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Industry Perspective: The Challenge of Managing Huanglongbing (HLB) and its Vector, the Asian Citrus Psyllid (ACP)

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Vice President Science & Technology



How much do you enjoy citrus?



Huanglongbing - HLB

“Yellow Shoot Disease”

- Most severe of all citrus diseases
- “*Death sentence*” for citrus trees
- Does not discriminate between a backyard and a production grove
- Affects most plants within the citrus family (Rutaceae)
- No known therapeutics
- No “known” resistance



Huanglongbing - HLB

“Yellow Shoot Disease”

First described in China



Sectoring –
yellow shoots



HLB - Leaf Symptoms

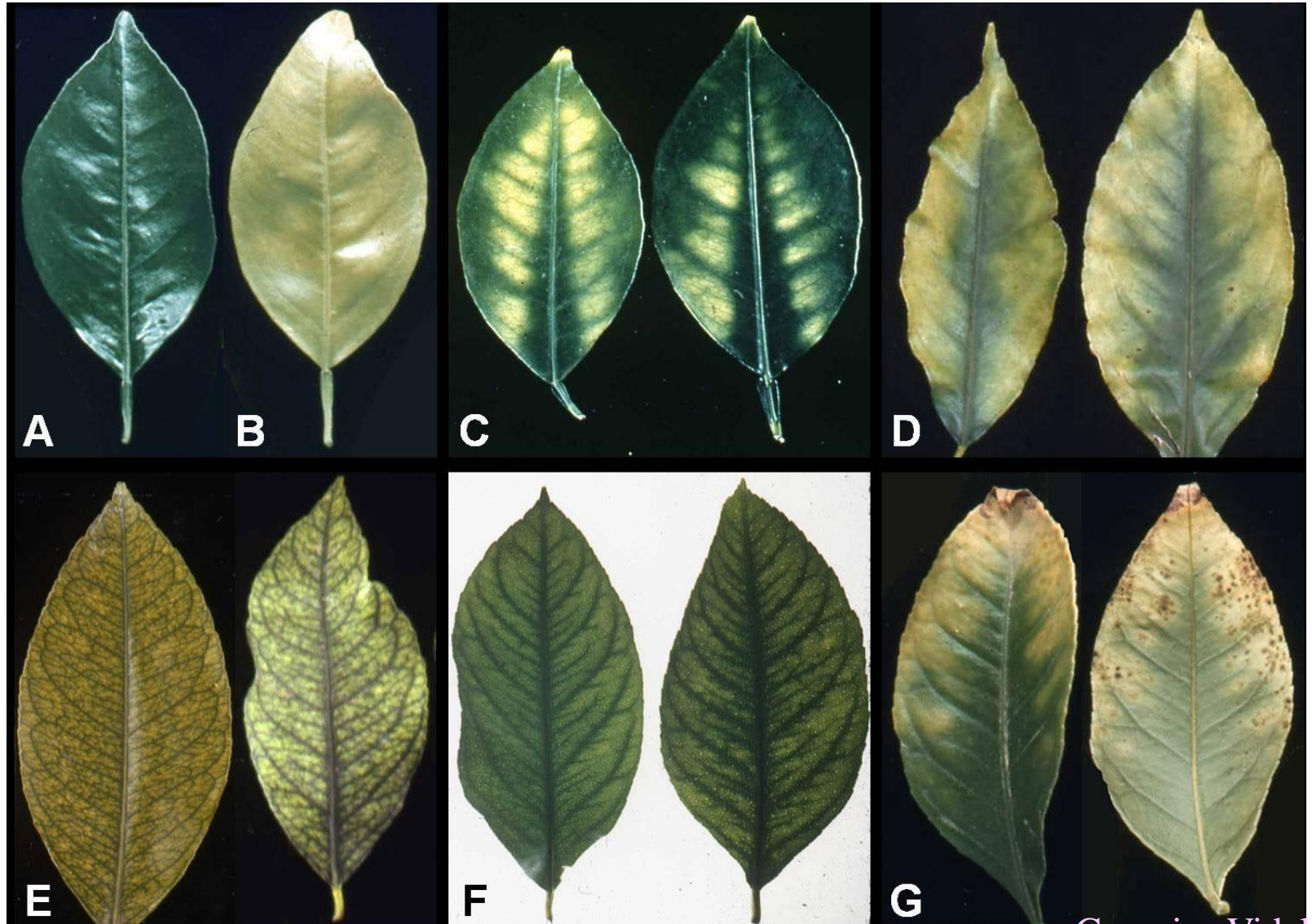
Blotchy Mottle



Notch
- Caused by psyllid



Don't be Fooled by Symptoms



Huanglongbing - HLB

“Yellow Shoot Disease”



Pre-mature fruit drop
Huge Problem in Florida

Tree growth and life expectancy is reduced, poor leaf production

Imparts an insipid, off-flavor to the fruit



HLB: Fruit Symptoms

Asymmetry



Reduced size



Aborted seeds

Greening

Normal

Causal Agent

Candidatus Liberibacter – a bacteria

- asiaticus
- africanus
- americanus

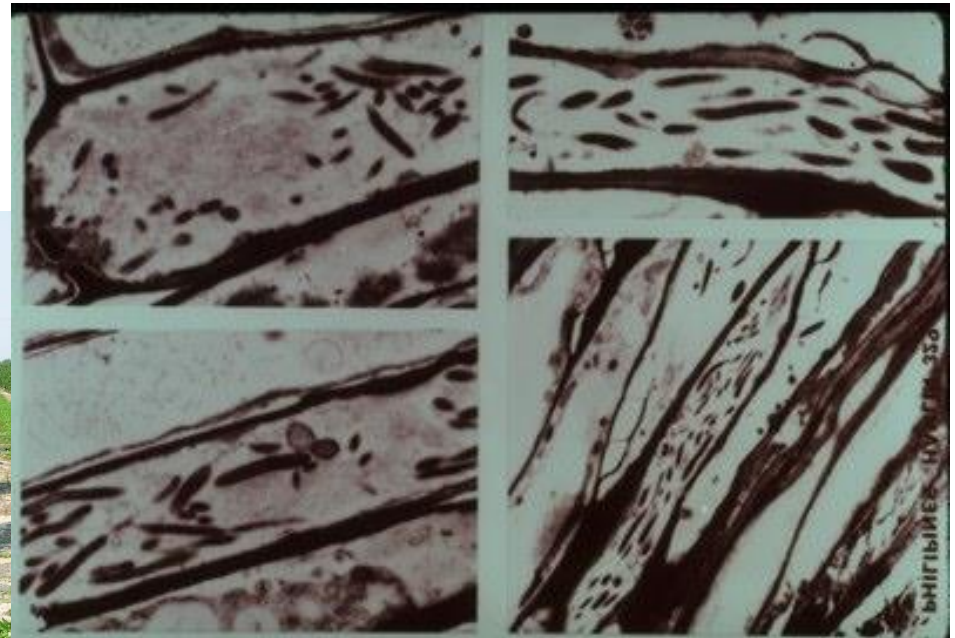


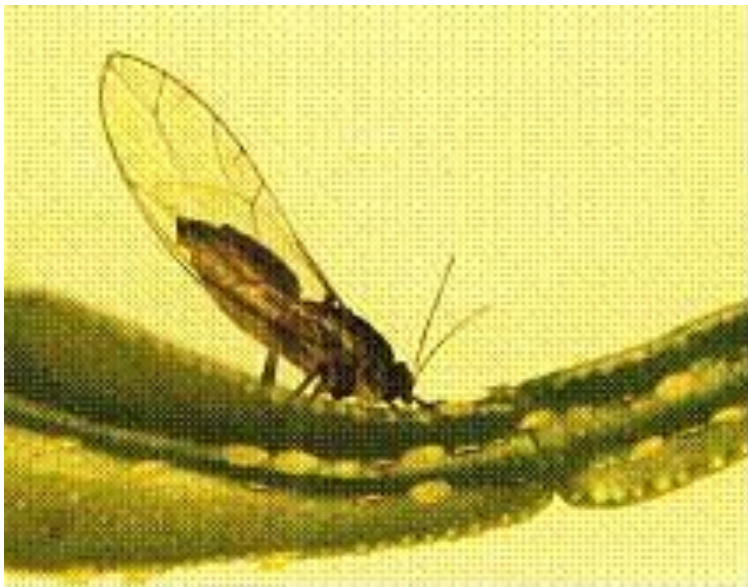
Photo by Mike Irey

Lives in phloem-associated cells

2 Known Species of Vector



- *Diaphorina citri* - Asian citrus psyllid
- *Trioza erytreae* - African citrus psyllid

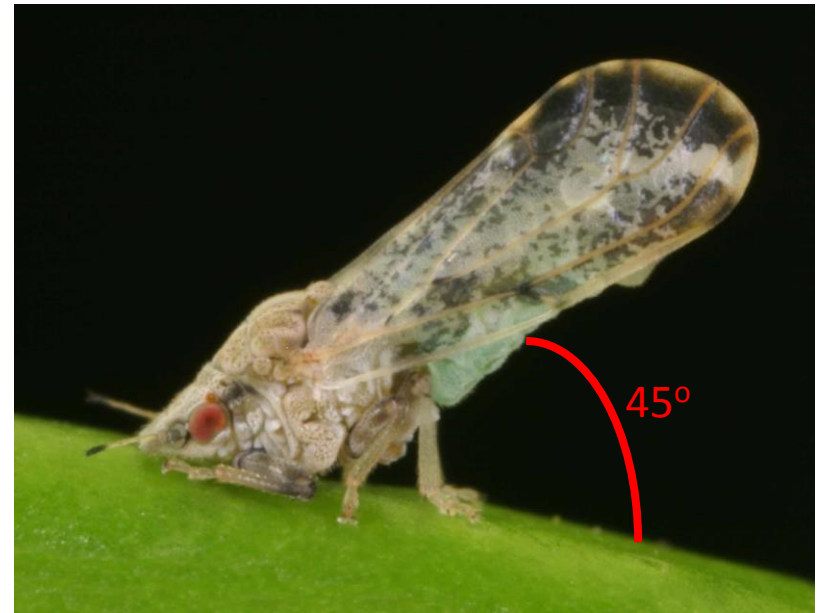


The vector

Diaphorina citri – Asian citrus psyllid



Adult psyllids usually feed on the underside of leaves (2-4 mm)
When feeding, they tip their body at a 45° angle



Eggs are bright yellow-orange, almond-shaped and are laid on the tips of growing shoots or in the crevices of unfolded “feather flush” leaves



Problems/Complications with Detection

- Symptoms resemble mineral deficiencies, toxicities or other diseases
- Visual symptoms take years to develop
- 30% root mass lost before above ground symptoms are observed



Problems/Complications with Detection

- Pathogen has not been cultured
- Pathogen is unevenly distributed within a tree
- Challenging to collect a good sample for lab analysis
- Polymerase chain reaction (PCR) is the USDA-approved diagnostic method
- Need pre-symptomatic detection methods

Additional Host Plants of HLB and ACP



Murraya – orange jasmine



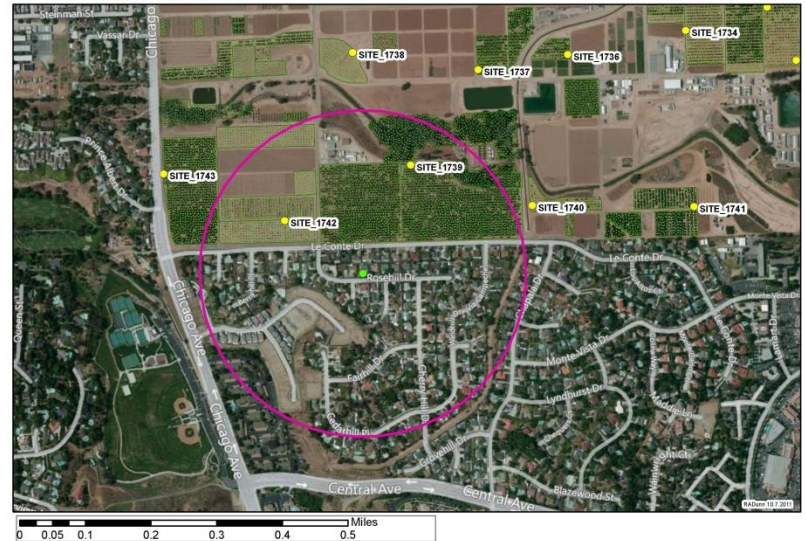
Clausena - wampee



Fortunella - cumquat



Severinia –
Chinese box-
orange



How do you look for HLB-affected trees in urban areas?

- Test psyllids – but not a regulatory item
 - Able to fly – which tree did it acquire the bacteria from?
 - Not every psyllid feeding on a known HLB+ tree acquires the bacteria
- Must have Liberibacter-positive plant material

Amy Harmon
July 27, 2013

A Race to Save the Orange by Altering Its DNA



Trees that are infected by disease are cut down and burned in Clewiston, Fla., at groves owned by Southern Gardens Citrus. Richard Perry/The New York Times

Challenges

- No known ACP attractants
- No known therapeutics
- No USDA-approved early detection methods
- ACP has almost never been eradicated (Reunion Island)
- Areawide treatment for ACP requires cooperation

Florida estimates the
collapse of their
industry in 2 years!!!

More Challenges



Citrus Stubborn
Spiroplasma citri
Endemic to California

New Plantings Must:

- Originate from certified disease-free sources
- Produced and maintained within certified protective structures
- This requires substantial financial investment!



Buy Organic ???



- Loss of organic farming operations
- Conundrum for treatment programs (conventional vs organic)
- Organic products do not have long residual activity, must be applied more frequently
- Research needed

Partnerships: Crucial for survival

- Disease cannot be conquered alone
- Regulatory enforcement: USDA-APHIS & State Departments of Agriculture, Customs & Border Patrol
- Research: USDA-ARS, Industry (FL – Citrus Research & Development Foundation, CA - Citrus Research Board), Federal funding sources, universities



Mass-rearing of *Tamarixia radiata*

Dan Flores, USDA, APHIS, Texas

Richard Stouthamer, Mark Hoddle, UC Riverside



Released in SoCal in December 2011

Continued releases

Good evidence of parasitism

Evidence of establishment



Parasitic wasps (*Tamarixia radiata*) are mass-reared inside field tent



HLB'S TOLL: PLOWING CITRUS GROVES INTO PEACH ORCHARDS

FLORIDA GROWERS BEGINNING TO DIVERSIFY

22 Citrograph Magazine | Winter 2014



THANK
YOU!!!

QUESTIONS ?

