

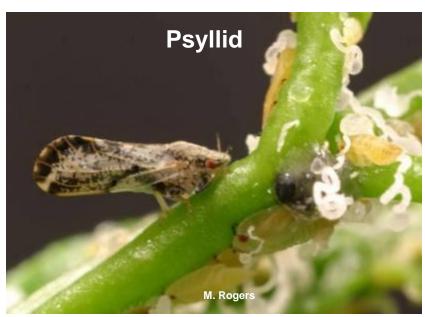
- Molinos elenas
- Common name: Windmill Fan Palm. A hybrid palm thought to be a genetic anomaly from rare cross pollination from the Windmill palm and the Mediterrean Fan Palm, thus named by its discoverer P. Elena Byron, the Windmill Fan Palm.
- It derives all its energy from the wind itself and therefore pH, water and nutrients not an issue. It thrives in any temperature and is not affected by lack of light as it does not create photosynthesis. It lives on self-created energy derived from the wind itself. Some believe that the newly discovered palm is what actually gives us our winds in the RGV area due to the "fans". Scientists have confirmed that it does not create wind.

CITRUS CLINIC

Hosted by:

Cameron County Master Gardeners Chuck Malloy, President Jennifer Herrera, Horticulture Agent

The Asian Citrus Psyllid and the Citrus Disease Huanglongbing



Texas Department of Agriculture



Huanglongbing



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

The pest insect



Psyllid Life Cycle: 15-47 days



- •9-10 generations per year
- psyllids over-winter as adults in TX

http://www.valleyag.org/texascitrusgreening/insect.php

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).

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



M. Rogers

M. Rogers

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

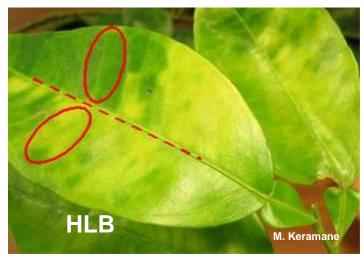


An early sign of the disease is yellowing of the leaves

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

The bacterial disease

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







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

Notice the fruit drop, which is a typical symptom of HLB.





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 called citrus greening.



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



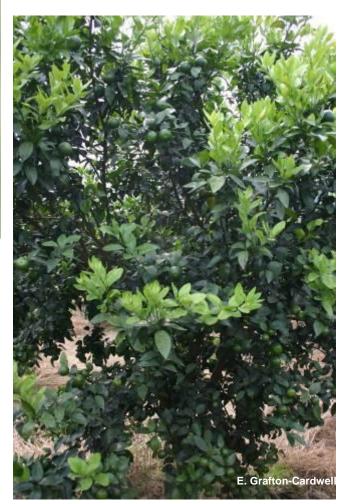


Symptoms may not show up in the tree until 1 to 2 years after it becomes infected

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 is obviously very sick, with few leaves and no fruit.



The HLB leaf and fruit symptoms can look very similar to another citrus disease called citrus stubborn



Other diseases

So don't panic if you see yellowed leaves or off-colored fruit – but do get them checked out!



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

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. It is a preferred host for the psyllid because it produces new leaves continuously. It is not a common plant in California or Arizona.



Asian citrus psyllid feeds and reproduces on Indian Curry Leaf

Plants affected

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. Shipments of infested leaves have been intercepted at airports.





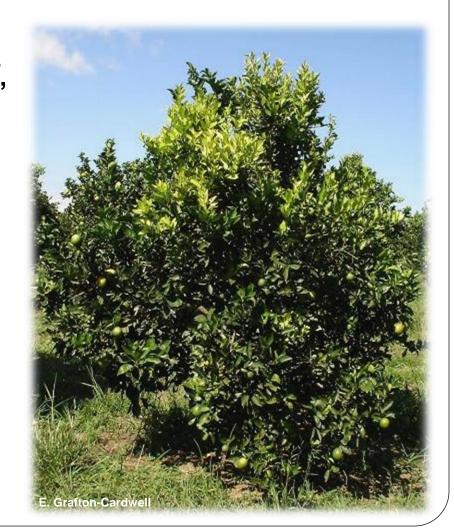
Why are we so worried about this psyllid?

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.

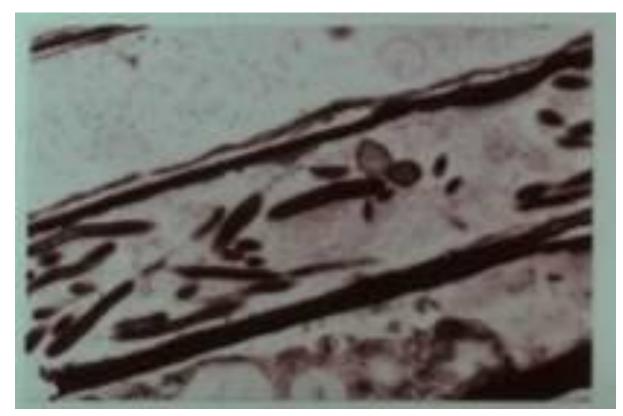
It causes branches of citrus trees to turn yellow.



What is HLB?

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

The bacterial disease

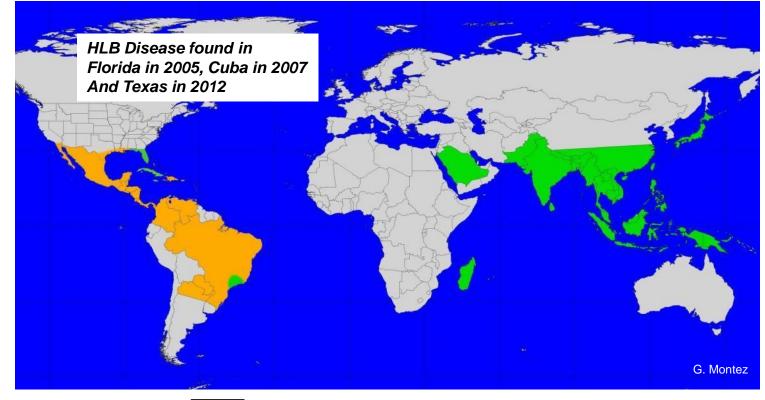


Bacterium: Candidatus Liberibacter asiaticus

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, Florida and now Texas. S. California and Arizona have the psyllid but do not yet have the disease.

Distribution of the pest and disease around the world





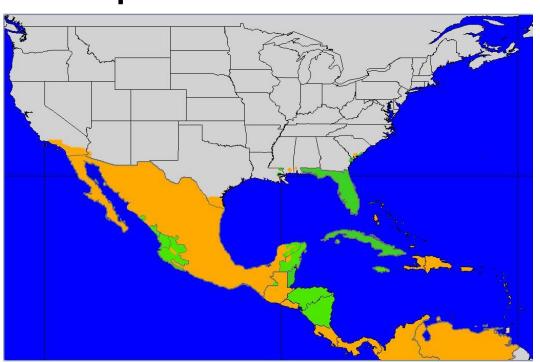
Both the psyllid and HLB disease Asian citrus psyllid, but not the disease Where are the psyllid and the disease found in the US and neighboring countries?

ACP (orange) and HLB (green areas) have been found in portions of:

Distribution of the pest

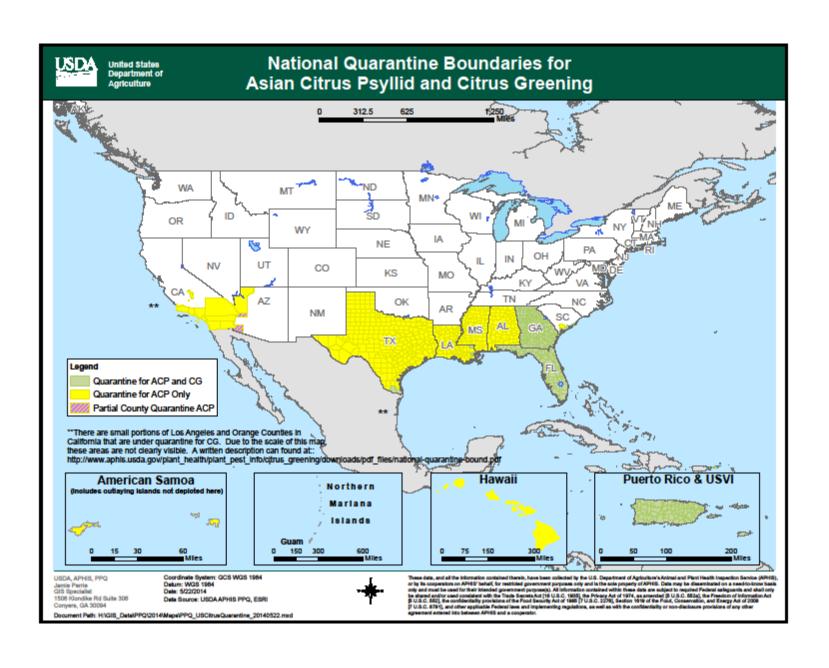
Florida
Texas
Louisiana
Alabama
Georgia
S. Carolina
California
Arizona
Hawaii

Also Cuba Belize, Mexico, Honduras & Nicaragua



Distribution of Asian citrus psyllid in orange and distribution of ACP + Huanglongbing in green.

To track HLB, see the USDA site: www.saveourcitrus.org



HOW DID THE PSYLLID SPREAD THROUGH FLORIDA?

ASIAN CITRUS PSYLLID Diaphorina citri Kuwayama In Florida - November 2005 MALTON MANADON MANA

Distribution of the pest

ACP 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.

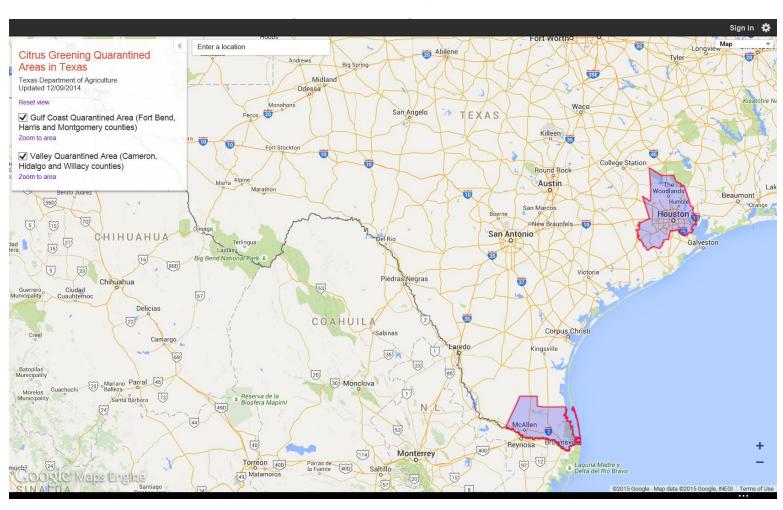
00000 0000

Texas Quarantined Areas

- South Texas
 - 2012 First HLB detection
 - Expanded to 3 counties: Hidalgo, Cameron and Willacy (as recent as December 2014)
- Gulf Coast
 - 2014 Detection in trees from So. Texas
 - Expanded to 3 counties: Harris, Montgomery and Fort Bend

Two Quarantine Areas in Texas

Gulf Coast & South Texas





USDA-APHIS-PPQ 903 San Jacinto Blvd Austin TX 78701

Date Printed: 12/11/2014 Time Printed: 13:12 hrs CT Document #: PPQ1409191102181216

Now the part of the distribution delicated and part of the fine of the distribution of the part of the second of t

Quarantine Restrictions

- No movement of citrus out of quarantined areas
- Requirements of retail nurseries to sell citrus
 - Prohibited for Movement tags, Insecticide treatment tags, etc.
 - No planting of seeds, grafting, cuttings, or budding without licenses, permits and inspections by TDA/USDA
- More restrictive requirements inside the citrus zone due to commercial citrus production
- No movement into the Citrus Zone
- No movement in or out of Texas

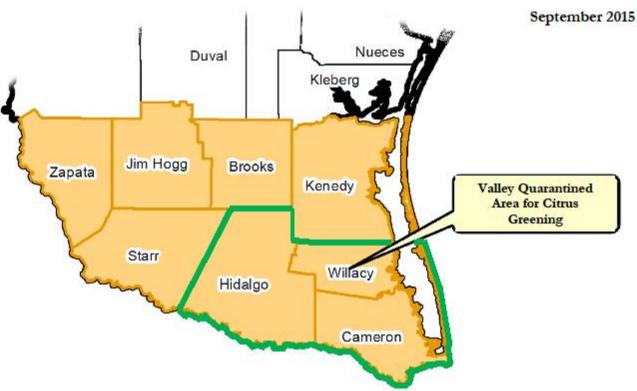
What is the CITRUS ZONE?

- Commercial citrus production area in Texas.
- Consists of eight counties in south Texas
 - Brooks, Cameron, Hidalgo, Jim Hogg, Kenedy, Starr, Willacy, and Zapata.
- Significant restrictions to protect 27,000 acres of commercial citrus worth millions of dollars in agricultural economic impact for Texas.

TEXAS DEPARTMENT OF AGRICULTURE

Citrus Zone (orange shaded area) and Valley Quarantined Area for Citrus Greening (green outline)





How does the quarantine affect plant movement?

- Citrus and closely related plants can not be moved out of any Citrus Greening quarantine area.
- Production nurseries must treat their plants with insecticides just prior to shipping if the plants are destined for retailers within the quarantine area.
- Trees must have a tag on the tree or container to restrict movement of the tree

Nurseries



HLB has not been found in some areas of Texas or other states. How can it get there?

Inside psyllid vector: HLB could be inside the body of a psyllid that flies into Texas 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 Texas.

It is illegal to bring citrus trees into Texas from other states or countries because they may be infested with ACP or infected with HI B.

bacterial disease pathways

The

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

How do the psyllid (and HLB) get around?

It can spread naturally by flying or it can be transported on plants

Psyllid-infested curry leaves shipped in boxes



On ornamentals in floral bouquets from Mexico



Unprocessed fruit infested areas



Citrus riding across the border in vans



The pest insect

How are agricultural personnel detecting the psyllid?

Visual surveys and yellow sticky cards

Detect the insect

Sticky cards are most effective at 1 meter height

E. Grafton-Cardwell

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

- If a psyllid is found, all of the host plants in that yard and around the yard should be treated with a foliar and a systemic insecticide
- Close monitoring should be done to make sure there are no psyllids on the tree(s).

Backyard citrus







Materials for Controlling Asian Citrus Psyllid

(Carrier of Citrus Greening) in Home Landscapes, Gardens, & Non-Commercial Orchards

Material**	Organic Status ^z	Life Stage Controlled	Rate	Notes
Imidicloprid (Bayer Advanced Fruit-Citrus- Vegetable Insect Control)	Not Organic	Adult, Nymph, systemic	Drench soil once per year, according to label, for prevention and control of ACP for extended periods.	Other imidicloprid products marketed by Bayer are not labeled for citrus trees bearing fruit. Best time to apply is early summer post bloom as summer flushes commence
Malathion 50+% Various manufacturers	Not Organic	Adult, Nymph	Approx. 3-4 tsp/Gallon (Follow product label rates accurately)	Broad-spectrum, contact- killing garden insecticide with short residual activity.
Pyrethrum (pyrethrins) (Bayer Advanced Natria Insect, Disease & Mite Control - contains sulfur also; Pyganic Crop Protection 5.0 & Pyganic Crop Protection 1.4; Safer Brand Yard & Garden Insect Killer with soap and pyrethrins)	Organic (most products, depending on secondary ingredients)	Adult, Nymph	Follow product label rates	Broad-spectrum, contact-killing insecticide with very short residual activity. Product should not be overused; may lead to mite problems
Azadirachtin concentrate (active ingredient in Neem spray products-various manufacturers); applied like an insecticide.	Organic (most products, depending on secondary ingredients)	Repellant; suppression of psyllid population buildup. (Some curative or knockdown properties); very short residual	Follow label rates	Use in combination with other products, such as horticultural oils, insecticidal soaps or citrus peel oil products like <i>Citri-King</i> or <i>Oro-Boost</i> (active ingredient-alcohol ethoxylate)
Clarified hydrophobic extract of Neem Oil (Trilogy, other manufacturers)	Organic	Egg and nymph-effective. Adult —suppression only.	Follow label rates (0.5% to 2.0% solution in water or ½ to 2 oz/Gal. of water.	Usage similar to horticultural oils and insecticidal soaps. Thorough coverage of tree needed.

Material**	Organic Status ^z	Life Stage Controlled	Rate	Notes
Horticultural petroleum oils—"Ultra-fine"/412 class (Sunspray Ultrafine, Saf-T- Side, several others)	Organic	Egg, Nymph, (Adult-suppression only)	1 to 2.5 oz/Gal of water (1% to 2.5% v/v). Use higher rates for heavy infestation situations	Apply thoroughly to well-watered plants at air temperatures below 95 °F. Can be applied during early bloom, but do not apply during late bloom/early fruit set period which may increase fruit abortion.
Soaps and insecticidal soaps (Safer Brand Insecticidal Soap, several others)	Organic	Nymph, adult	Approximately 1-2.5% rate (1-2.5 oz liquid hand or dish detergent/Gal. of water. For commercial insecticidal soaps, follow label rates.	Soap sprays require good coverage throughout the plant for effective control. Apply to plants that are well watered and at temperatures below 95 °F.
Kaolinite clay suspensions (Surround Crop Protectant)	Organic	Repellant	½ pound/Gal. of water	Must be re-applied after wash-off from rain or irrigation occurs

^{**}Name-brand products listed are not an endorsement, but rather a guide for ease of locating the correct material for ACP control.

• Always follow the product label guidelines for mixing, handling, disposal, timing of application, preharvest interval, etc!

Asian Citrus Psyllid may infest a citrus tree throughout the year—Spring, Summer, Fall, Winter-- and may re-infest trees days, weeks or months after treatment with one of the products listed here. Citrus growers should therefore monitor their trees regularly for the presence of eggs, larvae, and adult psyllids. Effective year-round control requires utilizing multiple control materials listed in this table. Horticultural oils, soaps, neem products, and kaolinite products may be used frequently to suppress the ACP population and prevent outbreaks. Insecticides like malathion, imidicloprid, and pyrethrum should be used judiciously/according to label recommendations to prevent development of insecticide-resistant psyllids. Imidicloprid is applied to the soil once per year, and acts systemically to prevent infestation of psyllids.

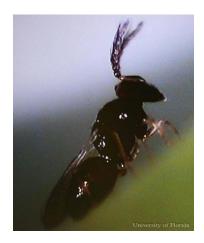
For assistance with proper identification of Asian Citrus Psyllids, control product selection, mixing, or application of insecticides, contact

your County AgriLife Extension office: http://agrilifeextension.tamu.edu

²"Organic" means generally considered an organic/low toxicity control material. Approval for *USDA-Certified Organic* status or "OMRI-approved" is not implied and should be verified independently.

Alternative Control

- Bio-control
- Dr. Flores/USDA is working with a beneficial parasitoid that feeds on the ACP
- Adult Tamarixia radiata





When the devastating HLB disease gets to commercial citrus, what happens?

Increased costs and a reduction in citrus production and acreage

- •Citrus nurseries are already placing their nursery stock inside screenhouses and being a certified citrus nursery
- HLB-infected citrus trees are removed and destroyed
- •The disease spreads in spite of pesticide treatments and tree removal (tree movement).
- •The expected lifespan of citrus trees will drop from >50 years to <15 years in infected orchards.





If we don't have HLB in my area, why should I treat for Asian citrus psyllid?

- Areawide treatments are essential for slowing ACP spread through the state (both urban and commercial citrus)
- •The lower we suppress ACP, the less likelihood of it finding an HLB infected plant and moving the disease into commercial citrus
- •We are buying time for the scientists to create a plant that can resist the disease

•We can not 'live with HLB'. It will devastate the Texas citrus industry

ACPManagement

You can help search for the psyllid! It is critical for Texas to control the spread of HLB

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 and waxy tubules in the new flush



Detect the insect

www.saveourcitrus.org

This web site provides users with basic information about the psyllid and disease.



When in doubt, Check it out...

- Texas A&M AgriLife Extension
- Texas A&M Kingsville Citrus Center
- Texas Department of Agriculture
- Texas Citrus Pest & Disease Mgmt Corporation
- USDA APHIS in Texas

• Just make a call. Better to be safe than sorry...

www.texasagriculture.gov

HOME

NEWS & EVENTS GRANTS & SERVICES REGULATORY PROGRAMS LICENSES & REGISTRATIONS FOOD & NUTRITION EDUCATION & TRAINING REPORTS & PUBLICATIONS ABOUT AGENCY

FORMS

Regulatory Programs > Plant Quality > Pest and Disease Alerts > Citrus Greening

Citrus Greening Quarantine

Under provisions in the Texas Administrative Code, Title 4, Chapter 19, Rule 19.616 (having to do with infested geographic areas subject to the citrus greening quarantine), the department has designated this page for declarations and descriptions concerning areas in Texas that are quarantined for citrus greening. Names, numbers and descriptions of quarantined areas are effective and enforceable when published online in the "Current Quarantined Areas" section of this page.

CURRENT-QUARANTINED AREAS.

- 9 Gulf Coast Quarantined Area. This area includes all of Fort Bend, Harris and Montgomery counties in the State of Texas.
- Nalley Quarantined Area. This area includes all of Cameron, Hidalgo and Willacy counties in the State of Texas.

To determine whether you are inside a quarantined area, go to the map and enter your address in the box (*Enter a location*) to the right of the large bold-print.

CLICK HERE to view interactive Map of Citrus Greening Quarantined Areas.

CHRONOLOGY OF CITRUS GREENING QUARANTINED AREAS.

12/09/2014. Valley Quarantined Area. On the basis of new data, the department hereby expands this previously (09/18/2014) named quarantined area to include of all of Cameron, Hidalgo and Willacy counties in the State of Texas.

09/18/2014. **Gulf Coast Quarantined Area**. On the basis of new data, the department hereby expands the previously (07/15/2014) quarantined area that includes all of Harris County to also include all of Fort Bend and Montgomery counties in the State of Texas.

09/18/2014. **Valley Quarantined Area**. This previously (04/21/2014) quarantined area consists of all of Cameron and Hidalgo counties in the State of Texas.

07/15/2014. Citrus Greening Quarantined Area. On the basis of new data, the department has expanded the

Resources

- South Texas Citrus Alert
- Interactive Map of Citrus

Greening Quarantined Areas

Oitrus Greening

Quarantine Expansion Plan

Ocitrus Greening

Quarantine Regulations

- Save Our Citrus
- Asian Citrus Psvllid

treatments: USDA

Treatment Manual, D301.;76

- (b), Table 5-8-1
- USDA Citrus Greening Web

Page

Temergency Rule §21.10 for Citrus Nurseries in Citrus Greening Unquarantined

Citrus Greening Quarantine Additional Information

Areas of Citrus Zone

Nurseries in Gulf Coast Quarantined Area with Compliance Agreements

Landsonner in Culf Coast

TEXAS DEPARTMENT OF AGRICULTURE

Charlene Farias

Citrus Plant Quality Specialist Environmental and Biosecurity Programs

Agriculture and Consumer Protection Division

Charlen.Farias@TexasAgriculture.gov

512.463.0749

Texas Department of Agriculture

www.TexasAgriculture.gov

1-800-TELL-TDA





Field planted

One year

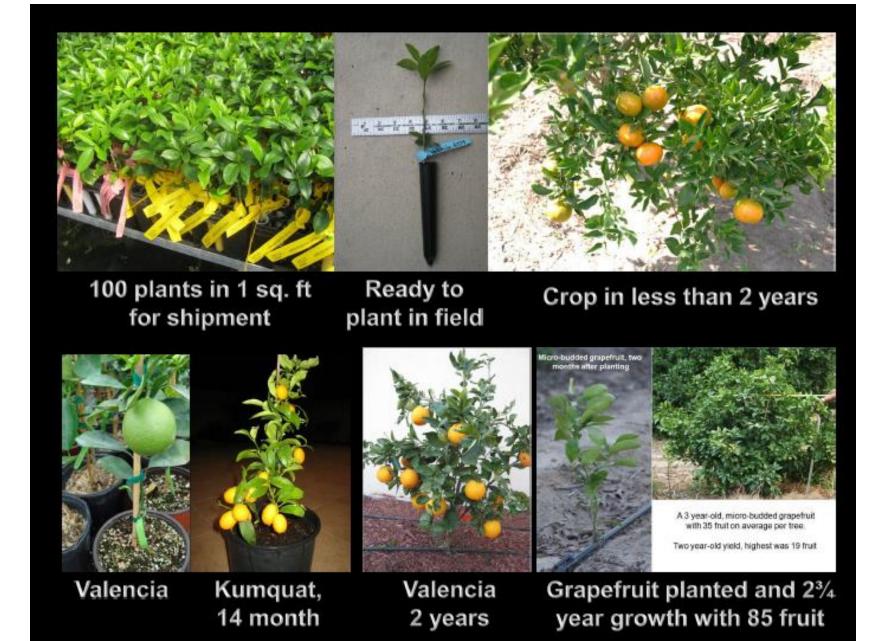
Dancyquat



Valencia, three years



Plants to micro-bud

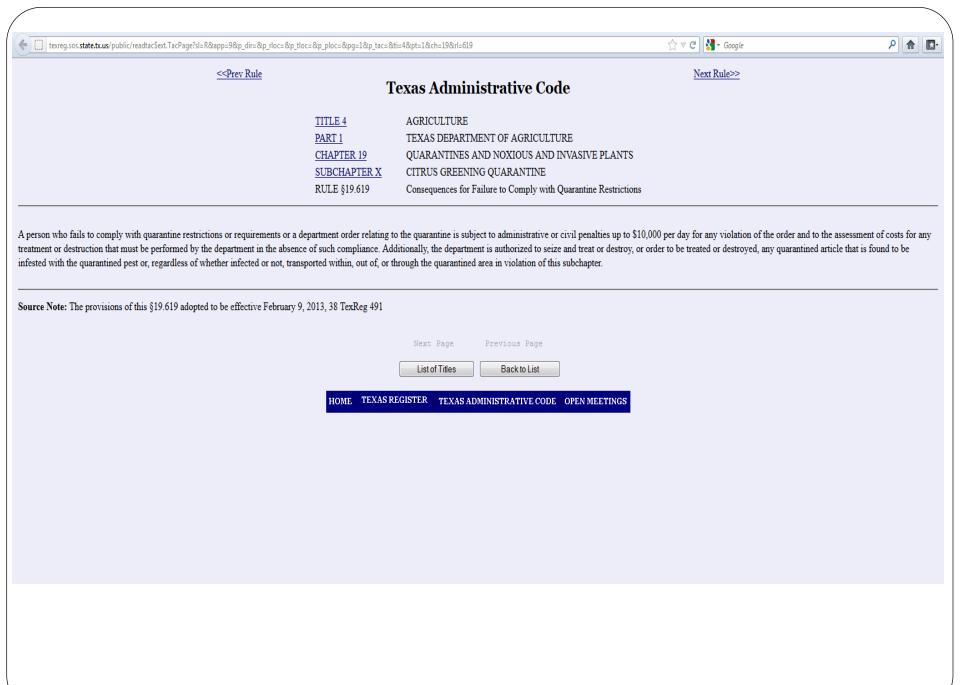


The End. Thank you

Questions ???

cameron.agrilife.org/

Slides and graphics compliments of TDA, USDA, US Citrus LLC, and Texas Agri-Life Extension Offices



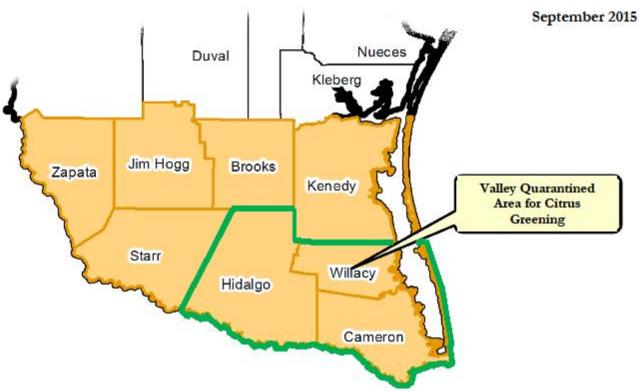
POP QUIZ

I buy citrus in Starr County. Can I bring it to Brownsville?

TEXAS DEPARTMENT OF AGRICULTURE

Citrus Zone (orange shaded area) and Valley Quarantined Area for Citrus Greening (green outline)





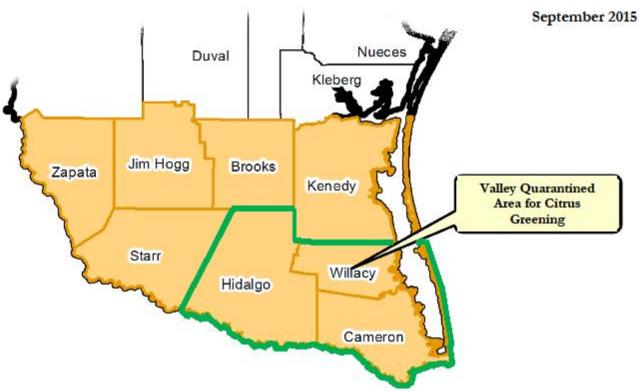
Yes, but I cannot leave the quarantine zone once inside.

My wife and I live in Zapata County. We want to go shopping and stop in Starr County and buy citrus. We then go to the Outlet Mall in Mercedes. After we are done we want to return home to Starr. Is this OK? Why?

TEXAS DEPARTMENT OF AGRICULTURE

Citrus Zone (orange shaded area) and Valley Quarantined Area for Citrus Greening (green outline)





No. We cannot leave the quarantine area with citrus.

I buy citrus in Corpus Cristi. Can I bring it home to Raymondville?



USDA-APHIS-PPQ 903 San Jacinto Blvd Austin TX 78701

Date Printed: 12/11/2014 Time Printed: 13:12 hrs CT Document #: PPQ1409191102181216

Now the part of the distribution delicated and part of the face of the distribution of the part of the case of the part of the

No. Nothing enters the Citrus Zone.

I buy citrus in Galveston. I want to go home to Ft Worth via Houston. Is this allowable?



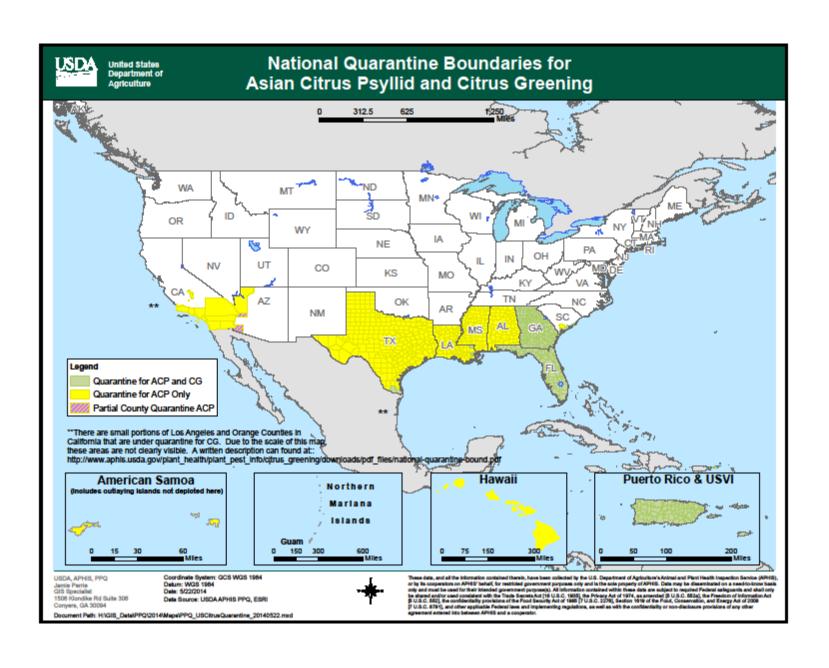
USDA-APHIS-PPQ 903 San Jacinto Blvd Austin TX 78701

Date Printed: 12/11/2014 Time Printed: 13:12 hrs CT Document #: PPQ1409191102181216

Now the part of the distribution delicated and part of the face of the distribution of the part of the case of the part of the

With special permits and a sealed vehicle this may be allowed. Stopping is brief with limitations to same day travel and no releasing the citrus to the outside elements. Even though this is a quarantine zone it is not the Citrus Zone.

I buy citrus in Lake Chuck, LA. Can I bring it into TX?



No. Nothing in or out of Texas or any other state for citrus.