



Invasive Pests in California

Ted Batkin
Citrus Research Board

Asian Citrus Psyllid and Huanglongbing: The Glass is Half Full



The plight of the
US Citrus Industry




Liberibacter
appears to multiply
in the psyllid

Psyllid retains the
bacteria FOR LIFE!



CRB Response Plan

- ▶ Early Detection / Rapid Response
 - ▶ Find the psyllid early
 - ▶ Test every psyllid found for HLB
 - ▶ Treat all populations early to prevent or suppress spread
 - ▶ Remove any host plant material that has eh HLB causing bacteria
- 

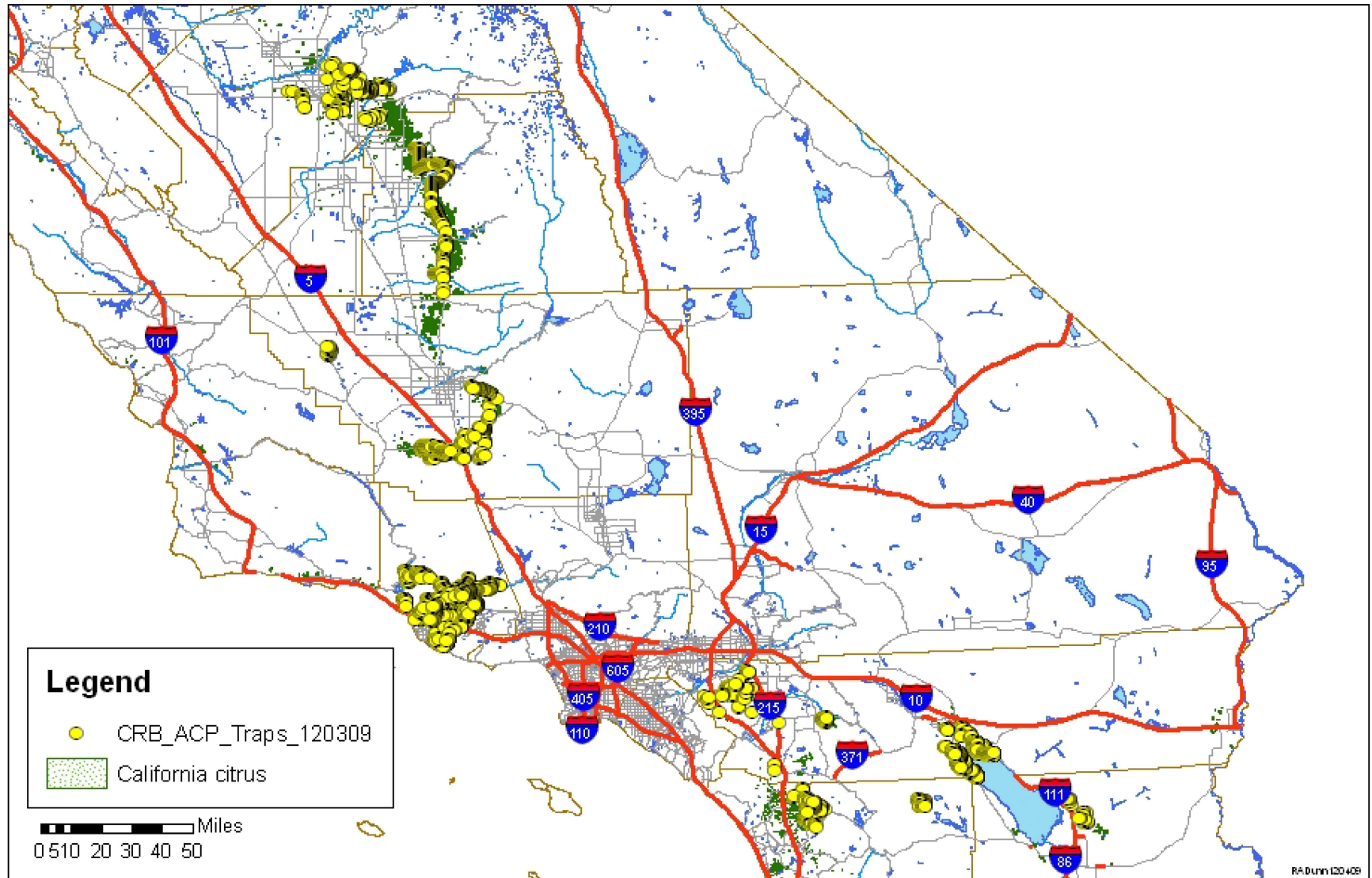
Brian Taylor, Field Director





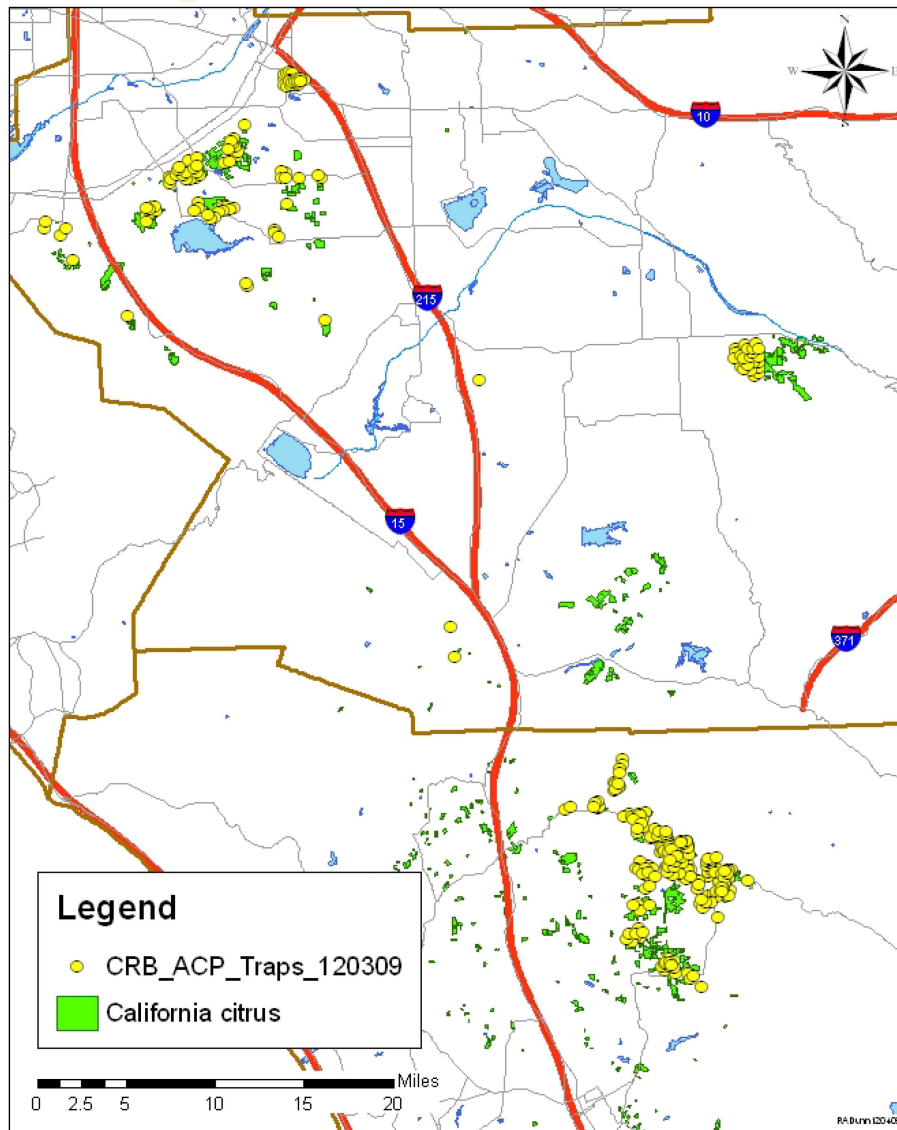


CRB ACP Traps as of 12/3/2009



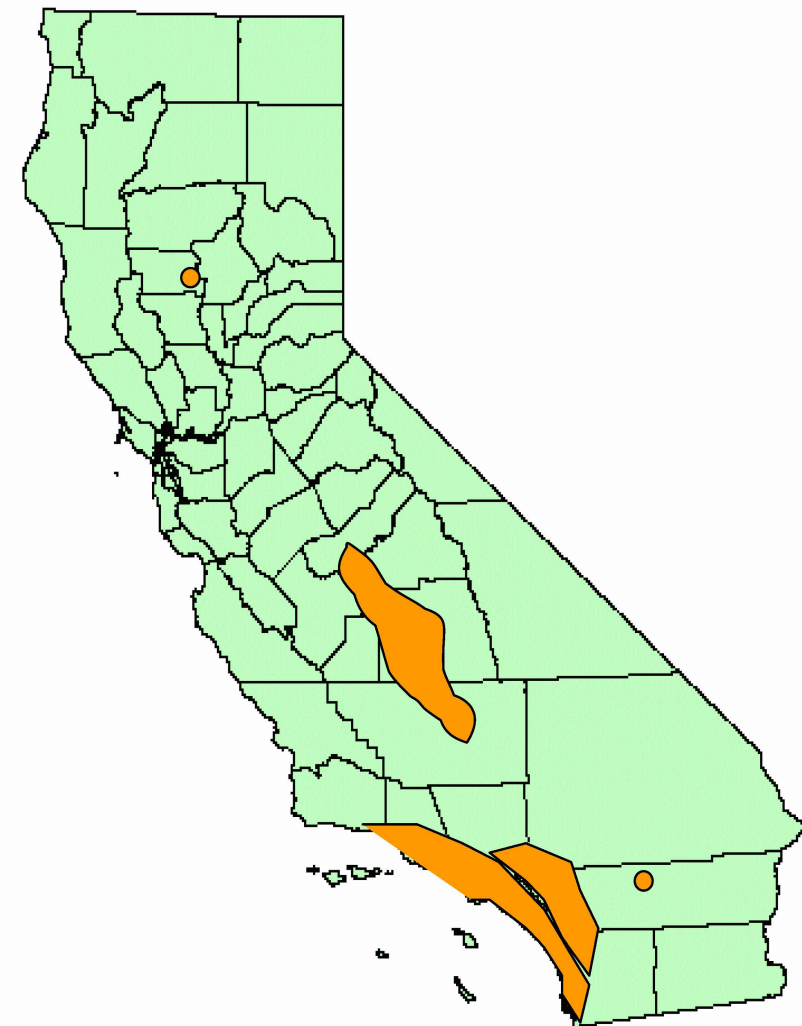


CRB ACP Traps as of 12/3/2009
Western Riverside and northwest San Diego counties





Strategies for Reaching the Public in California



HLB Task Force Communications Subcommittee

Mission Statement

To communicate to the general public the devastating nature of ACP and HLB, to educate the citrus and ornamental industry in the details of identification and management of the pest and disease and to provide communication linkages between Governmental agencies, the University, and the citrus industry

California Department of Food and Agriculture
University of California
Citrus Research Board
USDA



University of California ANR Publications: 2006-07

Select & Zoom



PUBLICATION 8205

Asian Citrus Psyllid

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The Asian citrus psyllid, *Diuraphis citri* Kuwayama (Homoptera: Psyllidae) (fig. 1) is a pest of citrus and close relatives of citrus. Asian citrus psyllid damages plants directly through its feeding activities. New shoot growth that is heavily infested by psyllids does not expand and develop normally and is more susceptible to breaking off. While direct damage is serious, there is even greater concern that the psyllid is an efficient vector of the bacterium that causes the economically devastating disease citrus greening, or Huanglongbing.

Asian citrus psyllid is found in tropical and subtropical Asia, Afghanistan, Saudi Arabia, Reunion, Mauritius, parts of South and Central America, Mexico, and the Caribbean (fig. 2). In the United States, Asian citrus psyllid was first found in Palm Beach County, Florida, in June 1998 in backyard plantings of *Murraya paniculata* (orange jasmine) (fig. 3). By 2001, it had spread to 31 counties in Florida, with much of the spread due to movement of infested nursery plants (Halbert et al. 2002). In the spring of 2001, Asian citrus psyllid was accidentally introduced into the Rio Grande Valley of Texas on potted nursery stock (orange jasmine) from Florida (French et al. 2001). The Asian citrus psyllid could invade California at any time, with most likely sources of infestation being Florida, Mexico, or Asia. There were 170 interceptions of Asian citrus psyllid at U.S. ports on plant material (primarily *Murraya* and citrus) from Asia from 1985 to 2003.



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



Figure 2. Worldwide distribution of Asian citrus psyllid alone (orange) and the psyllid in combination with the Asian form of greening disease (green). Illustration by G. H. Montaz.



Figure 3. *Murraya paniculata*, orange jasmine. Photo by E. E. Grafton-Cardwell.



UNIVERSITY OF CALIFORNIA

Division of Agriculture and Natural Resources
<http://anrcatalog.ucdavis.edu>

PUBLICATION 8218

Citrus Bacterial Canker Disease and Huanglongbing (Citrus Greening)

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INTRODUCTION

Compared with the rest of the world, the California citrus industry is relatively free of diseases that can impact growers' profits. Unfortunately, exotic plant pathogens may become well established before they are recognized as such. This is primarily because some of the initial symptoms mimic other diseases, mineral deficiencies, or toxicities. In addition, development of disease symptoms caused by some plant pathogenic organisms occurs a long time after initial infection. This long latent period results in significantly delayed disease diagnosis and pathogen detection. Citrus canker (CC) and huanglongbing (HLB), or citrus greening, are two very serious diseases of citrus that occur in many other areas of the world but are not known to occur in California. However, if the pathogens causing these diseases are introduced into California, they will create serious problems for the state's citrus production and nursery industries.

CITRUS BACTERIAL CANKER DISEASE

Citrus bacterial canker disease (CC) is caused by pathotypes or variants of the bacterium *Xanthomonas axonopodis* (formerly *campestris*) pv. *citri* (Xac). This bacterium is a quarantine pest for many citrus-growing countries and is strictly regulated by international phytosanitary programs. Distinct pathotypes are associated with different forms of the disease (Gottwald et al. 2002a). All disease forms are subject to the same international phytosanitary regulations.

Xac probably originated in Southeast Asia or India and presently occurs in over 30 countries including the United States (Florida) and Australia (northern region). Xac is present in Asia, Pacific and Indian Ocean islands, and South America. It is also found in dryer, more temperate areas in Southwest Asia and the Middle East, occurring in countries such as Iran, Iraq, Oman, Saudi Arabia, United Arab Emirates, and Yemen. (Whiteside et al. 1988; Gottwald et al. 2002a) (fig. 1).

Citrus canker occurs primarily in tropical and subtropical climates where considerable rainfall accompanies warm temperatures, but it can also occur in drier climates. CC becomes a serious disease when wet weather conditions occur during the periods of shoot emergence and development of young citrus fruit. Pathotypes of CC may vary in their severity, host range, and location in the world. CC-A (Asiatic canker) is the most severe form of the disease; it affects most citrus varieties and is the most economically



Figure 1. Areas shaded in red indicate the presence of citrus canker. The cross-hatched area in Australia shows where citrus canker occasionally occurs and infected trees are removed. Source: G. H. Montez, UC Kearney Agriculture Center.

University of California www.ccppp.ucr.edu/ G. Vidalakis (Dept of Plant Pathology) and E. Grafton-Cardwell (Dept of Entomology)

3- English,
Spanish, Chinese

HAVE YOU SEEN THIS INSECT?

Asian Citrus Psyllid



Eggs tucked
inside
new citrus flush



Adult psyllid -
1/8 inch in size



Young stages with waxy tubules



Twisted flush



Psyllids infesting a leaf

The Asian citrus psyllid, *Diuraphis citi*, is a small, aphid-like insect. It feeds on the new flush of citrus and very closely related plants such as orange jasmine (*Murraya paniculata*). Psyllid feeding causes burned tips and twisting of the new leaves. More importantly, it can spread the bacterium that causes Huanglongbing disease. This pest has recently been found in Southern California, and infests citrus growing regions of Florida, Louisiana, Mexico, Texas and Hawaii. It is very important that you do not bring plants from other states or countries into California to avoid pests such as these.

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



Lopsided, bitter, hard fruit with
small dark aborted seeds



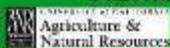
Asymmetrical blotchy
mottling of leaves



Yellow shoots

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 infected budwood. Symptoms include yellow shoots, leaf mottle, small upright leaves, and lopsided fruits with a bitter flavor. Diseased trees are non-productive and must be removed and destroyed to prevent further spread of the disease. HLB is a serious threat to the California citrus industry. This disease is not yet found in California, but was discovered in Florida in 2005. It is very important that you plant 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**



E. Grafton-Cardwell and G. Vidalakis: University of California Riverside
University of California ANR Core Grants Program
Photos by M. Rogers and M. Karamane

Spanish English Chinese

Asian Citrus Psyllid
Efectos de citrio en
nuevo brote de
Huanglongbing disease
of citrus.
Psyllid feeding damage
includes burning and
burned tips of new flush.

If you see this
pest, please
contact the
CDFA
HOTLINE
1-800-491-1899



Young stages with
waxy tubules

Adult psyllid
1/8 inch in size

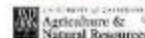
Adult with
waxy tubules
on new flush



Asymmetrical blotchy
mottling of leaves

Not known to occur in
California, Huanglongbing
or citrus greening disease
is caused by a bacterium.
Symptoms of the disease
include leaf mottle,
yellow shoots, twig
dieback and small hard
fruit with a bitter taste.
The disease is spread by
the psyllid or by grafting
infected budwood.

If you suspect your citrus has this disease, please
contact the CALIFORNIA DEPARTMENT OF FOOD
AND AGRICULTURE HOTLINE: 1-800-491-1899



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

STOP THE ASIAN CITRUS PSYLLID!



Adult psyllid - 1/8 inch



Eggs tucked
inside new citrus flush



Young stages with
waxy tubules



New citrus flush is
twisted or burnt back

It is a carrier of the Huanglongbing
citrus greening disease. It feeds
on citrus and closely related plants.

IF YOU SEE THIS PSYLLID IN
CALIFORNIA,
CALL 1-800-491-1899
or visit the CDFA website at www.cdffr.com



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Asymmetrical leaf blotch



Lopsided, bitter, hard
fruit with dark seeds



Diseased Healthy



Yellow shoots

This devastating disease of citrus is
not known to occur in California.
If you suspect your citrus has
this disease, please contact the
CDFA website at www.cdffr.com

IF YOU SEE THIS PSYLLID IN
CALIFORNIA,
CALL 1-800-491-1899
or visit the CDFA website at www.cdffr.com



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

Citrus Research Board and Nuffer Smith and Tucker flyer

In English, Spanish, Hmong, Vietnamese, Chinese, Punjabi, Khmer

No more California citrus?

That's what is at stake if the disease-carrying Asian citrus psyllid gets a foothold.
It must be stopped – before it's too late.



The Dangerous Pest: Asian Citrus Psyllid

- A small insect, about the size of an aphid.
- Feeds on citrus leaves and stems.
- Is a carrier of the deadly bacterial plant disease, Huanglongbing (HLB) also known as citrus greening disease.
- This insect has already been found at several sites in California.
- It threatens our locally produced citrus and Californians' ability to grow citrus in their backyards.

The Disease: Huanglongbing (HLB)

- Destroys production, appearance and value of citrus trees.
- Causes asymmetrical yellowing and spotting of leaves.
- Produces bitter, inedible, misshapen fruit.
- Is fatal to citrus trees.

The Solution: We All Play a Critical Role

- It can take years for symptoms of the disease to appear, meaning inspection for and elimination of the psyllid is our first line of defense.
- HLB is also spread through grafting with infected budwood. Be sure to plant only certified disease-free citrus trees from a reputable nursery and do not bring any plant material into California from other states or countries.
- Inspect trees monthly and whenever watering, spraying, pruning or tending trees.
- If you find the Asian citrus psyllid, act fast! Call your County Agricultural Commissioner or the CDEA hotline at **800.491.1899**. Time is critical.



To learn about the Asian citrus psyllid and HLB disease, visit

CaliforniaCitrusThreat.org

Printed materials in English, Spanish and Chinese are downloadable from this Web site.

¿Se quedará California sin cítricos?

Esto podría suceder si el psílido asiático de los cítricos y la enfermedad que transmite se establece en el estado.



Debemos detenerlo – antes de que sea demasiado tarde.

La peligrosa plaga: el psílido asiático de los cítricos

- Un insecto diminuto (3-4 mm), del tamaño de un áfido.
- Se alimenta de las hojas y tallos de los cítricos.
- Es portador de la enfermedad Huanglongbing (HLB) la cual mata las plantas. También se le conoce como el enverdecimiento de los cítricos.
- Este insecto ya se ha encontrado en el Sur de California.
- Representa una seria amenaza para la producción y cultivo de cítricos en California.

La enfermedad: Huanglongbing (HLB)

- Hace que las hojas se tornen de un color amarillento con moteado. (ver foto a la izquierda)
- Produce frutos amargos, incomedibles y deformes.
- Daña la apariencia y reduce el valor de los árboles de cítricos.
- Es mortal para los árboles de cítricos.

La solución: todos jugamos un papel importante

- La detección y eliminación del psílido es la primera línea de defensa contra la enfermedad.
- Es ilegal traer árboles de cítricos a California provenientes de otros estados o países, porque podrían estar infectados con HLB. Asegúrese de plantar sólo árboles de cítricos cultivados en California y que hayan sido certificados como libres de enfermedades.
- Inspeccione sus árboles con frecuencia en busca de señales del insecto o de la enfermedad.
- Si sospecha que sus árboles tienen el psílido asiático de los cítricos, actúe de inmediato! Llame a la línea directa de CDEA al **800.491.1899** o comuníquese con el Comisionado de Agricultura de su condado. No pierda un minuto para hacerlo!



Para conocer más acerca del psílido asiático de los cítricos y el HLB, visite el sitio

PeligroCitricosEnCalifornia.org

En este sitio se pueden descargar materiales impresos en inglés, español, chino y otros idiomas.





www.saygoodbyetocaliforniacitrus.com



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 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

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. >



El insecto

La enfermedad

En qué fijarse

Si lo encuentra

Otros recursos

¿Está un insecto acabando con sus árboles de cítricos?

English



Evite que el psílido asiático de los cítricos acabe con los cítricos en California.

Podemos detener a este insecto, que puede ser portador de una devastadora enfermedad para los árboles de cítricos, pero necesitamos su ayuda! Proteja sus cítricos y los árboles de cítricos cultivados en California; inspeccione sus árboles con frecuencia.

El insecto



El psílido asiático de los cítricos es una señal de peligro. >

La enfermedad



El huanglongbing produce hojas amarillentas y acaba con los árboles. >

En qué fijarse



Detecte el insecto y entérese si su árbol está infectado. >

¿Encontró el insecto?


¡Todo minuto cuenta! Comuníquese con la oficina del Comisionado de Agricultura cuanto antes. >

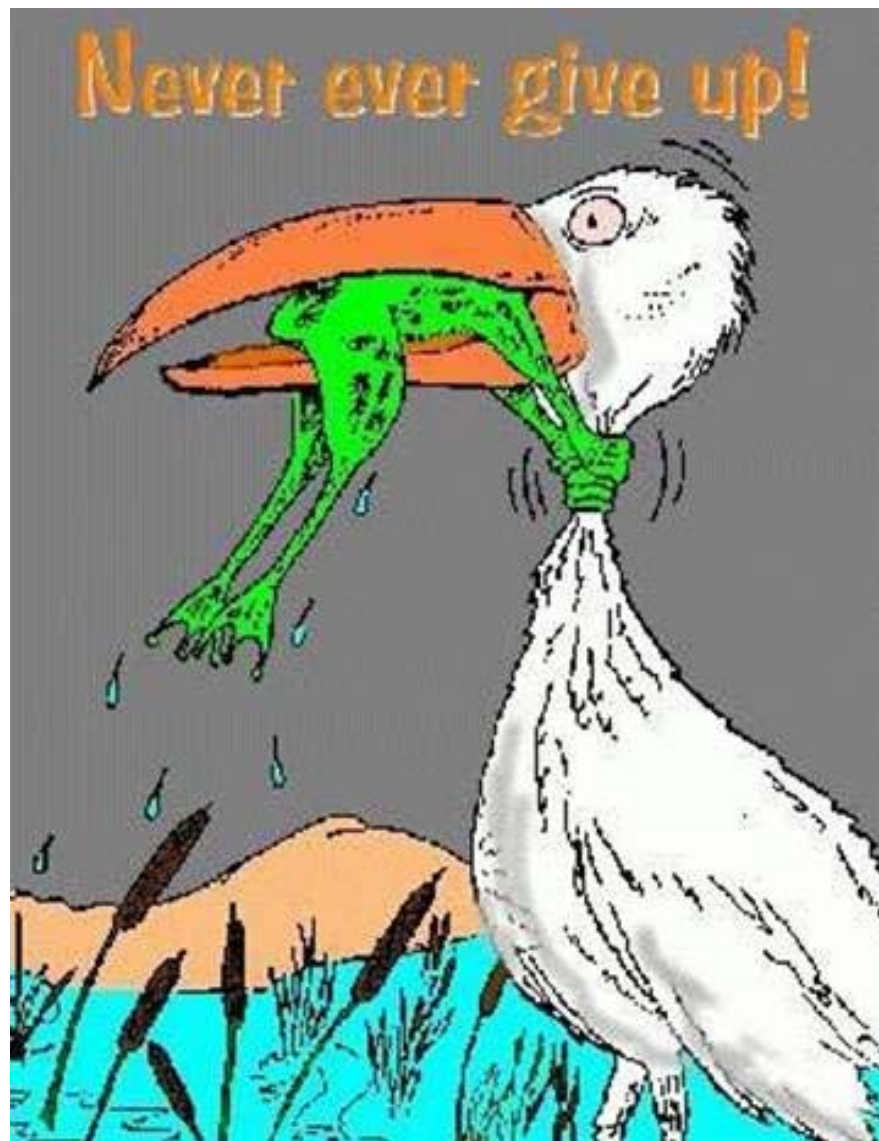
Banners on cotton trailers



Citrus Research Board

Communications Opportunities and Challenges

- ▶ Fresh news to retain the interest of the general public
 - ▶ Addressing the cultural aspects of plant movement
 - ▶ Social media: using it for education and countering anti-pesticide efforts
 - ▶ Size of the audience, severity of the problem and the rapidity with which the situation changes
- 



Thank you !!!