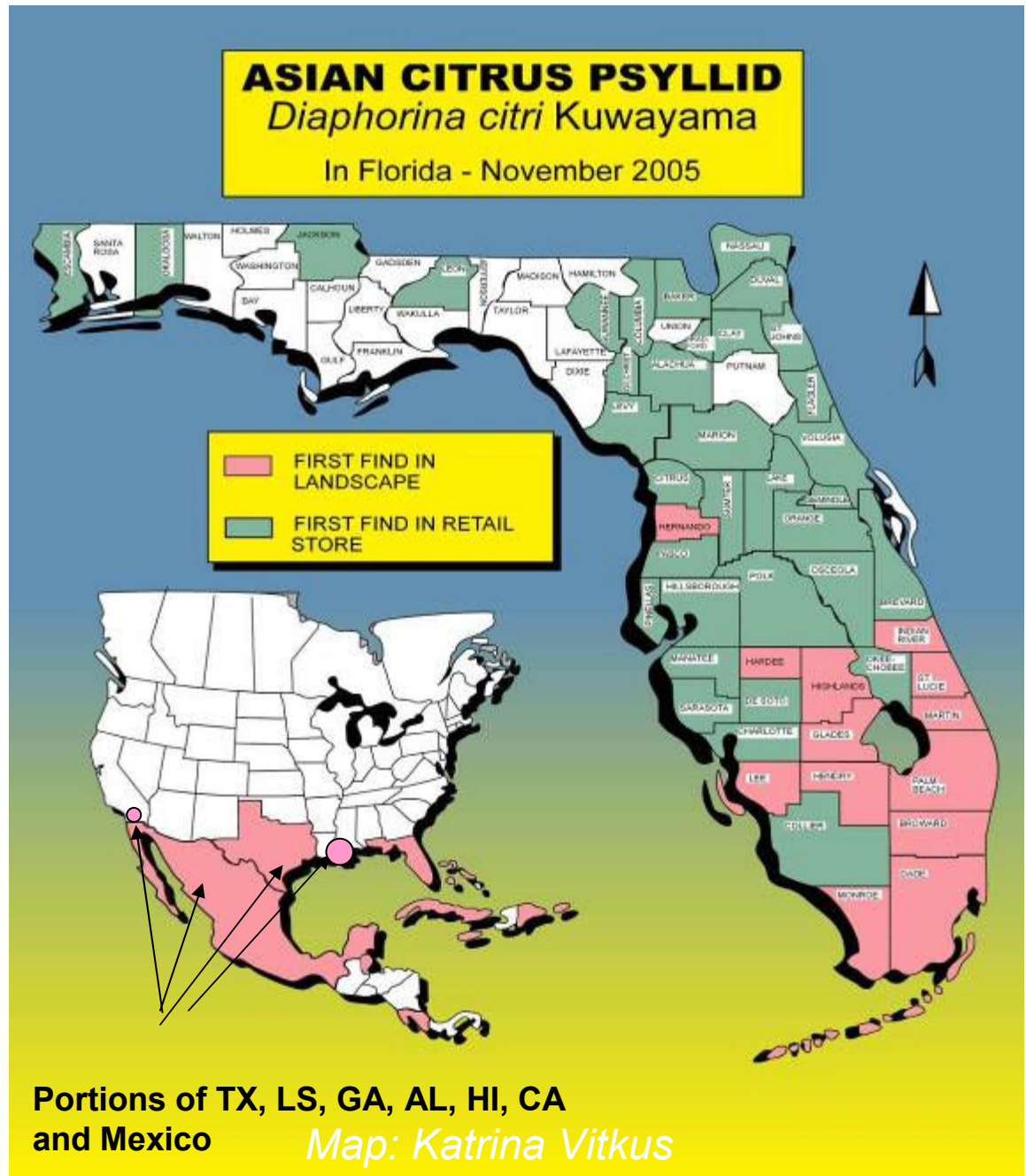




Where is the psyllid located in the United States?

Florida: The psyllid was first detected in dooryard citrus trees in south Florida in 1998, it moved very rapidly both naturally as well as on nursery plants (orange jasmine, *Murraya paniculata*) in retail nurseries throughout the state. The psyllid is well established in all citrus growing areas of FL.

ACP is now found in Portions of Florida, SE Texas, Louisiana, Alabama, Georgia, S. Carolina, southern California, Hawaii and most of Mexico.





How does the psyllid get around?

The psyllid can spread naturally by flying or it can hitch a ride on plants into new areas of California

Psyllid-infested curry leaves shipped in boxes from Hawaii



Unprocessed fruit from Mexico



On ornamentals in floral bouquets from Mexico



Citrus riding across the border in passenger or cargo vans



The pest insect



Asian citrus psyllid arrived in California from Mexico in 2008 and was found in backyard citrus in San Diego and Imperial Counties

The red dots indicate locations where the psyllid has been found in CA and the pale green dots in Mexico.





How does the insect pick up the bacteria?

When the insect feeds it takes up the bacteria into its mouthparts and passes it on when it feeds on the next citrus tree or 'citrus-like' plant

The pest insect and the pathogen



Once the psyllid takes up the bacteria, it carries it in its body for the rest of its life (weeks to months), spreading the disease as it moves from tree to tree.



HLB has not been found in California, but it may be here. What are the pathways for the disease?

Illegally imported plants: HLB could already be infecting a citrus tree (or close relative) that is planted in a yard or orchard in California – or it may arrive in the near future in this way.

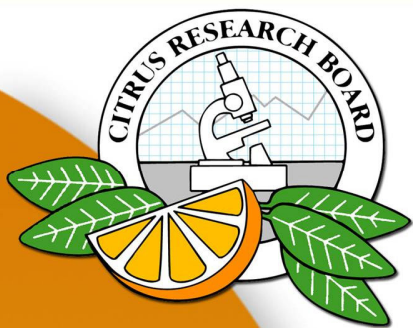
Via the psyllid vector: It could be inside the body of a psyllid that flies into California or is transported by humans on plant material

By law all citrus trees must be disease-free. Rutaceae that are hosts of the psyllid or HLB are prohibited from entering California

Plants, such as this *Murraya* (orange jasmine), can be a source of the psyllid and the disease



The bacterial disease pathways



**You can help search for the psyllid!
It is critical for California to keep this insect
from gaining a foothold**

**Look for immature stages of psyllids (eggs and
nymphs) on the tips of branches in the new flush.**

**Detect the
insect**





What should I look for?

Look for psyllids, waxy tubules, and twisted flush

Detect the insect

Adult psyllids



Eggs



Twisted leaves



Nymphs with tubules





How are California Department of Food and Agriculture personnel detecting the psyllid?

Visual surveys, vacuum, and yellow sticky cards

Detect the insect

Sticky cards are most effective at 1 meter height





Backyard citrus

What happens when Asian citrus psyllids are found in a California backyard?

Detection of this psyllid is considered a 'find' and all of the host plants in that yard and 400 meters around that yard are treated with both a foliar and a systemic insecticide.

Backyard host plants (citrus trees and closely related plants) are treated with insecticides by a professional applicator

cyfluthrin (Tempo) a foliar pyrethroid

imidacloprid (Merit) a systemic neonicotinoid

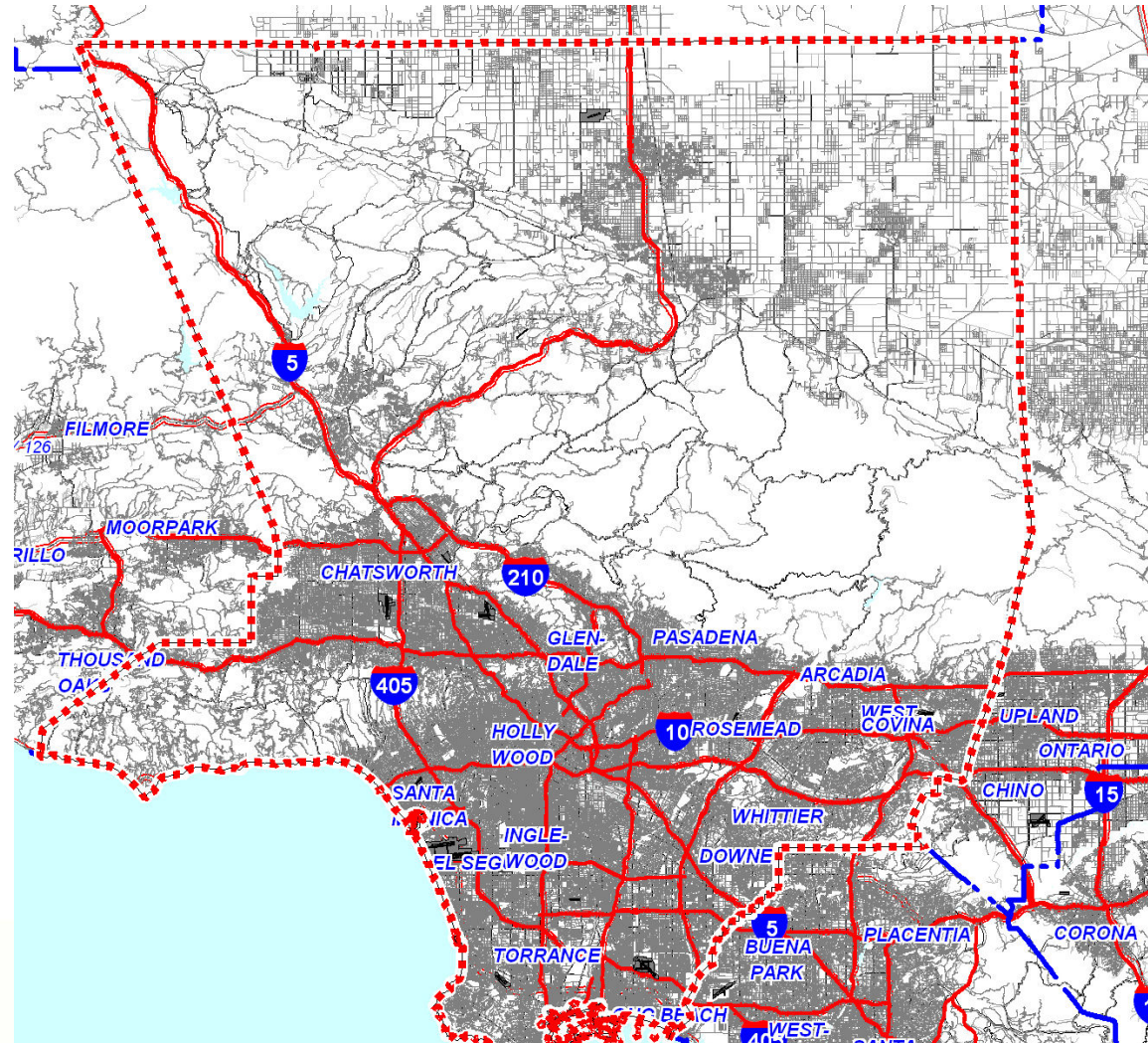




Detection of a psyllid in a yard, nursery, or orchard generates a quarantine area around that find

<http://pi.cdфа.ca.gov/pqm/manual/pdf/420.pdf>

The dotted red line shows the quarantine areas in Los Angeles County





How does the quarantine affect plant movement?

- Citrus and closely related plants can not be moved out of the quarantine area.
- Wholesale nurseries treat their plants with insecticides just prior to shipping if the plants are destined for retailers who lie within the quarantine area.

Nurseries

Wholesale Nursery treatment choices – both a systemic and foliar insecticide treatment are required
systemic insecticides

imidacloprid (Admire, Merit, Marathon, Discus, CoreTect)
thiamethoxam (Flagship)
dinotefuran (Safari)

foliar insecticides

fenpropathrin (Danitol, Tame)
cyfluthrin (Baythroid XL, Tempo SC Ultra)
chlorpyrifos (Chlorpyrifos Pro)
carbaryl (Sevin XLR Plus, Sevin SL)
spirotetramat (Movento)



Citrus Orchards

How does a psyllid infestation affect commercial citrus orchards?

- If Asian citrus psyllid infests a citrus orchard, the grower will need to treat during periods of flush and to make sure the trees are disinfested prior to harvest.
- This will increase the number of insecticide applications in citrus from 2-3/year to 5-7/year.
- Treatments will negatively affect the IPM program because many of the effective insecticides disrupt natural enemies needed for other pests.

Commercial citrus orchard treatments that control psyllid systemic insecticides

imidacloprid (Admire)
spirotetramat (Movento)

foliar insecticides

fenpropathrin (Danitol, Tame)
cyfluthrin (Baythroid XL)
chlorpyrifos (Lorsban Pro)
dimethoate
carbaryl (Sevin XLR Plus, Sevin SL)
formetanate (Carzol)
spinetoram (Delegate)
diflubenzuron (Micromite)



If the devastating Huanglongbing disease gets to California, what will happen to citrus?

Increased costs and a reduction in citrus production and acreage

- Because there is no cure for the disease, infected citrus trees will need to be removed and destroyed
- Because the disease takes 1-2 years to show symptoms and just a few psyllids will move the disease, the disease will spread in spite of pesticide treatments and tree removal.
- The expected lifespan of citrus trees will drop from > 50 years to <15 years in infected orchards.
- Citrus nurseries will be required to build screenhouses for their nursery stock

Infected tree removal





Detection and reporting

How can I help prevent the pest and disease from establishing?

- Buy only certified disease-free trees from a reputable nursery
- Don't bring plant material into California from other states or countries
- Learn to recognize the pest and disease symptoms
- Check flush foliage of citrus and citrus relatives - wherever you go
- Call your County Agricultural Commissioners office or the CDFA hotline immediately, if you suspect you have either the pest or the disease

If You Find it: Act Fast, Time is Critical

Call
800/491-1899

Think you found the disease-carrying insect?

- Time is critical.
- Secure psyllids in a clear, locked sandwich bag, jar or plastic container.
- Contact your local Agricultural Commissioner's office or call the California Department of Food and Agriculture.



www.CaliforniaCitrusThreat.org

This web site, funded by the Citrus Research Board, is designed to provide users with basic information about the psyllid and methods of identification in order to report infestations.

For more
Information

CITRUS RESEARCH BOARD

Is a Disease-Carrying Insect Killing Your Citrus Tree?

Look Closely

Stop the Asian Citrus Psyllid from delivering what could be a death sentence for California citrus trees.

The insect, which can be a carrier of a fatal citrus tree disease, can be stopped – but we need your help. Protect your citrus trees and the availability of California-grown fresh citrus by inspecting for the insect often.

The Insect

The Disease

What to Look For

Want to keep the psyllid out of your backyard?

Get breaking news and important information about keeping the insect out of California.

Sign Up

The Asian Citrus Psyllid is a sign of danger. >

Huanglongbing produces yellow, splotch leaves and kills trees. >

Detect the insect & determine if your tree is infected. >

Found the Insect? Time is Critical! Contact your local Agricultural Commissioner. >

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See www.CaliforniaCitrusThreat.com
 For brochures, cards and bookmarks
 to print out and distribute

Resources

For more information on Asian citrus psyllid [\(download pdf\)](#)
 For more information on the disease [\(download pdf\)](#)
 Printable versions of posters and cards in English, Spanish and

Posters*

[English](#)
[Spanish](#)
[Chinese](#)

Identification Cards*

[English](#)
[Spanish](#)
[Chinese](#)

Bookmark*

[English](#)

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Asian Citrus Psyllid

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The Asian citrus psyllid, *Diuraphis citri* (Komatsu) (Homoptera: Luteolinae), is a pest of citrus and close relatives of citrus. Asian citrus psyllid transmits citrus greening disease (Huanglongbing) to citrus. While direct damage to citrus is minimal, there is even greater concern for the economic citrus greening, or Huanglongbing.

Asian citrus psyllid is found in tropical and subtropical Asia, Africa, Australia, and the Pacific Islands. In the United States, Asian citrus psyllid was first detected in Florida in June 1998 in backyard plantings of 'Orange Jamboree' (Fig. 1). By 2001, it had spread to 31 counties of the state due to movement of infested nursery plants. In the spring of 2001, Asian citrus psyllid was accidentally introduced to the Valley of the Sun (Orange Jamboree) in Arizona (Fig. 2). The adult psyllid is small, with a body length of 1.5 to 2.0 mm. It is a pest of citrus and other plants in the citrus family. It is a pest of citrus and other plants in the citrus family.

UC IPM
 UNIVERSITY OF CALIFORNIA
 Division of Agriculture and Natural Resources
<http://ipm.ucdavis.edu>

UC PIER REVIEWED

Figure 1. Asian citrus psyllid adult and nymphs. Photo by M. E. Rogers.



Figure 2. Worldwide distribution of Asian citrus psyllid (orange) and its spread to California in 2001. Photo by G. H. Winters.



Figure 3. Asian citrus psyllid on a citrus branch. Photo by E. E. Graffon-Cardwell.

HAVE YOU SEEN THIS INSECT? Asian Citrus Psyllid

The Asian citrus psyllid, *Diuraphis citri*, is a small, psyllid-like insect. It feeds on the new flush of citrus and very closely related plants such as orange jasmine (*Murrays paniculata*). Psyllid feeding causes curled tips and heating of the new leaves. More importantly, it can spread the bacterial plant disease Huanglongbing disease. This pest has not been seen in California, but it is now invading citrus growing regions of Florida, Mexico, Texas and Hawaii. It is very important that you do not bring in plants from other states and countries, in order to avoid introducing pests such as the Asian citrus psyllid to California.

HAVE YOU SEEN THIS CITRUS DISEASE? Huanglongbing or Citrus Greening Disease

Huanglongbing (HLB), also known as citrus greening disease or yellow shoot disease, is a very destructive bacterial disease of citrus and closely related plants. It is spread primarily by psyllid insect vectors and through grafting with infested budwood. Symptoms include yellow shoots, leaf mottle, small upturn leaves, and localized fruit with a bitter flavor. Damaged trees are less productive and more likely to die. There is no cure for HLB. The disease is not yet found in California, but was discovered in Florida in 2003. It is very important that you grow only disease-free certified citrus to avoid introducing diseases.

IF YOU SUSPECT YOU HAVE SEEN THIS INSECT OR DISEASE CALL THE CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE HOTLINE: 1-800-491-1899

University of California ANR Core Grants Program
 Photos by M. Rogers and M. Karamanos



<http://citrusagents.ifas.ufl.edu/>

Videos of 2009 ACP/HLB Conference in Florida

Resources



**We thank the following people
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