## UNIVERSITY of FLORIDA

#### IFAS DISEASE ALERT FOR FLORIDA PANHANDLE HUANGLONGBING (HLB)



Causal organism: *Candidatus* Liberibacter asiaticus Insect vector: Asian citrus psyllid *Diaphorina citri* Kuwayama



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Huanglongbing (HLB) is currently the most devastating disease of citrus disease worldwide.

First reported in 1919 in southern China, reported in Brazil in 2004 and discovered in south Miami-Dade County-FL in August 2005. Since then it has affected most of Florida's citrus-producing areas (Fig. 1) leading to a "75% decline in Florida's \$ 9 billion citrus industry". (USDA NIFA in IPM in the South 2017).

Citrus Huanglongbing (HLB), has been the subject of large number of publications, some of them are:

- <u>Citrus Greening (Huanglongbing): A Serious Threat to the Florida Citrus Industry</u>
- <u>Citrus Huanglongbing: The pathogen and its impact</u>.
- <u>Citrus Huanglongbing: Understanding the Vector-Pathogen Interaction for Disease</u> <u>Management.</u>



## DISTRIBUTION

#### Known Distribution of Citrus Canker and Citrus Greening (HLB) in Florida

Date: 1/10/2017



Data being depicted on this website is for reference use only. This data is refreshed on a weekly basis. The Department is not enforcing the destruction of infected material, therefore there is no sure way to determine which infections have been removed and which have not. As such, the data depicted only represents known confirmed positive locations, and due to changing conditions may or may not represent real world scenarios. Before being poste all reasonable efforts have been made to contact owners to inform them of infections. For further explanations please download the available data definitions. If you have additional questions or problems regarding the use of this data, please contact the Help Line 1-800-282-515



**Fig. 1.** Statewide Citrus Canker and Citrus Greening Map

## **CITRUS GREENING FINDING IN FL PANHANDLE**

- In North Florida, Huanglongbing was discovered on December 6th, 2016 at a residential property in Carabelle, FL when a suspected citrus sample was submitted (Fig. 2 and 3.) for diagnosis to UF NFREC plant disease Diagnostic Clinic. The samples tested positive for *Candidatus* Liberibacter asiaticus based on qPCR assay. On December 9<sup>th</sup>, 2016 the Florida Department of Agriculture and Consumer Services Department of Plant Industry (FDACS DPI) confirmed the finding as a new FL county official record.
- Even though psyllids were not detected in Carrabelle, some were found in Bay and Gadsden counties in 2007, therefore it is likely that several other citrus in the area are also infected, possibly presenting symptoms or with asymptomatic (latent) infections. Further scouting of the disease is needed.
- Since the entire state of FL is under quarantine, FDACS DPI officials stated that currently there are no regulations for infected dooryard citrus. However shipments of any citrus plant or fruit outside of the state is prohibited. It is recommended however to remove the plant to avoid further spread of the disease to nearby healthy plants. Herbiciding the stump is also essential.
  - Citrus growers in the area should be familiar with the symptoms of Huanglongbing and monitor their plants routinely as early detection will slow down further spread of the disease by removal of infected trees and control of the insect vector.



#### Finding in Franklin Co, FL



Affected leaves develop a pattern of yellow and green areas giving a "blotchy mottle" appearance. The patterns are asymmetrical on the two halves of the leaf and will be visible on both sides of the leaf (Fig. 4 & 5)



or more).

**Fig. 4.** Backyard citrus in Franklin county showing symptoms of Huanglongbing.



Leaves can become thicker, with veins enlarged and corky in appearance (Fig. 6 and 7)



Fig. 7. Citrus hystrix tree showing severe vein corking symptom.

Iriarte F.



**Fig. 8.** South Florida pummelo tree displaying "zinc-pattern-deficiency" interveinal chlorosis symptoms.

On severely infected trees, leaf drop, twig dieback and extensive fruit drop occurs (Fig. 9).

**Fig. 9.** A 2 to 3 year old sweet orange tree in south Florida with HLB-induced fruit drop, dieback, and defoliation leading to thin canopy.

Zinc-like deficiency symptoms may develop (Fig. 8). Zinc deficiency will appear on new foliage throughout the tree in contrast to early HLB symptoms which are restricted to a single or a few shoots.



Fruit may be small, poorly colored, and lopsided. Although relatively rare in FL, fruit's stylar end may remain green (Figs. 10, 11 & 12).



More symptoms



**Fig. 10.** Infected fruits have stylar end "lack of coloration".

Fruit taste may be bitter, medicinal and sour.

**Fig. 11.** Lopsided Citrus fruit in residential property in Franklin county.



**Fig. 12.** Asymmetrical "lopsided" sweet orange fruit from São Paulo, Brazil.

## **CAUSAL AGENT and INSECT VECTOR**

Huanglongbing disease is caused by Gram-negative phloem limited bacteria in the genus *Candidatus* Liberibacter (*Fig. 13*).

There are three species of concern: *Candidatus* Liberibacter asiaticus *Candidatus* Liberibacter africanus *Candidatus* Liberibacter americanus (Texeira *et al.* 2005).

SPECIES	VECTOR	HEAT TOLERANCE
Asian	<i>Diaphorina citri</i> (psyllid)*	heat tolerant
African	<i>Trioza erytreaae</i> (psyllid)*	heat-sensitive
American	<i>Diaphorina citri (</i> psyllid)	heat-sensitive

Source: UF IFAS CREC

**Diagnostics** PCR (<u>Polymerase Chain Reaction</u>) and qPCR (<u>Real-time polymerase chain</u> reaction) are the most accurate and sensitive tests to detect *C*. Liberibacter spp.



## **INSECT VECTOR**

The only vector species in FL is *Diaphorina citri* Kuwayama (Fig. 14.) found for first time in the US in Palm Beach County in June 1998 and is widespread in Florida.

For more information see: <u>Asian citrus psyllid</u>

**Fig. 14** . Asian citrus psyllid adult (right) and eggs (below) (*Diaphorina citri* Kuwayama)





David Hall, USDA-ARS 2007



**Fig. 15.** Adult Asian citrus psyllid nymphs and characteristic waxy exudate.

*C*. Liberibacter spp. can also be transmitted by grafting, and by dodder, but not seed. The pathogen does not spread by casual contamination of personnel and tools or by wind and rain.

#### Host Plants of HLB and Asian Citrus Psyllid

It severely affects most sweet oranges, mandarins, and mandarin hybrids, as well as some citrus relatives (Fig. 16, 17 & 18) (Halbert and Majunath 2004).

**Fig. 16.** Chinese box (*Severinia buxifolia*)



<u>Known Host Plants of</u> <u>Huanglongbing and Asian</u> <u>Citrus Psyllid</u>

The psyllid vector feeds on a wide variety of host plants including the common Orange Jasmine (*Murraya paniculata*) Fig. 17. Curry Leaf Murraya koenigii



Fig. 18. "Orange Jasmine" Murraya paniculata



## **DISEASE MANAGEMENT**

Scouting for the disease for early detection Scouting for Citrus Greening (Huanglongbing; HLB) Cultural control (tree removal) + stump herbiciding Integrated management Propagation of clean nursery stock **Psyllid control** Removal of potential inoculum sources Remove alternate hosts If possible, remove host plants, Murraya paniculata (orange jasmine) and *Severinia buxifolia* (box orange) from around a commercial citrus grove.



#### **CITRUS QUARANTINES IN FLORIDA**

For detailed information about Quarantines refer to the following links:

#### **Citrus Quarantines in Florida**



Florida is currently under statewide quarantine as directed by CFR 301.75 Subpart Citrus Canker and by federal order from the United States Department of Agriculture (USDA) for citrus canker, sweet orange scab, Huanglongbing disease and the Asian citrus psyllid. In addition, portions of Collier, Hendry and Polk counties in Florida are under quarantine for citrus black spot disease.

**Citrus National Quarantine Map** 

## Learn more about Huanglongbing



#### **Citrus Greening**



Huanglongbing (HLB)/Citrus Greening Disease Information

Citrus Health Response Program (CHRP)

UF/IFAS Citrus Extension

**Citrus Greening (Huanglongbing)** 

# Testing sites in Florida



Division of Plant Industry, FDACS 1911 SW 34th Street, Gainesville, FL 32608 (352) 395-4768 <u>xiaoan.sun@freshfromflorida.com</u> http://www.freshfromflorida.com/Divisions-Offices/Plant-Industry



UF IFAS North Florida Research and Education Center 155 Research Road, Quincy, FL 32351 850-875-7154 paret@ufl.edu or fbiriarte@ufl.edu http://nfrec.ifas.ufl.edu/ http://programs.ifas.ufl.edu/u-scout/Lab\_Profile.html



Plant Diagnostic Center Department of Plant Pathology, University of Florida Building 1291, 2570 Hull Road Gainesville, FL 32611-0830 352-392-1795 <u>clharmon@ufl.edu</u> <u>http://plantpath.ifas.ufl.edu/extension/plant-diagnostic-center/</u>



UF/IFAS Southwest Florida Research and Education Center 2686 State Road 29 N., Immokalee, Florida 34142 (239) 658-3408 <u>obatuman@ufl.edu</u> http://swfrec.ifas.ufl.edu/programs/plant-path/