

Asian Citrus Psyllid and the Citrus Disease Huanglongbing

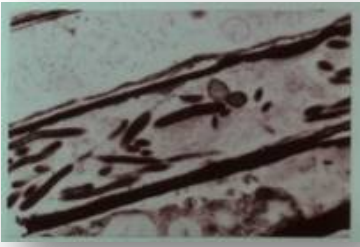


Beth Grafton-Cardwell
Department of Entomology
UC Riverside

**The adult psyllid deposits eggs on new leaf flush,
that then hatch into nymphs**

**Nymphs can only
survive by living on
young, tender
leaves and stems
(new flush)**





Huanglongbing (HLB)

Bacterial disease:

Candidatus Liberibacter asiaticus Clas



As the disease progresses:

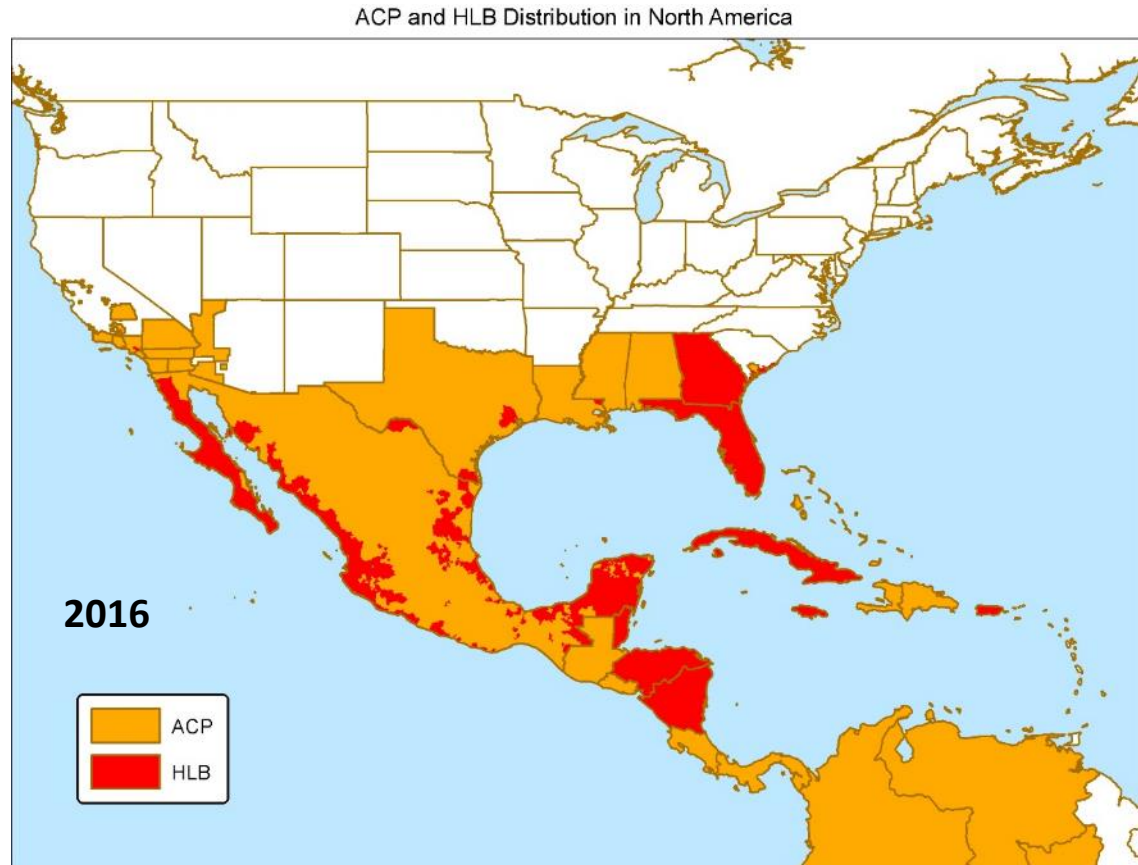
- *Roots decline
- Leaves become yellow
- Foliage becomes thin
- Fruit drops off easily
- Fruit is smaller
- Juice is bitter
- Tree death (there is no cure)

How did the psyllid get to California and where is the disease?

The psyllid was first found:
In Florida in 1998
in California in 2008

The psyllid most likely
arrived in California from
Mexico

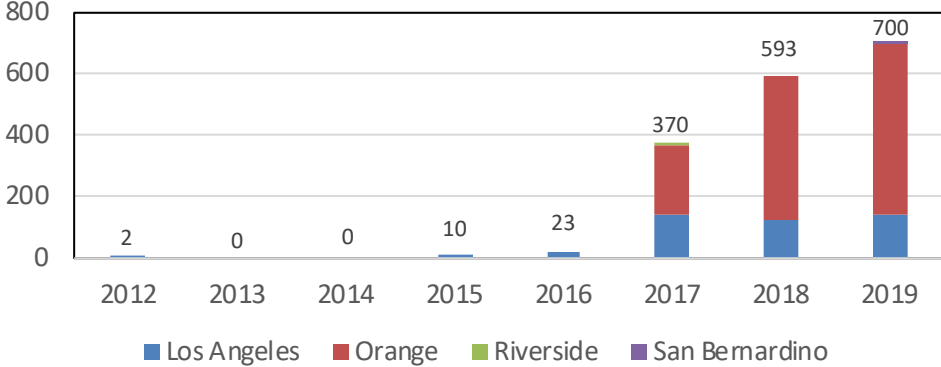
The infected plants were
likely already here (illegal
grafting) and the psyllid
spread HLB further



*Florida has lost 50% of its citrus
production due to this disease!*

<https://ucanr.edu/acpmap>

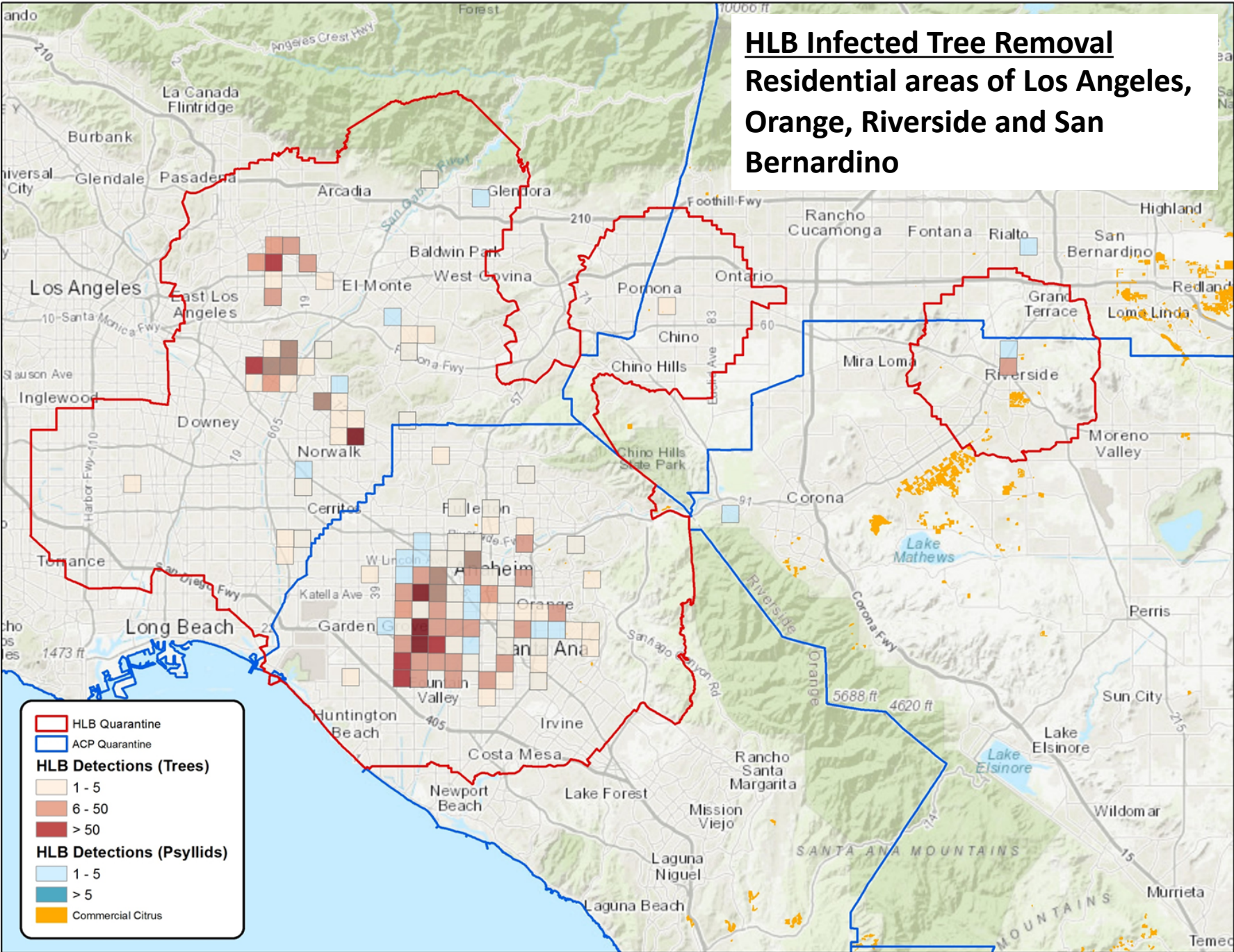
1698 HLB positive Trees removed in Southern California



1698 HLB-infected tree removals from residential citrus

- HLB Quarantine
- ACP Quarantine
- HLB Detections (Trees)**
 - 1 - 5
 - 6 - 50
 - > 50
- HLB Detections (Psyllids)**
 - 1 - 5
 - > 5
- Commercial Citrus

HLB Infected Tree Removal Residential areas of Los Angeles, Orange, Riverside and San Bernardino



	HLB Quarantine
	ACP Quarantine
HLB Detections (Trees)	
	1 - 5
	6 - 50
	> 50
HLB Detections (Psyllids)	
	1 - 5
	> 5
	Commercial Citrus

In March 2012, HLB was found in a residential tree in Southern California. How did it get there?

Most likely an HLB-infected tree or infected budwood was brought illegally into California and planted or grafted onto a residential tree. The disease just sits inside the plant, until a psyllid arrives and picks it up and moves it.



It is very important to obtain disease-free trees and budwood from reputable nurseries rather than trading plant material of unknown origin

How does the bacterium spread? – Two ways

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 psyllid can pick up the bacteria as a nymph or adult and then it carries the bacteria in its body for the rest of its life (weeks to months).

The bacteria can be spread by grafting infected plant material



Most Citrus trees are grafted

Rootstock grown from seed with good disease resistance

+ **Scion** plant material with good fruit qualities



Budwood



Rootstock

Scion





Disease-free budwood is shipped to the nurseries, who then make the trees that are sold to growers and retail stores



Citrus Clonal Protection Program
... starting citrus correctly

<https://ccpp.ucr.edu>



UC Lindcove

Fruit Mentor - Dan Willey

Videos teach how to graft citrus and recommend Citrus Clonal Protection Program Budwood

- YouTube
- Home
- Trending
- Subscriptions
- Library
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- Watch later
- Liked videos
- SUBSCRIPTIONS
- Popular on YouTube...
- Music
- Sports
- Gaming
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- Gaming
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- Fashion
- Settings

grafting citrus

FILTER



Easy Grafting Citrus
 Grafting Examples • 38K views
 Grafting Examples: To day i v
 Check my lates citrus ...



Grafting Citrus Trees
 fruitmentor • 708K views • 3
 In this video on grafting citru
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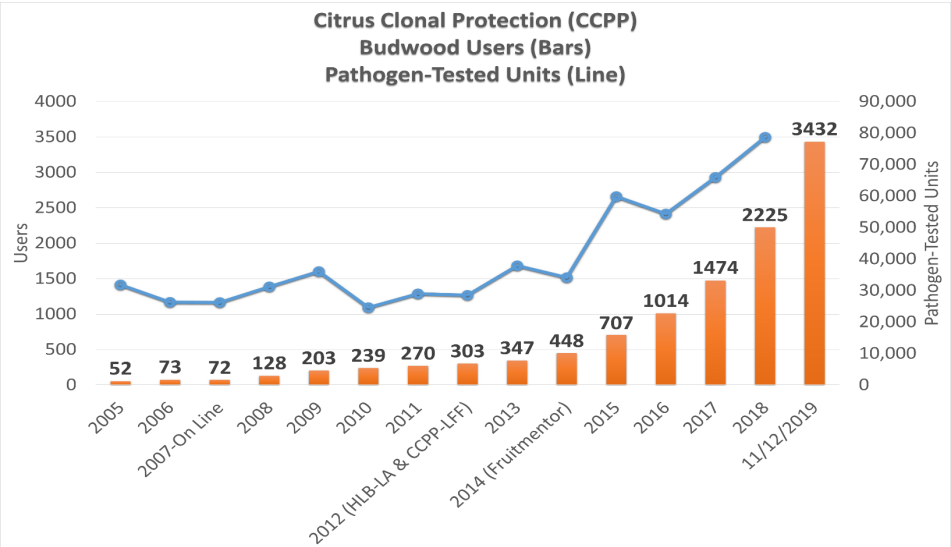
Crazy About Citrus | Ep02 Results of Citrus Grafting Attempt
 Never Enough Dirt • 7.9K views • 1 year ago
 Crazy About Citrus® is a series chronicling our connection with citrus. In this episode: The reveal on how we did on our ...



Growing Citrus from Cuttings - Rooting and Grafting Citrus in One Step
 fruitmentor • 842K views • 3 years ago
 This video on growing citrus from cuttings shows rooting citrus cuttings and grafting citrus cuttings in one step. http ...



Grafting Citrus Trees - Bud Grafting Successfully
 fruitmentor • 281K views • 4 years ago
 Learn how to bud graft citrus fruit trees successfully. I have found that chip budding of citrus gives a high success rate and ...



Why is this disease so quick to spread and so hard to detect?

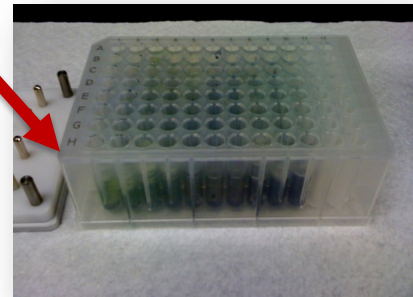
The nymphs hatch and immediately pick up the bacterium and spread it when they molt and fly away 4-6 weeks later.



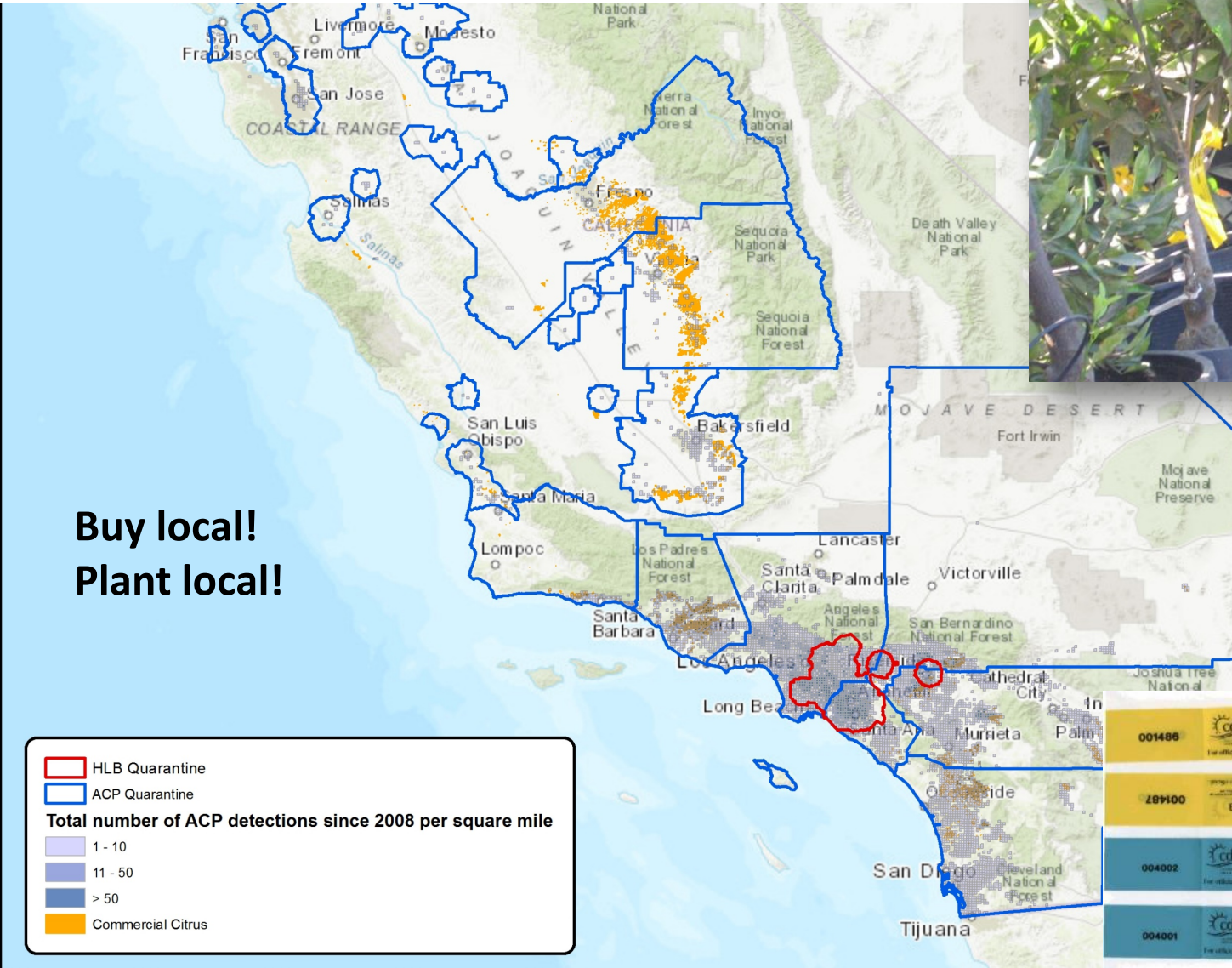
The eggs are laid on new flush next to the where the psyllid injects the bacterium.



When leaves are sampled, they must have the bacteria for PCR to detect it. It takes 9 months to 2 years for the bacteria to spread throughout the tree for sampling to pick the right leaf.



Citrus trees in **retail nurseries** in the ACP quarantine areas have a tag on them to keep plants local and retail citrus in HLB Q areas is destroyed



**Buy local!
Plant local!**



The tag explains that the tree should not be moved out of the quarantine area.



Response to psyllids

Goal: reduce psyllids to reduce the spread of disease

<http://ucanr.edu/sites/ACP/>



Central/Northern CA:
Eradicative/ Coordinated Treatments

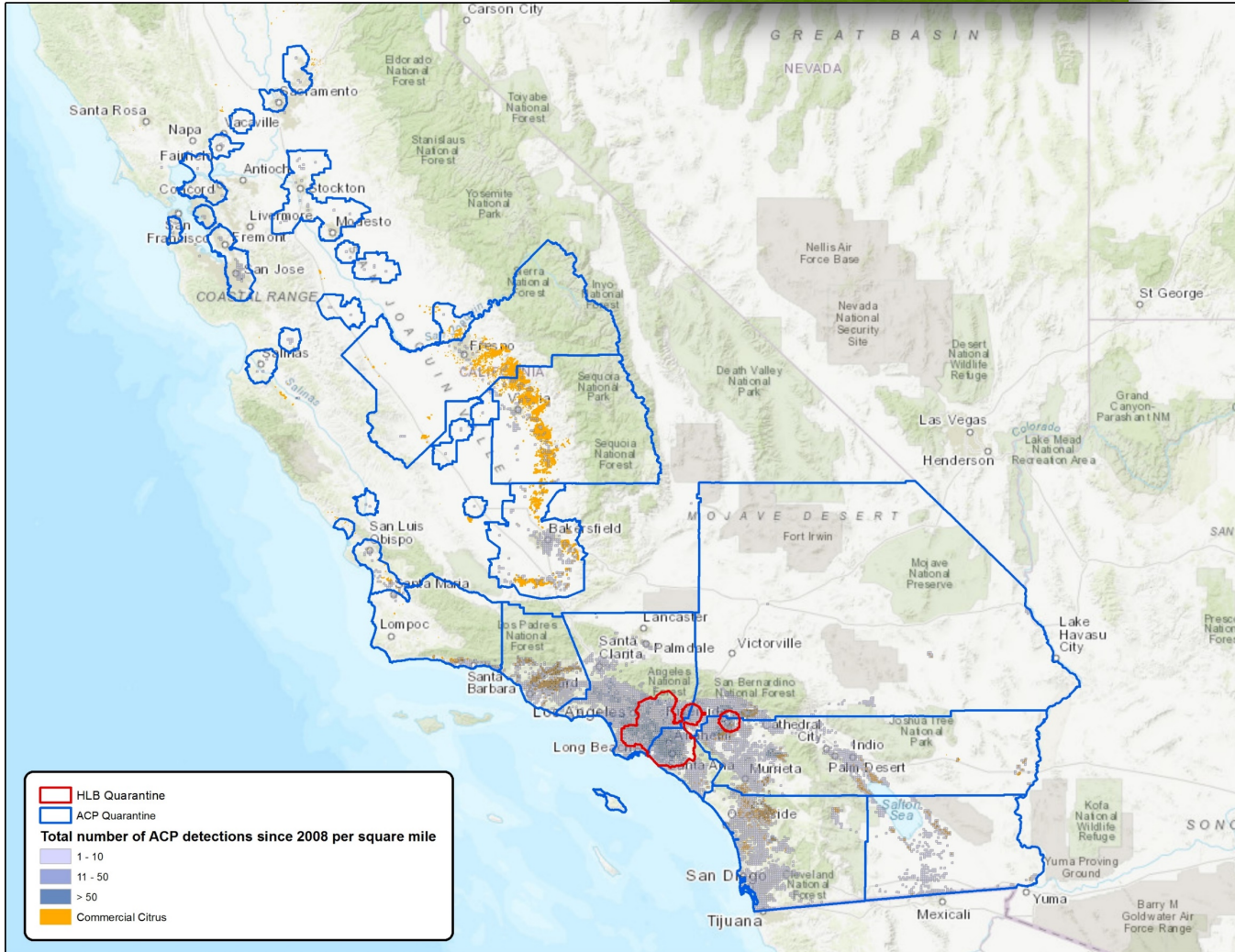
Commercial citrus:
coordinated treatments

Urban: find site and neighbors

Southern California:
Area-wide treatment program

Commercial citrus: Growers treat together over a 2-3 week window (fall and winter)

Urban: parasites released



Action Steps for Homeowners in areas where psyllids are not known to have established (generally north of the grapevine)

- Examine citrus trees whenever there is young leaf flush
- If you find psyllids, call the hotline or the local Ag Commissioners office
- If the psyllid is found in or near your home, support CDFA-applied insecticide treatments to help locally eradicate the pest

Locally eradicate the psyllid!

If You Find it: Act Fast, Time is Critical

Call
800/491-1899

Think you found the [Asian citrus psyllid](#) or [HLB symptoms on your tree](#).

- Time is critical.
- Secure psyllids and leaf samples 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 hotline immediately.

How do I look for the psyllid?

Look at new leaves for adult and nymphs that produce the waxy tubules



If you find it north of the grapevine, call your county ag commissioner
Or the CDFA hotline – either way act fast to contact the authorities

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What actions does CDFA take to locally eradicate the psyllids?

All of the host plants in that yard and neighboring yards, are treated with a foliar and a systemic insecticide.

A professional applicator treats the backyard citrus trees and closely related plants with insecticides

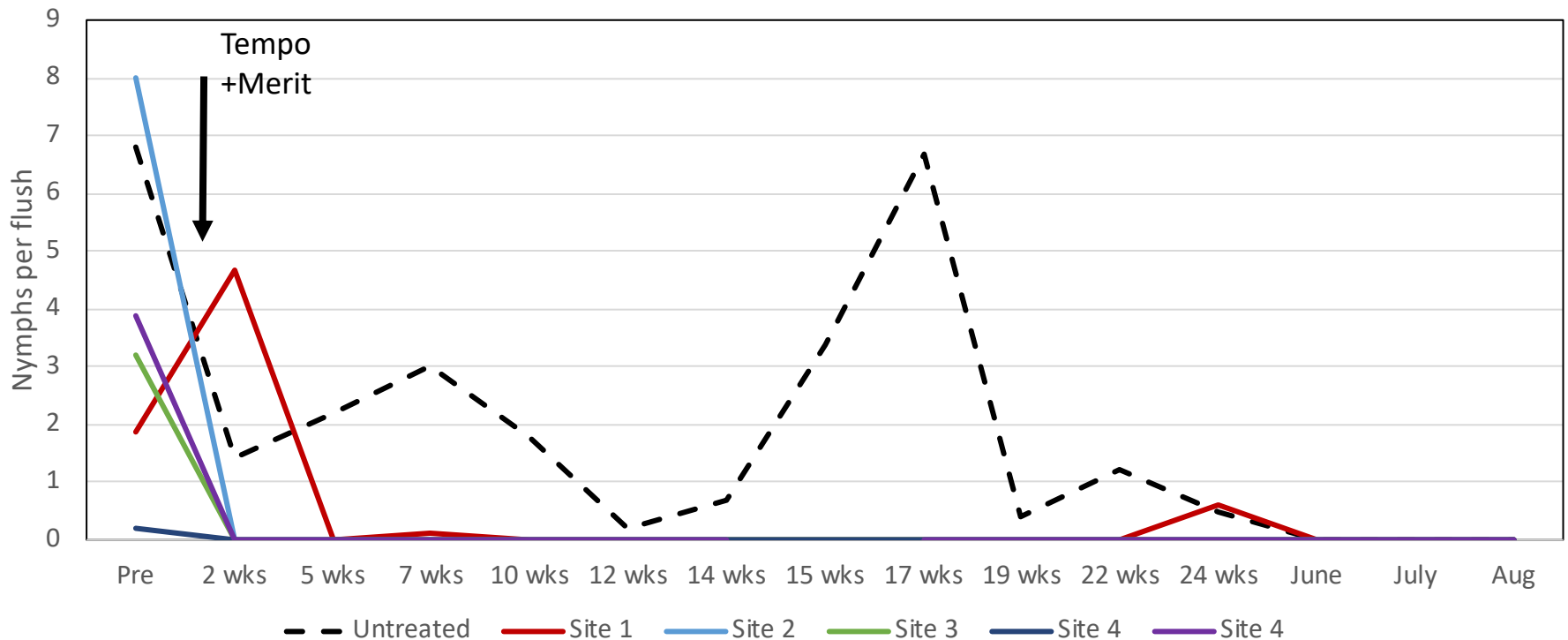
- cyfluthrin (Tempo) a foliar pyrethroid

- imidacloprid (Merit) a systemic neonicotinoid



Treatments are very effective

Riverside Residential ACP Densities



Conclusions

Tempo + Merit rapidly eliminated psyllids in 4 out of 5 sites

Protection lasted for at least 4 months and in some areas of CA eradicates the pest

5 flushes examined (when available) on 2-5 trees at each site



What about bees?

- CDFA does not treat with the foliar pyrethroid pesticide if bloom is present
- The neonicotinoid is applied to the soil
- Most citrus trees only bloom in April. Bees are not attracted to citrus the rest of the year. So treatments applied outside of April do not affect them.
- Bees are not feeding just on citrus flowers, but other plants in the yard as well and that reduces the effect of pesticides.
- Citrus is self-pollinating, which means that it doesn't need bees to produce fruit.

Action Steps for Homeowners in southern California where the psyllid is well-established, but not near HLB-infected trees

- **Protect your trees from psyllids**
 - Control ants to help biological control
 - Pesticides
 - Bags
 - Kaolin clay
- Examine your trees for HLB-leaf symptoms and if you see something suspicious, call the CDFA hotline

Protect your trees from psyllids and be on the lookout for HLB!

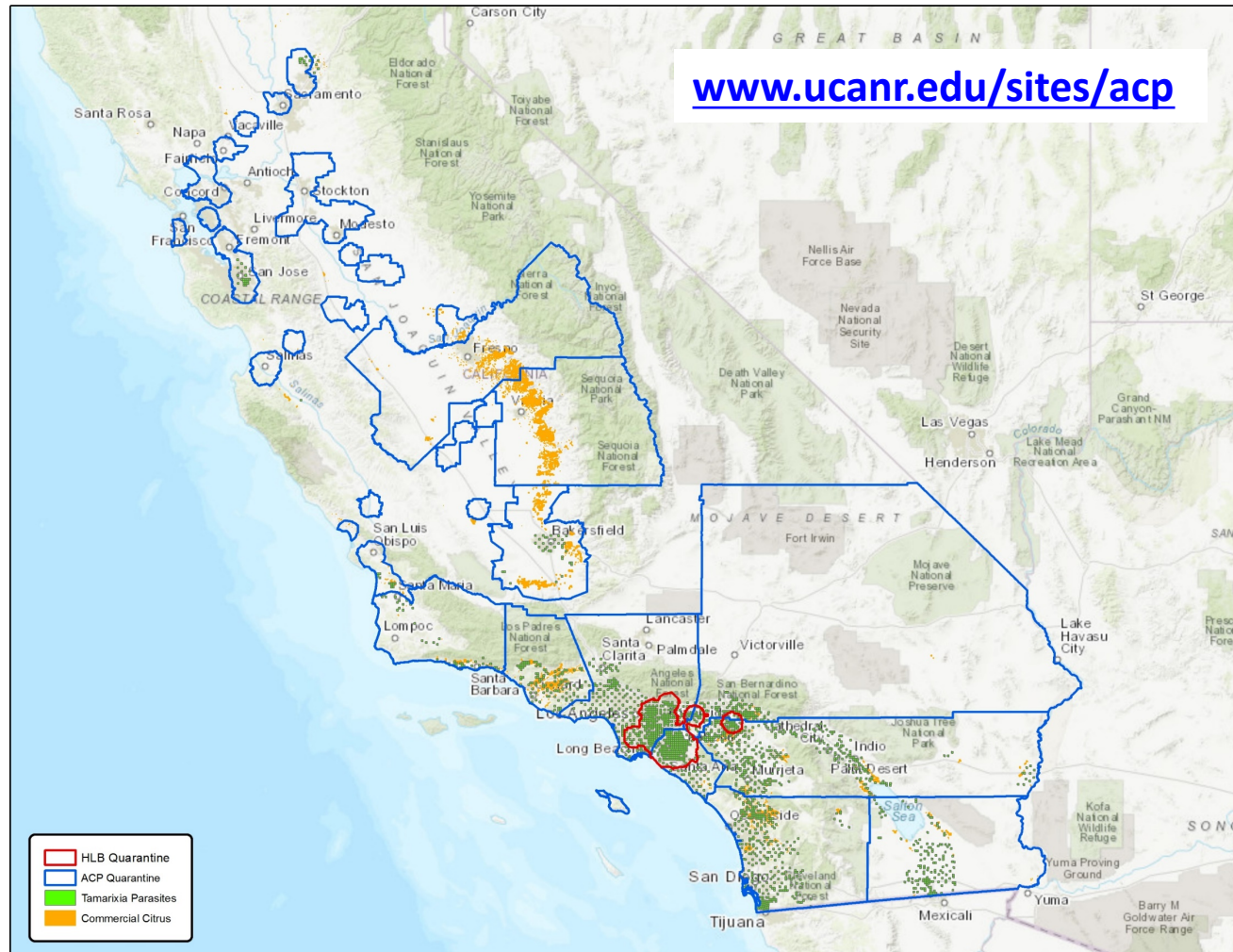
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Tamarixia radiata parasite releases



USDA/UC Releases have been successful in establishing the parasites and releases continue, however, the *Tamarixia* are very expensive (\$.50/wasp) and parasitism levels are not high enough to prevent disease spread.

Control ants to promote natural enemies (parasites, lacewings, syrphid flies)

All Ants:

Stickem band on the trunk

Surface treatments: pyrethroids

Sugar Feeders (grey and black ants)

Liquid baits: boric acid

Gel baits: arsenic, boric acid

Protein Feeder (red ants)

Corn cob grit baits:

**hydramethylnon, fipronil,
sulfuramid**



The nymphs produce sugary honeydew as waste and the ants protect the psyllids from parasites and predators (natural enemies) in order to farm that honeydew

Insecticide treatments available to homeowners – treatments to apply when CDFA does not treat

Type of treatment	Pesticide Name	Effectiveness against ACP	Duration of control	Application timing
Professional treatment	Tempo & Merit	High	Months	Foliar: when psyllids are present Systemic: summer or fall
Homeowner-applied broad-spectrum foliar	Sevin, Malathion	Moderate	Weeks	When psyllids are observed
Homeowner-applied soil drench	Bayer Advanced Fruit, Citrus & Vegetable	Moderate	Months	When psyllids are observed in summer or fall
Homeowner-applied soft foliar	Insecticidal soaps, oils and pyrethrins	Low to moderate	Days	Every 7-10 days especially during *leaf flushing

*Flushing: when new leaves are first developing until they expand and harden

Surround at Home© Crop Protectant

- $\frac{1}{4}$ to $\frac{1}{2}$ lb per gallon, premix in a bucket and spray on the plant
- Be sure to shake the sprayer and clean the nozzles when done



The trick is to keep the new flush protected because that is where the psyllid wants to lay the eggs



Mesh bags or screenhouses to prevent psyllids reaching the trees

- Mesh must be small enough to keep psyllids out
- Bags for individual trees
- Screen houses for community gardens



The
**TREE
DEFENDER**
CREATED BY GROWERS FOR GROWERS

<http://thetreedefender.com>

4, 5, 7 and 12 foot bags
(\$8 -25 + shipping)



****Its critical to make sure there are no insects on the tree to begin with and to check periodically, or you will create an insectary of scales, whiteflies, mealy bugs, psyllids etc inside the bag.**

How do I look for the disease?

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

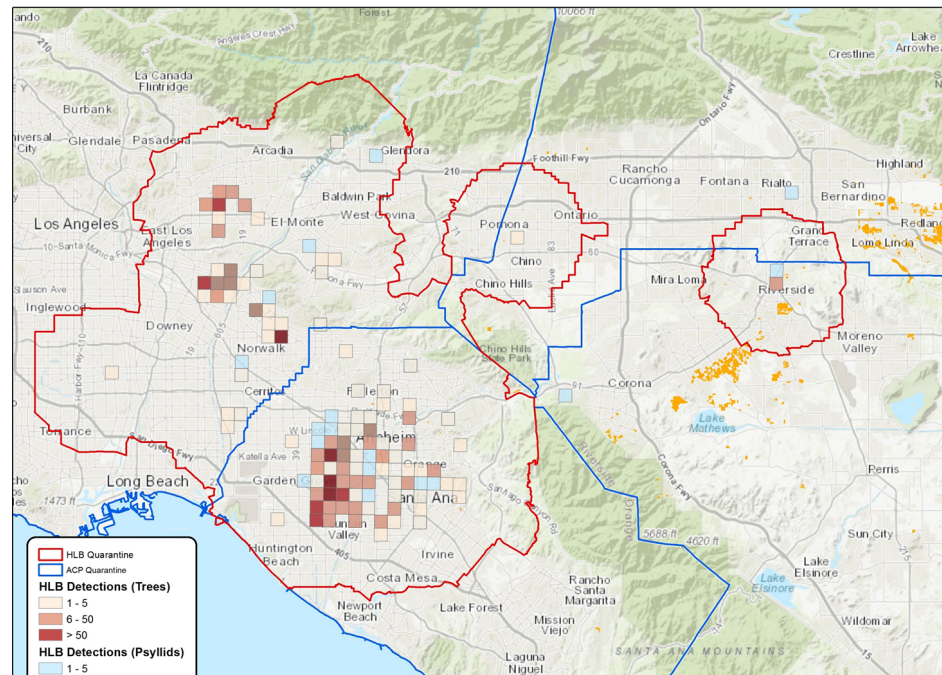


Leaves with nutrient deficiencies (Zinc is an example) have the same yellow pattern on both sides of the leaf.



Action Steps for Homeowners near HLB-infected tree removals or infected psyllids

- Support CDFA treatment of your citrus (mandatory treatments)
- Parasitic wasps are being released outside the treated yards
- Protect your trees from psyllids
 - Pesticides
 - Bags
 - Kaolin clay
- Examine your trees for HLB-leaf symptoms and if you see something suspicious, **call the CDFA hotline**
- Consider replacing your citrus with non-citrus or keeping it covered with a mesh bag



Replace citrus with something else until a cure is found!

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- Secure psyllids and leaf samples 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 hotline immediately.

Homeowner Messaging in the HLB Quarantine Area

<https://ucanr.edu/hlbapp>



Should I replace my citrus tree with a non-citrus fruit tree?

The Asian citrus psyllid is spreading a bacterial disease called huanglongbing (HLB) that kills citrus trees. Trees that are known to have the disease are treated and removed by the California Department of Food and Agriculture (CDFA). HLB quarantines have been set up in areas where diseased trees have been found. Unhappily, not all trees with disease test positive, but they can still provide a home for the psyllids and the disease.

If you are close to or within the HLB quarantine, you may need to replace your citrus tree with a non-citrus fruit tree to help prevent the spread of HLB. See the graphic below to find out more.



Use the web link ucanr.edu/hlbapp or the QR code to determine how close you are to an infected tree.



HLB detected 0-2 miles: replace your tree

Remove and replace your tree with a non-citrus fruit tree.

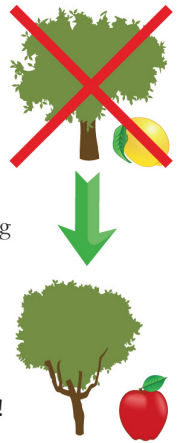
Your tree is likely to be infected with HLB even if it is not showing symptoms or a positive test.

When removing the tree:

Treat with the tree with insecticide and/or dry out the tree before disposing of it so that you don't move psyllids.

Alternative fruit trees

There are lots of great choices for southern California planting: apples, figs, jujube, loquat, persimmon, pomegranate, avocado, and many more!



HLB detected 2-5 miles: consider replacing your tree!

Support regular treatment and testing for HLB by CDFA. Regularly check the map and intensify the protection of your citrus trees by additional treatments to kill ACP or a tree covering to block ACP reaching the foliage.

HLB detected greater than 5 miles

Regularly check the map and protect citrus trees with pesticide treatments for ACP and control ants to promote natural enemies.

Resources

UC ANR ACP and HLB Distribution and Management:

ucanr.edu/acp

UC IPM *Pest Notes* for ACP: ucanr.edu/pnacp

Call CDFA hotline with ACP/HLB questions in Spanish and English: (800) 491-1899

E-mail photos of insects, damage, or disease concerns to:

pesthotline@cdfa.ca.gov

UCCE Master Gardener Hotlines

Los Angeles County mglosangeleshelpline@ucdavis.edu (626) 586-1988	Desert/Indio area anrmgindio@ucanr.edu (760) 342-2511
Orange County uceocmg hotline@ucanr.edu (949) 809-9760	San Bernardino County mgsanbern@ucanr.edu (909) 387-2182
City of Riverside area anrmgriverside@ucanr.edu, (951) 683-6491 ext. 231	Ventura County mgventura@ucdavis.edu (805) 645-1455

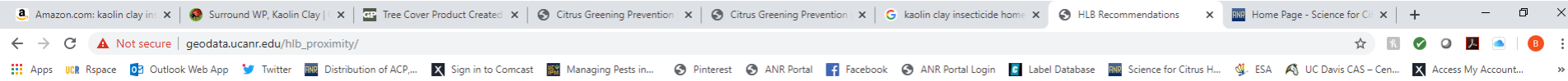


University of California

Agriculture and Natural Resources | UCCE Master Gardener Program

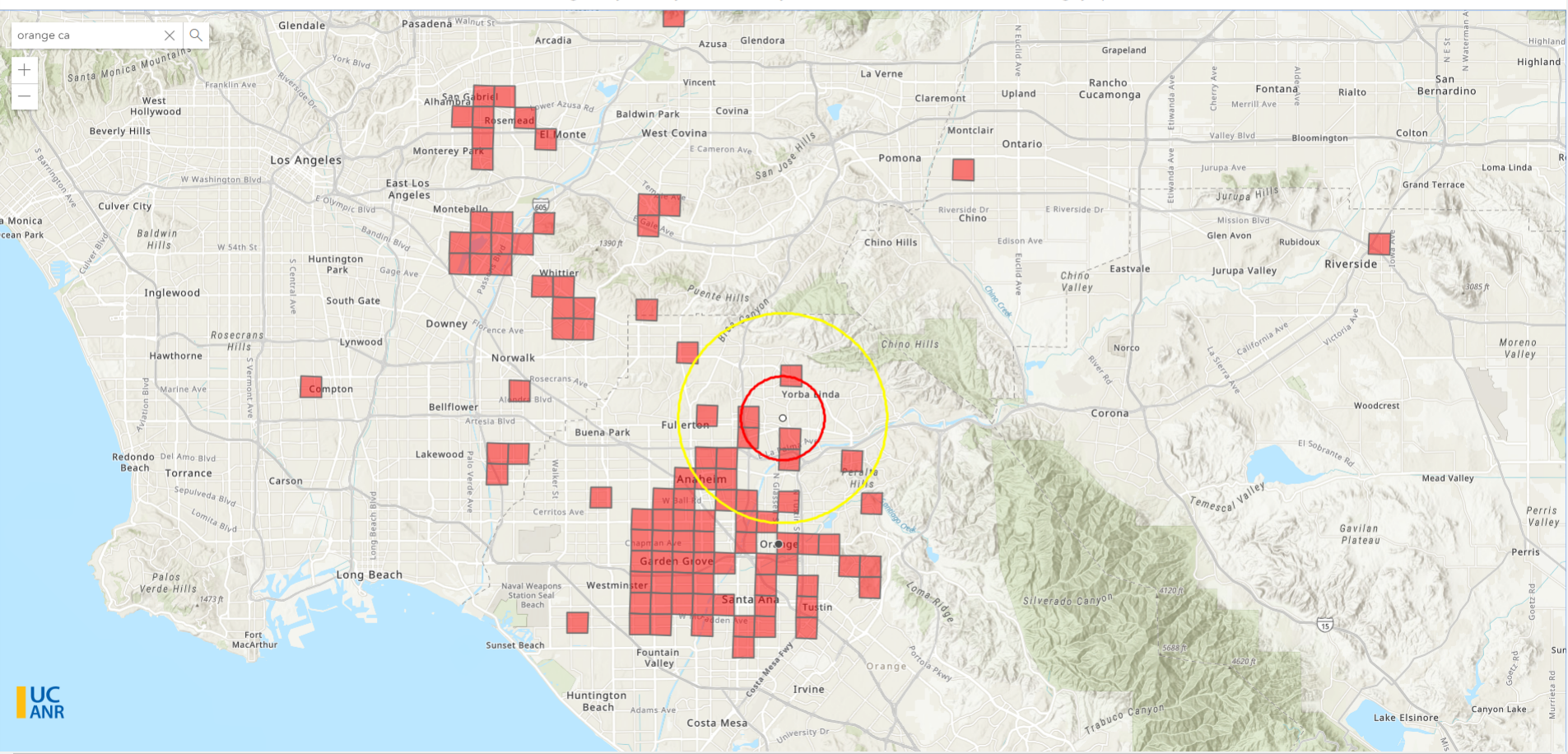
2 to 5 miles from an HLB-infected tree removal – recommend intensifying protection of the tree and consider replacing the tree with noncitrus

<2 miles from an HLB-infected tree removal – recommend replacing citrus with noncitrus



Remove and replace your tree with a non-citrus fruit tree.

You are within **2 miles** of an HLB detection (colored boxes). Tree removal is occurring near you and your tree is likely infected with HLB even if it is not showing symptoms.



If I am in the HLB quarantine area, is it safe to pick fruit from my tree and give it to my friends?

The immature psyllids can't live on citrus fruit, so as long as you brush or wash the fruit to remove the adults and make sure it is free of leaves and twigs that could harbor eggs and nymphs before transporting it, it is ok to move it.



What about bactericides?

- Though bactericides (oxytetracycline and streptomycin) are registered, they are not currently being used by California growers
- In Florida, where 80% of the trees have HLB, some growers use the antibiotics to lower the titer of the bacteria in trees so that they produce better
- Bactericides for plants are formulated very differently than for humans and **can not select for antibiotic resistance** in micro-organisms, animals or humans.
 - Plant bactericides formulated as a very low concentration
 - They are applied to the surface of the plant
 - They are broken down very rapidly and naturally by micro-organisms in the environment
- The micro-organism and human effects have been studied extensively
- The products are registered with rate, frequency and timing restrictions (both Federal and State) that protect consumers from any effect whatsoever

The Future of California Citrus Production

- Using **early detection techniques** to rogue out infected trees
 - Machines that measure changes in the volatiles (smells) of sick trees
 - Tests that measure defense proteins in the leaves of sick trees
 - Measure changes in the organisms that live on the surface of leaves
 - Canines that can detect the bacterium
- Growing **tolerant varieties**
- Growing trees in **higher densities** with a shorter lifespan
- Applying **bactericides** to the trees
- Utilizing **genetic engineering** to create a protected tree
 - Altering the tree and replanting the new trees
 - Using Citrus tristeza virus as a carrier for HLB resistance to protect planted trees
- Spray trees with chemicals (**interference RNAs**) that prevent psyllid from picking up the disease
- CUPS- grow citrus under a **protective structure**



Canines can detect trees infected with the bacterium that causes huanglongbing



Research by Dr. Tim Gottwald, USDA-ARS, Fort Pierce, Florida
Article written by Tim Gottwald, Holly Deniston-Sheets and Beth Graffon-Cardwell.
Revised June 11, 2019: <http://ucanr.edu/sites/scienceforcitrushealth/>

What is the technique?

Canines have a highly sensitive scent detection capability that is significantly better (parts per trillion) than most laboratory instruments and they can be trained to "alert" (either sit or lay) when they detect specific "smells" (known as scent signatures). Most people are familiar with their ability to detect bombs, drugs, and plant material at airports. However, canines are also used to detect human pests, such as bed bugs, and agricultural pests, such as stink bugs, date palm weevils and imported fire ants. With regard to agricultural pathogens, canines have been shown to detect with greater than 98% accuracy the fungal pathogen that causes laurel wilt disease in avocado, the bacterium that causes citrus canker disease in citrus, and plum pox virus in peach orchards.

Researchers have been training and evaluating the efficacy of canines for detecting "Candidatus Liberibacter asiaticus" (CLas), the bacterium that causes huanglongbing (HLB), for 5 years in Florida, and CLas detection efforts with canines have recently begun in California. Dogs have been trained in both the laboratory environment and in the field.

Researchers have demonstrated that well-trained canines can detect CLas over 95% of the time in commercial trees and over 92% of the time in residential trees. Researchers did not observe any differences in canine performance between citrus species and varieties. The training that the canines receive is very specific to CLas. When they are taken into citrus orchards infected with Citrus tristeza virus, viroids, the fungal pathogen *Phytophthora*, or the bacterium that causes citrus stubborn, the CLas-trained canines do not respond to these diseases.



Canine checking trees at Lindero Research and Extension Center, Exeter, CA



The canines provide a significant opportunity to be used as an Early Detection Technology (EDT) in California. In a field study using potted citrus in Florida, dogs could detect CLas in some of the trees as early

as 2 weeks after CLas-infected psyllids fed on the trees. In contrast, it can take 1-2 years for CLas to distribute itself in a mature citrus tree sufficiently for the bacterium to be present in sampled the leaves, which are then tested and shown to be infected using laboratory techniques, such as Polymerase Chain Reaction (PCR). Using canines to detect early infections could significantly help reduce disease spread in California, where HLB is currently limited to southern areas of the state and identify areas where increased psyllid control measures are needed

Who is working on the project?

Dr. Tim Gottwald, Research Leader and Epidemiologist at the USDA, U.S. Horticultural Research Laboratory in Fort Pierce, Florida, and additional collaborators with F1K9 laboratories, USDA, North Carolina State University, Texas A&M University and the California Department of Food and Agriculture.

What are the challenges and opportunities?

The volatile scent signature associated with CLas-infection settles from the canopy and simultaneously emanates from root infections pooling at the base of the tree. The detector dog interrogates the tree holistically by alerting in seconds on the scent signature regardless of its origin (i.e., a single leaf, root, stem or the entire tree if systemically infected). Conversely, other detection technologies, like PCR, are reliant on selecting and processing a small amount of tissue from large trees and often miss incipient infections because infected tissue is so rare in newly infected trees. Early detection via dogs is devoid of these sampling issues. Therefore, it is difficult to confirm CLas detections by dogs using currently available molecular or chemical detection methods. Dogs have been tested in hot and cold temperatures and with wind speeds up to 20 MPH with no perceptible degradation in detection.

Human scouts require several minutes per tree to visually examine it for symptoms, then they must collect tissue which must be transported to a diagnostic lab for processing and analysis, which is time consuming and labor-intensive. Whereas, in a residential environment dogs can assess all trees in even large yards in a couple of minutes. The major limitation to the number of trees a dog can assess per day is access to these residential properties and the time required to relocate from property to property. In commercial groves a team of two dogs and one handler can survey a 10 acre planting (~1500 trees) in 1-2 hours depending on the number

<http://ucanr.edu/sites/scienceforcitrushealth/>

A great resource for sharing information about the pest and disease with friends

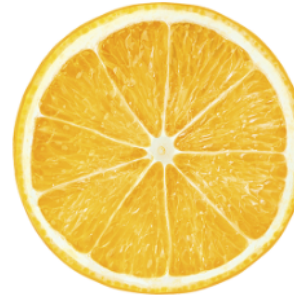
www.CaliforniaCitrusThreat.org
www.PeligranCitricosenCalifornia.com

This web site, funded by the citrus industry provides users with basic information about the psyllid and disease and how to respond.



Citrus Pest & Disease Prevention Program

🏠 PEST & DISEASE PROTECT YOUR CITRUS CALIFORNIA CITRUS NEWS RESOURCES CONTACT



A Threat to California Citrus

A plant disease that kills citrus trees has been found in California. The disease, called Huanglongbing or citrus greening disease, isn't harmful to humans, but it is fatal for citrus trees and has no cure. The disease is spread by a pest called the Asian citrus psyllid as it feeds on citrus tree leaves. Until researchers find a solution, California homeowners who enjoy growing fresh citrus fruit in their yards, and California farmers tending to \$2.5 billion worth of citrus fruit trees must work together to protect their trees. Learn more about [how to detect the pest and disease](#) and protect California's beloved citrus heritage.



Protect Your Citrus Trees

The Citrus Pest & Disease Prevention Program recommends these tips to protect citrus trees.

- Inspect trees for the Asian citrus psyllid and Huanglongbing
- Don't move citrus into or out of your area
- Buy citrus trees from licensed, local nurseries
- Only use registered budwood
- Cooperate with agriculture crews
- Apply products that protect your tree
- Dry or double bag plant clippings



Where can I get more University of California information?

- **ACP HLB Website:** www.ucanr.edu/sites/ACP
- **UC IPM Pest note for homeowners**
<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74155.html>
- **UCIPM Quick tip for homeowners**
<http://www.ipm.ucdavis.edu/QT/asiancitruscard.html>

UC IPM
Statewide Integrated Pest Management Program

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UC IPM Home > Home, Gardens, Landscapes, and Turf > Asian Citrus Psyllid and Huanglongbing Disease

How to Manage Pests
Pests in Gardens and Landscapes

Asian Citrus Psyllid and Huanglongbing Disease
Revised 9/18

In this Guideline:

- Background
- Identification
- Damage
- Monitoring and Management

About Pest Notes

- Publication
- Glossary

Related videos

- Detecting Asian citrus psyllid

The Asian citrus psyllid, *Daphniphyllum citri*, is a tiny, mottled brown insect about the size of an aphid. This insect poses a serious threat to California's citrus trees because it vectors the pathogen that causes Huanglongbing disease (HLB). This disease is the most serious threat to citrus trees worldwide—including those grown in home gardens and on farms. The psyllid feeds on all varieties of citrus (e.g., oranges, grapefruit, lemons, and mandarins) and several closely related ornamental plants in the family Rutaceae (e.g., calamondin, box orange, Indian curry leaf, and orange Jessamine/orange Jasmine).

The Asian citrus psyllid (or ACP), damages citrus directly by feeding on newly developed leaves (flush). However, more seriously, the insect is a vector of the bacterium *Candidatus Liberibacter asiaticus*, associated with the fatal citrus disease HLB, also called citrus greening disease. The psyllid takes the bacteria into its body when it feeds on bacteria-infected plants. The disease spreads when a bacteria-carrying psyllid flies to a healthy plant and injects bacteria into it as it feeds.

HLB can kill a citrus tree in as little as 5 years, and there is no known cure or remedy. All commonly grown citrus varieties are susceptible to the pathogen. The only way to protect trees is to prevent the spread of the HLB pathogen by controlling psyllid populations and destroying any infected trees.

The Asian citrus psyllid is widely distributed throughout Southern California and is becoming more widespread in the Central Valley and further north. The first tree with HLB was found in March 2012 in a home garden in Los Angeles County and a few years later was found in residences in Orange and Riverside Counties. Spread of the disease began to rapidly accelerate in these areas in 2017. Removal of infected trees by the California Department of Food and Agriculture (CDFA) has occurred wherever they have been found.

The presence of HLB in pockets of Southern California emphasizes that it is critical to control psyllid populations so that disease spread is limited.

BACKGROUND

The Asian citrus psyllid and the HLB disease originated in eastern Asia or the Indian subcontinent and then spread to other areas of the world where citrus is grown. The psyllid was first found in the United States in 1998 in Palm Beach County, Florida on backyard plantings of orange Jessamine, *Murraya paniculata*, and spread rapidly over a 3-year period. HLB spread equally rapidly in Florida.

In 2008, the Asian citrus psyllid was first detected in California. The psyllid spread throughout Southern California, particularly in urban and suburban environments, but also in commercial groves. The psyllid has since expanded its range to the Central Valley and the Central Coast, and has been found as far north as the San Francisco Bay Area and sites near Sacramento.

The first infected tree found in California is believed to have been the result of illegal grafting of an infected bud (taking plant tissue from one tree and inserting it into another to form a new branch). The infected tree was destroyed to prevent further spread of the bacterium. Since that time, additional infected trees have been found in southern California's residential areas; these may have resulted from illegally imported diseased trees, illegal grafting of infected wood, and, more recently, the natural spread of the bacterium by the psyllid. CDFA is continuing to detect and eliminate infected trees.

To protect the state's commercial and residential citrus from HLB, it is important to control the psyllid, prevent the accidental introduction of any infected host plant, and detect and remove any infected plants found in California as quickly as possible. The job of detecting infected trees is made difficult by the fact that it takes one to several years for symptoms of HLB to begin to show in the trees. Meanwhile, psyllids can pick up the HLB pathogen as nymphs and spread it only a few weeks after the tree is infected when they fly away as adults. Therefore, it is important to monitor and control psyllids in citrus trees and immediately report any suspected plant symptoms to the county agricultural commissioner.

IDENTIFICATION
Psyllid Life Stages

The adult Asian citrus psyllid is a small brownish-winged insect about the size of an aphid. Its body is 1/6 to 1/8 inch long with a pointed front end, red eyes, and short antennae. The wings are mottled brown around the outer edge except where a clear stripe breaks up the pattern at the back. The adult psyllid feeds with its head down, almost touching the leaf, and the rest of its body is raised from the surface at an almost 45-degree angle with its back end in the air. No other insect pest of citrus positions its body this way while feeding. Adults typically live 1 to 2 months. Females lay tiny yellow-orange almond-shaped eggs in the folds of the newly developed leaves of citrus. Each female can lay several hundred eggs during

Asian citrus psyllid adult and nymphs.
Adults feed on and deposit eggs on the newly developing citrus flush.
ACP nymphs are yellowish with red eyes. They produce white waxy tubules.

University of California, Division of Agriculture and Natural Resources

Asian Citrus Psyllid Distribution and Management

Home Growers Homeowners Map of Psyllids, HLB and Parasites

Home
Grower Options
Homeowner Options

Residential ACP Management Strategy

The Asian citrus psyllid (ACP) is widely established in urban and suburban areas throughout Southern California. Large-scale eradication of ACP in these environments is not feasible. Rather, the goal is to reduce psyllid populations enough to slow the establishment and spread of Huanglongbing (HLB) disease. While HLB has only been found in one tree to date, it is likely to begin spreading soon and it will kill citrus trees. Homeowners can help by looking for the psyllid and helping to control it and by reporting trees they suspect have the disease.

See the tabs at the left to answer questions about what steps you should take in the effort to control the psyllid and disease in order to protect California citrus.

Homeowner Management

- What Am I Looking For?
- How do I look for it?
- What should I do if I find it?
- Biological Control
- Insecticidal Control
- Homeowner Costs

Asian citrus psyllid nymphs and adult (inset) on citrus shoot. Photo: M. Lewis, UC Riverside

Asian Citrus Psyllid and Huanglongbing Disease

The Asian citrus psyllid and the deadly bacterial disease it spreads, Huanglongbing (HLB), threaten citrus trees in backyards and on farms. The psyllid arrived in Southern California in 2008, and HLB disease was first detected in Los Angeles in 2012. All types of citrus—including oranges, grapefruit, lemons, and mandarins—are affected as well as a few closely related ornamentals.

What are some of the concerns?

- The Asian citrus psyllid carries HLB disease from tree to tree.
- HLB disease will kill citrus trees in as little as five years.
- There is no cure or effective control method for HLB disease.

Inspect your citrus trees for psyllids.

- Reducing the psyllid population helps to slow the spread of HLB disease.
- From spring through fall, check trees monthly and look for psyllid eggs, nymphs, and adults on newly forming leaves.
- Adults are about the size of an aphid and have brownish mottled wings. They feed with their head down and their "tail" in the air.
- Nymphs are tiny and yellowish, and they excrete white waxy tubules.
- Psyllids feed on plant sap and produce sticky honeydew that may be covered with black sooty mold. However, other citrus pests (e.g., aphids and scale) may cause this symptom too.
- Although this psyllid can damage leaves, it doesn't kill trees by itself, and the fruit is safe to eat.

What are the symptoms of HLB disease?

- Leaves show an asymmetrical yellow mottling with patches of green.
- Fruit are small, lopsided, and fall off the tree early, and the juice tastes bitter.

What should you do if you think you have the Asian citrus psyllid or HLB disease?

- Contact your agricultural commissioner's office, or call the California Department of Food and Agriculture (CDFA) Exotic Pest Hotline at 1-800-491-1879 to confirm a find.

How can I manage the psyllid and disease?

- Plant trees from reputable nurseries to avoid bringing either the insect or HLB into your yard.
- Learn where you are relative to quarantines. Don't move citrus plants or clippings out of infested areas because doing so can spread the insect and disease.
- Parasitic wasps that attack Asian citrus psyllids have been released in some areas. These wasps will help to reduce psyllid numbers but aren't likely to stop the spread of HLB disease.
- You can reduce psyllid numbers by treating infested trees with insecticides including oils, soaps, carbaryl, or systemic imidacloprid. Oils and soaps don't last long, so they need to be reapplied every few weeks. Carbaryl and imidacloprid are longer lasting, but because both are toxic to bees, don't use these products when citrus trees are in bloom. Make sure follow-applied insecticides reach the new growth where young psyllids hide.
- Only apply pesticides if psyllids have been found on your trees.
- When HLB is detected, diseased trees must be removed to protect the trees around them from becoming infested.

See Pest Notes: Asian Citrus Psyllid and Huanglongbing Disease at www.ipm.ucanr.edu for more details.

Remove such yellow mottling and white wax of Asian citrus psyllid (ACP). Symptoms of HLB in leaves and fruit (right).

Minimize the use of pesticides that pollute our waterways. Use nonchemical alternatives or less toxic pesticide products whenever possible. Read product labels carefully and follow instructions on proper use, storage, and disposal.

For more information about managing pests, contact your University of California Cooperative Extension office based under the county government pages of your phone book or visit the UC IPM Web site at www.ipm.ucanr.edu

What you use in your landscape affects our rivers and oceans!

University of California Agriculture and Natural Resources
Statewide IPM Program

UC CE

Master Gardeners can help with messaging about how homeowners can protect their citrus

- If you graft citrus, use only disease-free budwood from the Citrus Clonal Protection Program (CCPP.ucr.edu)
- Plant only disease-free citrus plants obtained from a reputable nursery.
- Do not move citrus trees around the state
- Learn to recognize the pest and disease.
- Call the Department of Food and Agriculture hotline if you think you might have the psyllid (central and northern CA) or the disease (southern CA).
- Allow officials to inspect and test your citrus for the disease – if HLB is found, the tree must be destroyed
- Allow officials to treat your citrus trees if HLB is found near you
- If you live near an HLB-infected area in southern California, consider removing your citrus tree in advance of it becoming infected with the disease or covering it with a bag.
- Follow the Science for Citrus Health website to learn what scientists are doing to fight this disease

All of these steps buy time for the scientists to find a cure for the disease!