



# The Asian Citrus Psyllid and the Citrus Disease Huanglongbing



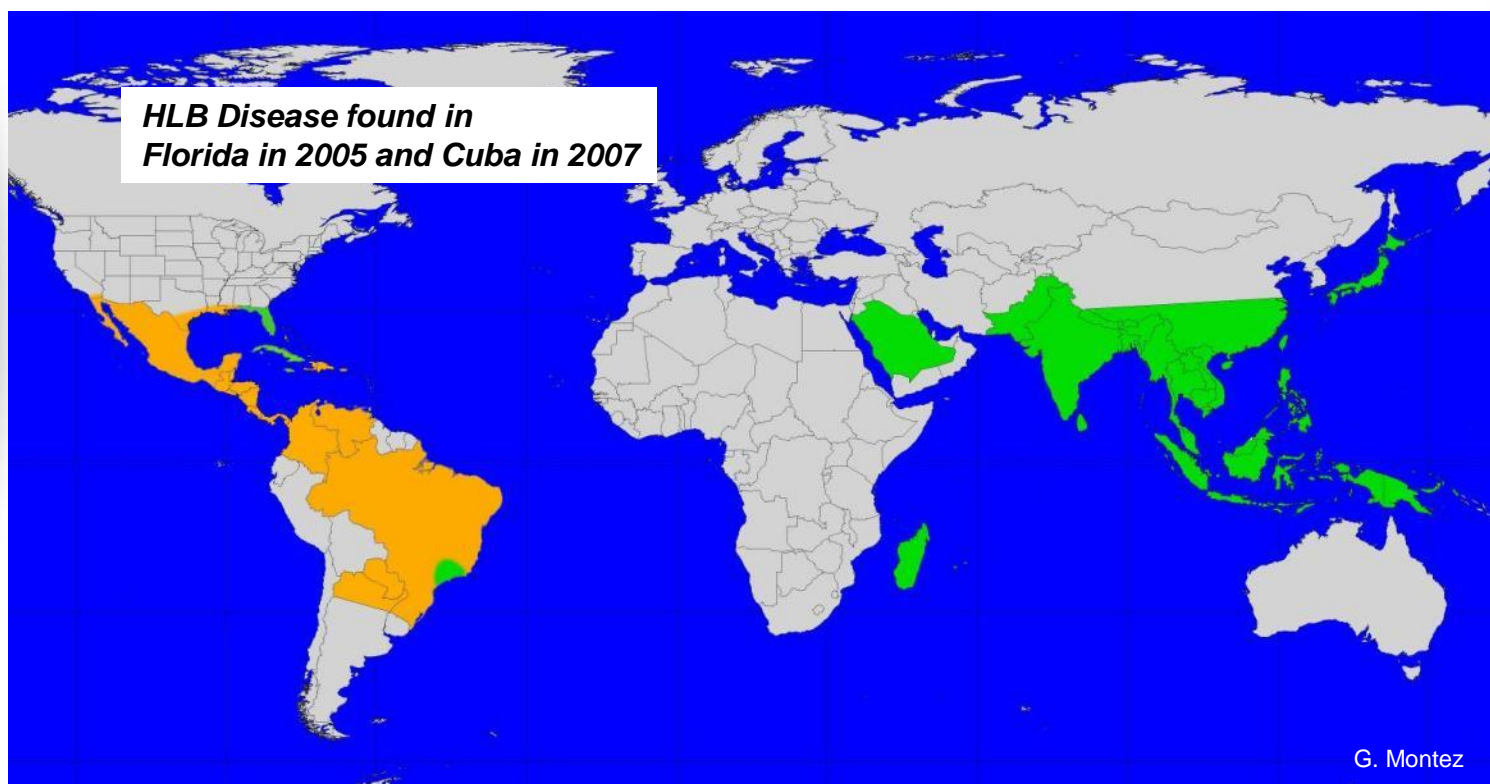
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**Riverside**





# 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, Mexico, Belize and Florida. **S. California and Arizona have the psyllid but do not yet have the disease.**



**Both the psyllid and HLB disease**  
**Asian citrus psyllid, but not the disease**

**Distribution  
of the pest  
and disease  
around the  
world**



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

**The  
pest  
insect**

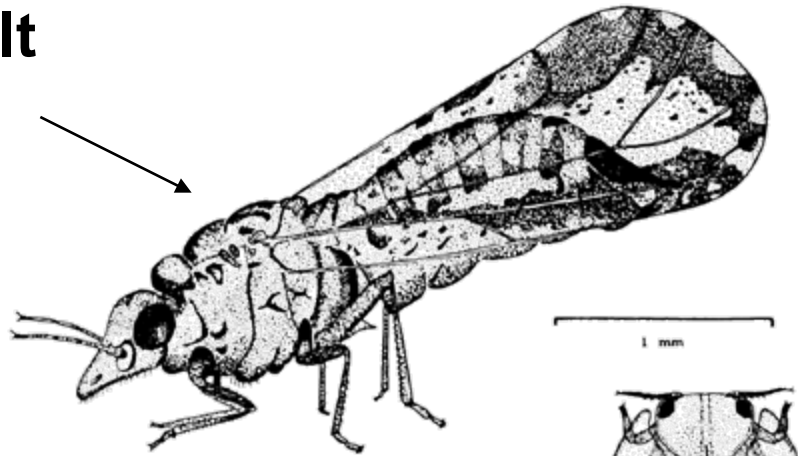






**It has an egg stage,  
5 wingless intermediate stages called  
nymphs, and winged adults**

**Adult**



**Egg**



**5 Nymphs  
(insects molt to grow bigger)**

**The  
pest  
insect**



**Adult psyllids 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. They are difficult to see because they are so small**

**The  
pest  
insect**



M. Rogers





**The nymphs produce waxy tubules that direct the honeydew away from their bodies. These 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 the 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* (wampei)
- *Microcitrus papuana* (desert-lime)
- Others.....

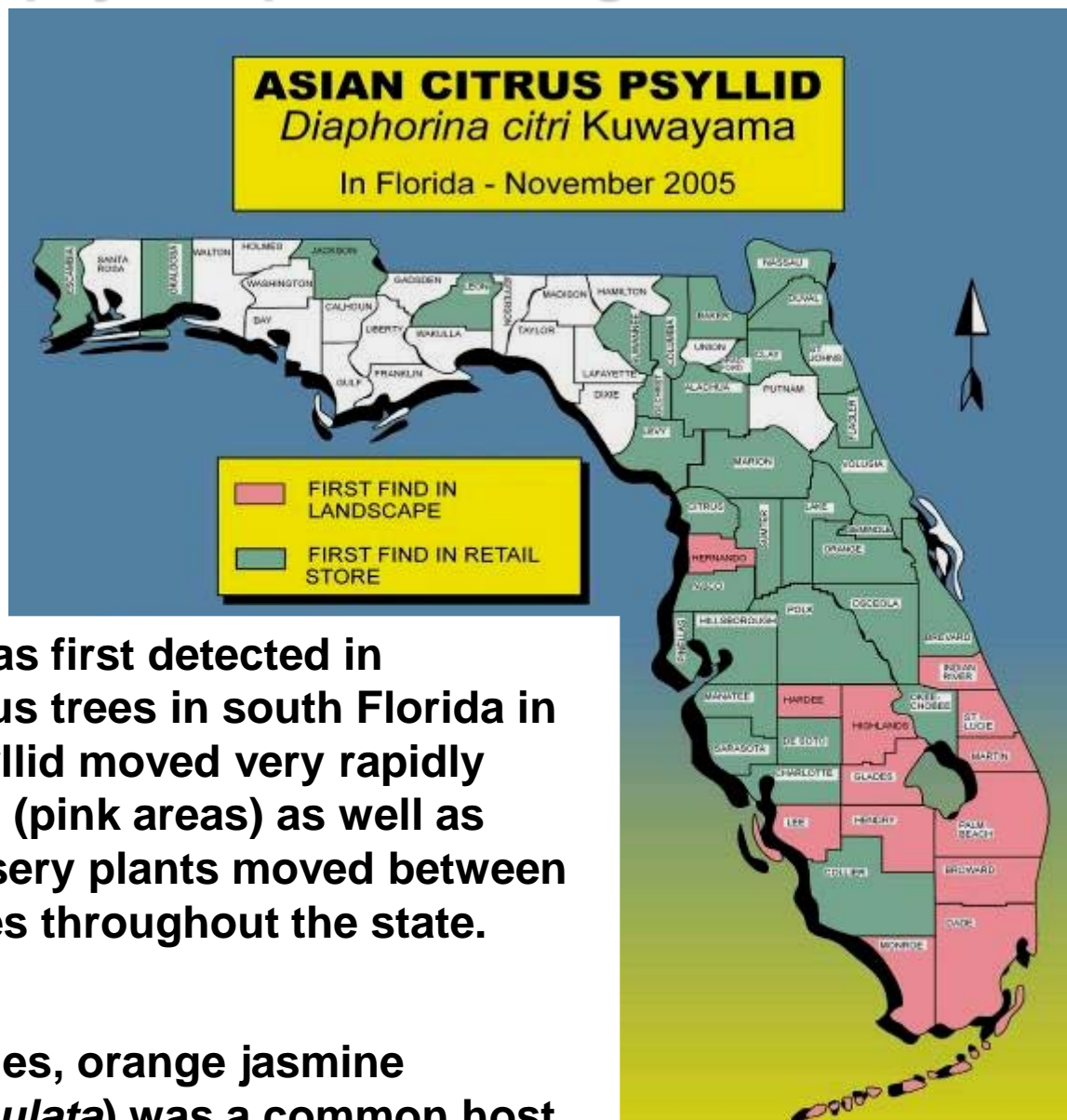
**Plants  
affected**



Calamondin



# How did the psyllid spread through Florida?



## Distribution of the pest

The psyllid was first detected in backyard citrus trees in south Florida in 1998. The psyllid moved very rapidly both by flying (pink areas) as well as riding on nursery plants moved between retail nurseries throughout the state.

In retail nurseries, orange jasmine (*Murraya paniculata*) was a common host.





## **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.**



E. Grafton-Cardwell





## The bacterial disease

### What is HLB?

HLB is thought to be caused by a bacterium that affects the plant's ability to move nutrients

**Bacterium: *Candidatus Liberibacter asiaticus***

\*Some researchers think that a phytoplasma may also be required to produce symptoms

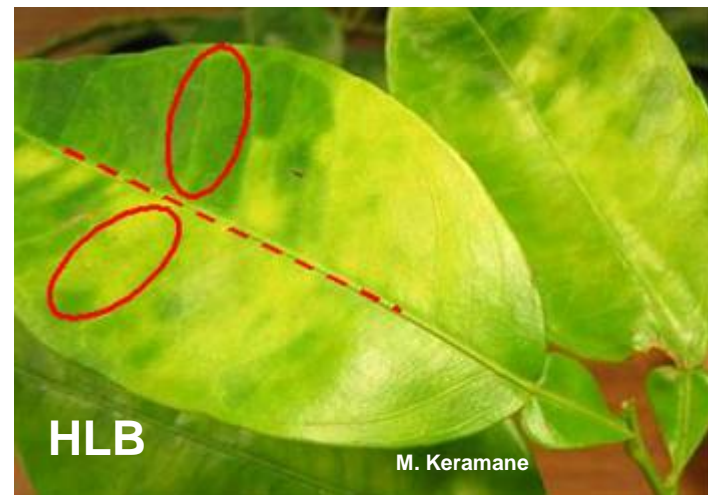




## **An early sign of the disease is yellowing of the leaves**

### **The bacterial disease**

Leaves with HLB disease have a blotchy 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.





**HLB leaf symptoms can range from slight to nearly completely yellow**



**The  
bacterial  
disease**



S. Halbert





**HLB in orange**





# HLB disease prevents the fruit from developing the proper color

**The  
bacterial  
disease**

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



S. Halbert



S. Halbert



**Even more devastating, HLB causes the fruit to be small, oddly shaped, with aborted seeds and bitter juice**

**The  
bacterial  
disease**

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







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

## **The bacterial disease**





**Within 3 to 5 years after HLB 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.**



S. Halbert





## How does the insect pick up the bacteria?

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

The pest insect and the pathogen



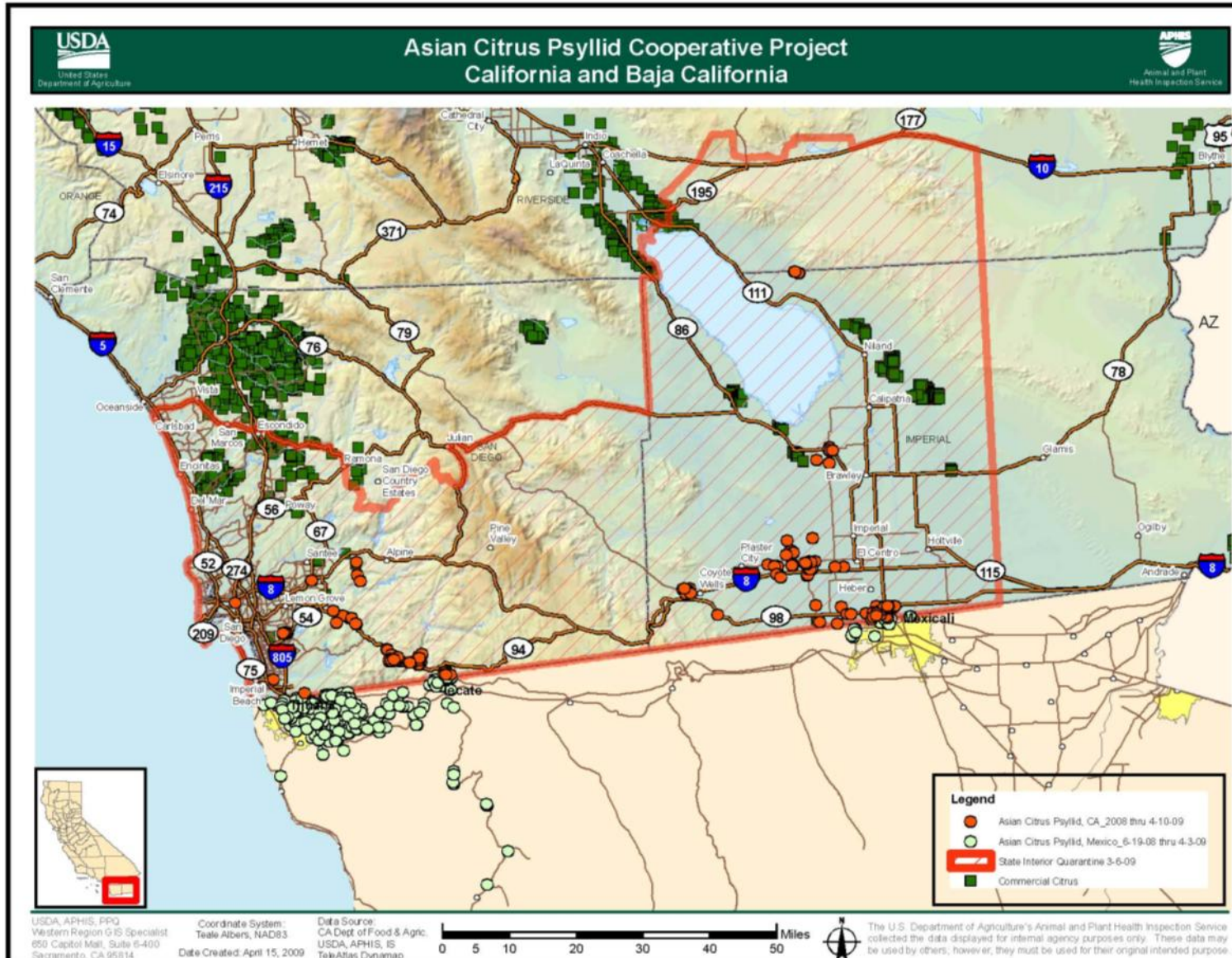
The psyllid carries the bacteria in its body for the rest of its life (weeks to months).



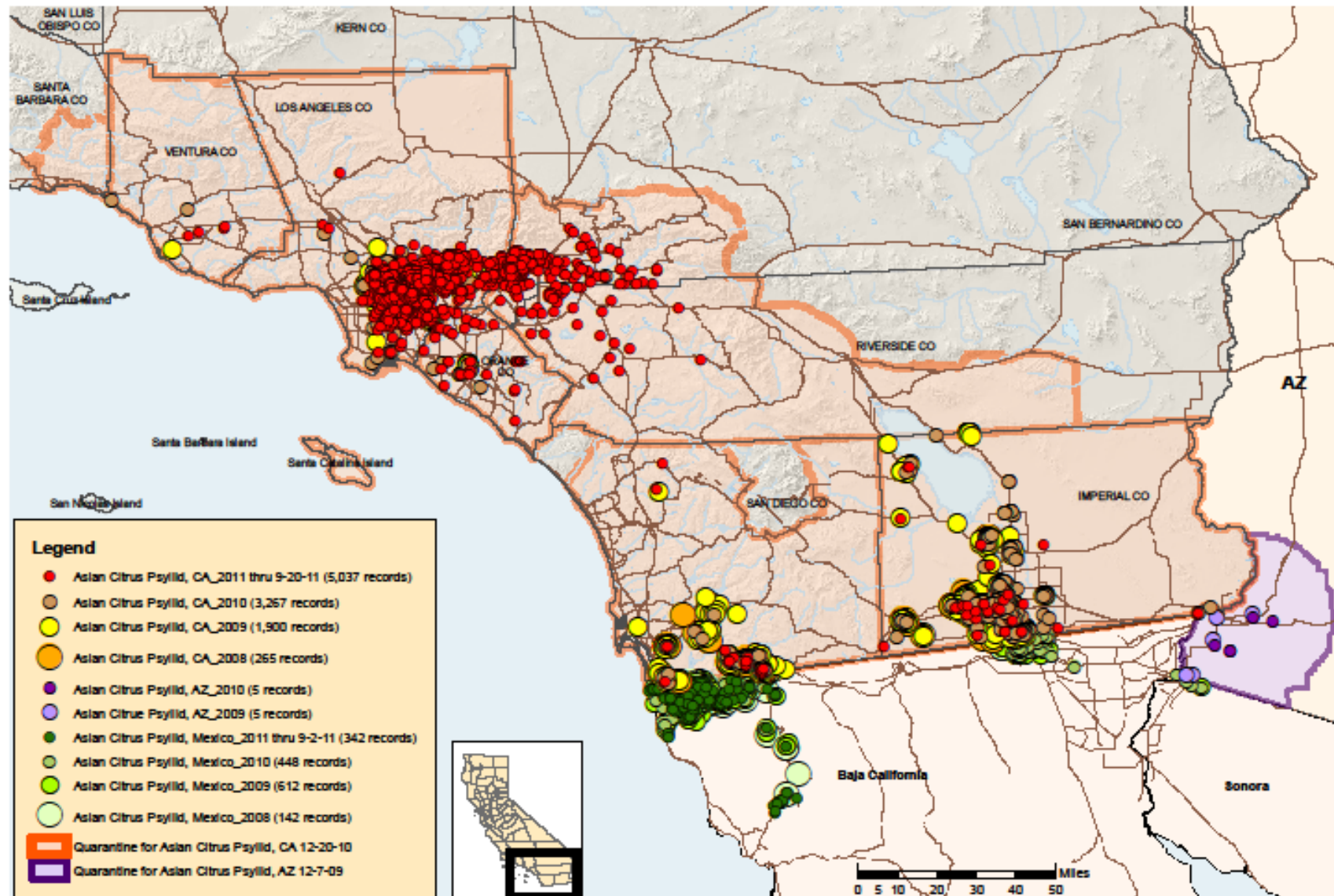


# Asian citrus psyllid arrived in California from Mexico in 2008 and was found in backyard citrus in San Diego and Imperial Counties

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



# Asian Citrus Psyllid Cooperative Project California, Arizona, Baja California, and Sonora







# Pest Alert

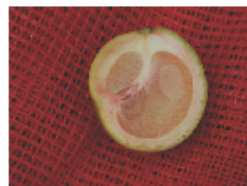
Plant Protection and Quarantine

November 2010

## Get the Facts on Citrus Greening (Huanglongbing)



**Figure 1**—Citrus greening-affected trees may take years to die from the disease. In this image, an infected citrus tree displays multiple symptoms of citrus greening, including being dieback, leaf mottling, leaf yellowing, fruit drop, and poor fruit color.



**Figure 2**—Trees infected with citrus greening produce bitter, misshapen fruit. Here, the asymmetrical development and aborted seed in this fruit are telltale signs of citrus greening.



**Figure 3**—Tiny to the naked eye, adult Asian citrus psyllids are no bigger than common gnats.

Citrus greening disease, or huanglongbing, is one of the world's most serious citrus diseases. There is no known cure for citrus greening. While not a threat to human health, citrus greening greatly reduces citrus production. Once infected with the disease, citrus trees usually decline within 5 to 12 years (fig. 1), whereas healthy commercial citrus trees are typically productive for more than 50 years. Trees infected with citrus greening produce bitter, misshapen, unmarketable green fruit (fig. 2).

Because there is no cure for this disease, the U.S. Department of Agriculture (USDA) prohibits citrus plants and plant material from moving outside of areas where citrus greening is present and restricts the movement of the same material from areas where the Asian citrus psyllid, a primary vector of the disease, is present.

Citrus greening is believed to have originated in China in the early 1900s. It has greatly reduced citrus production in all countries where it has become established. First

detected in the United States in August 2005 in Miami-Dade County, FL, citrus greening is now established throughout most citrus-producing counties in Florida, and the entire State is under Federal quarantine for citrus greening and Asian citrus psyllid. Federal law prohibits the movement of live citrus plants, plant parts, budwood, or cuttings outside of Florida. Subsequent U.S. detections of the disease have occurred in numerous citrus-producing States and U.S. Territories. The most current information on disease-affected areas in the United States can be found online at [www.aphis.usda.gov/citrusgreening](http://www.aphis.usda.gov/citrusgreening).

### How It Spreads

Citrus greening is spread primarily by gnat-sized insects called Asian citrus psyllids (*Diaphorina citri* Kuwayama). These invasive pests transmit the disease to citrus trees and other host plants when they feed on the leaves and stems.

Adult psyllids resemble aphids in appearance, measuring about

one-eighth of an inch. Their bodies are grayish-tan with brown markings and mottled brown wings. The last two segments of their antennae are black. They feed with the posterior of their bodies raised at a 45-degree angle (fig. 3). When disturbed, they typically jump or fly a short distance. They are most likely to be found on new shoots, or young growth, of citrus plants.

In nymph form, Asian citrus psyllids' oval-shaped bodies are yellowish-brown. Difficult to see, nymphs cannot fly, and they move slowly. Most visible are the waxy, white excretions they produce (fig. 4).

Asian citrus psyllid eggs are yellow/orange in color and shaped like almonds. They are often tucked inside crevices and leaf folds.

Not all Asian citrus psyllids carry the disease-causing bacteria. But even non-infected psyllids can damage citrus plants and trees by stunting the growth of new shoots. On host plants and trees, these psyllid infestations result in burned shoot tips and twisted leaves on





## The bacterial disease pathways

# HLB has not been found in California or Arizona How can it get there?

**Inside psyllid vector:** HLB could be inside the body of a psyllid that flies into California or is transported by humans on fruit, leaves or stems of citrus relatives.

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

**It is illegal to bring citrus trees into California from other states or countries because they may be infested with ACP or infected with HLB.**

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



E. Grafton-Cardwell



**You can help search for the psyllid!  
It is critical for California and Arizona to  
keep this insect from establishing**

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

**Detect the  
insect**



E. Grafton-Cardwell





[www.CaliforniaCitrusThreat.org](http://www.CaliforniaCitrusThreat.org)

[www.PeligranCitrocosenCalifornia.com](http://www.PeligranCitrocosenCalifornia.com)

This web site, funded by the Citrus Research Board, provides users with basic information about the psyllid and disease.

For more  
Information



The Insect

The Disease

What To Look For

If You Find It

Other Resources

Want to keep the  
psyllid out of your  
backyard?

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

Sign Up

## Is a Disease-Carrying Insect Killing Your Citrus Tree?



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 Asian Citrus Psyllid is  
a sign of danger. >

### The Disease



Huanglongbing produces  
yellow, splotch leaves  
and kills trees. >

### What to Look For



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

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