

The Florida Experience and Lessons Learned


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US Congressional Briefing
July 23, 2015

UF UNIVERSITY of
FLORIDA
IFAS
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Education Center*

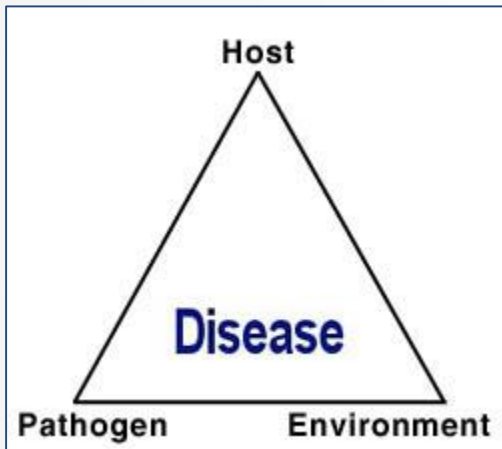
Huanglongbing “Yellow Shoot Disease” (HLB)=Citrus Greening



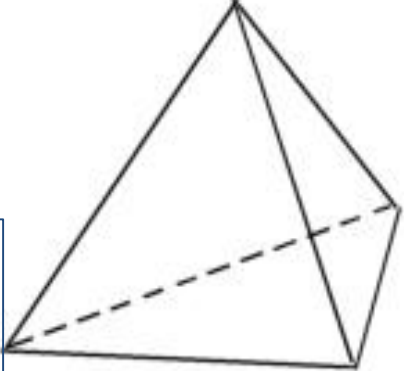
My Background

- Professor of Soil Microbiology at CREC for 34 yr
- 150 refereed publications in citrus research, Fellow of the American Phytopathological Society (APS)
- Citrus tree health management as affected by belowground pathogens and pests, and the systemic bacterial disease, HLB
- Identified root damage due to bacterial infection of fibrous roots and increased susceptibility to soil pathogens & pests
- Research defining control strategies to maintain **root health** on HLB-affected trees
- Research mainly supported by the:  Citrus Research and Development Foundation, Inc.
- Recent funding from NIFA Specialty Crop Research Initiative (SCRI) to study bactericides and the Multi Agency Coordination (MAC) to augment our root health research

HLB is especially challenging to research and manage due to the complexity of host-pathogen-vector interaction



Candidatus
Liberibacter
asiaticus (CLas)
is systemic
unculturable
inaccessible



Subtropical
climate with no
geographic barrier
to psyllid spread

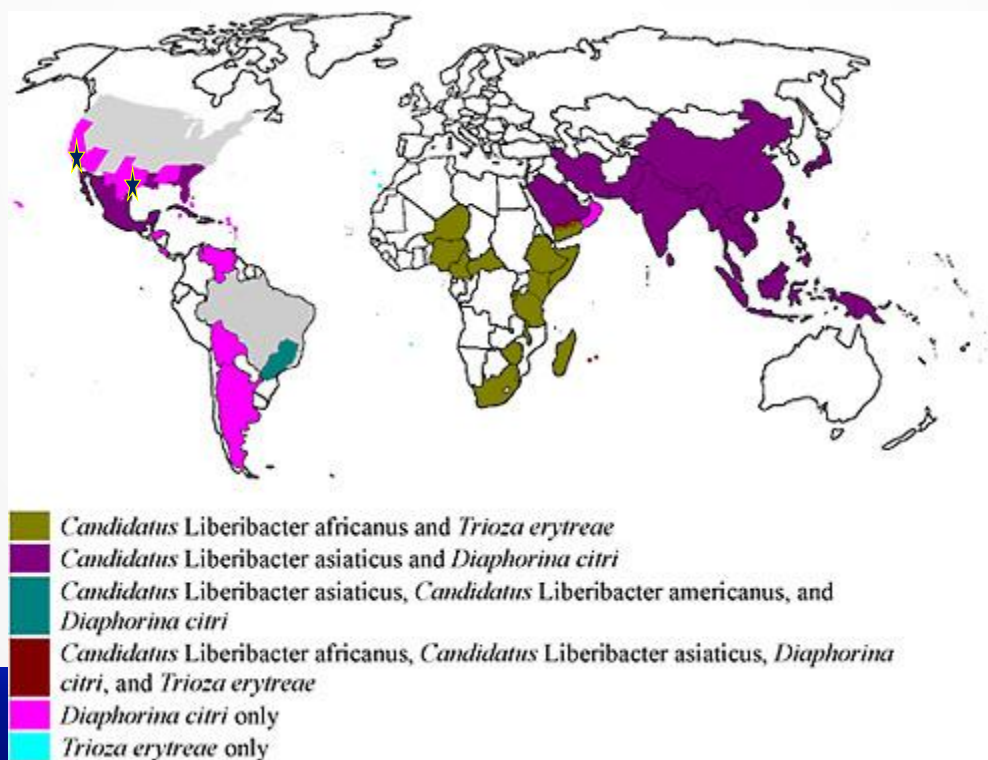


Folimonova & Achor, 2010

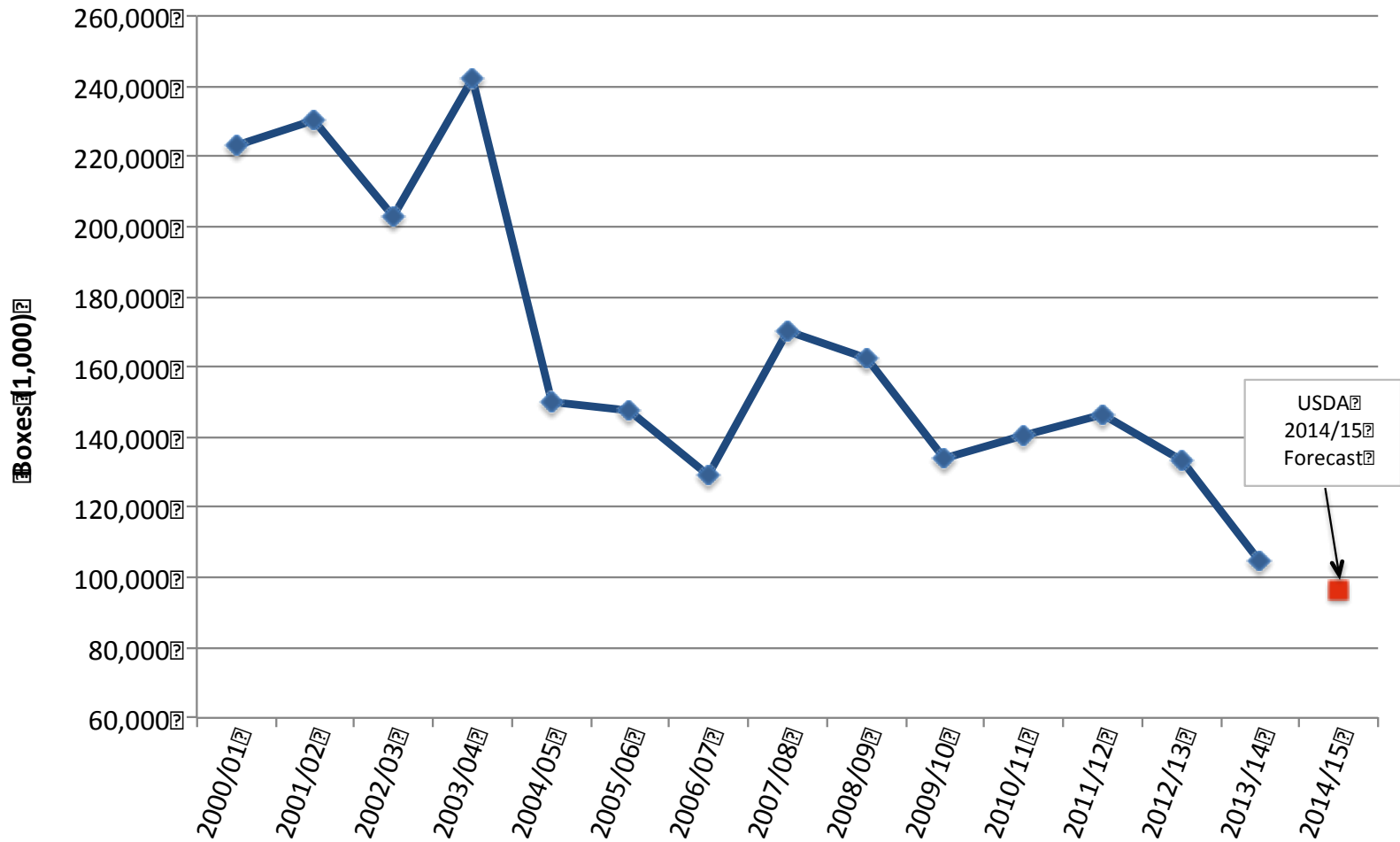


Psyllid and CLas are invading the Western Hemisphere (disease originated from the Indian subcontinent)

- US distribution
 - First detected in FL in 2005
 - All citrus producing counties of Florida (endemic)
 - Epidemic in Texas and recently detected in Southern California



Orange production in FL has declined 58% primarily due to HLB



Source: USDA-NASS

HLB disrupts CHO allocation to fruit causing stem-end break-down and premature fruit drop



Fruit drop is directly correlated with loss of fibrous roots that take up water and nutrients

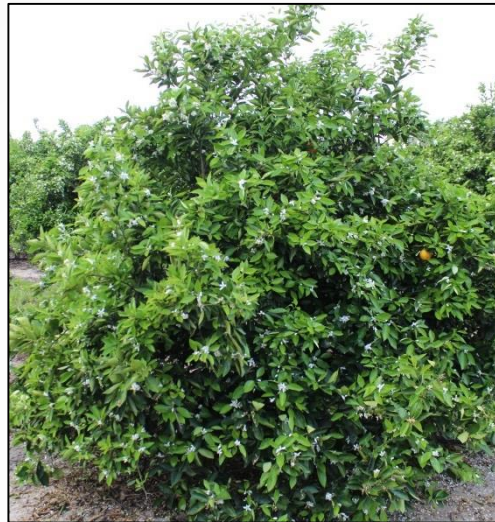
Healthy



Full roots



Symptomless Infected



30-50% root loss



Thinning



70-80% root loss



Initially, FL growers followed “3-pronged management” as practiced in Sao Paulo, Brazil

- 1) Enclosed nurseries to protect nursery trees
- 2) Intensive grove surveys
 - 4-6 times a year
- 3) Intensive psyllid spray programs
 - Spray at 15 day intervals
 - Finding one insect triggers a spray
 - Multiple chemicals to manage resistance to insecticides



FL growers adopted enhanced nutritional program as an alternative to the 3-pronged approach

- **Aversion to tree removal (related to canker eradication program from 1985-2005)**
- **Getting response to increased fertilizer applications (different than controlling the disease)**
- **End result: inoculum from infected trees left in the field spread rapidly across the industry**
- **100% of groves infected and infection level approaching 100% of trees infected**

Coordinated area-wide sprays for psyllid control in Citrus Health Management Areas (CHMAs)

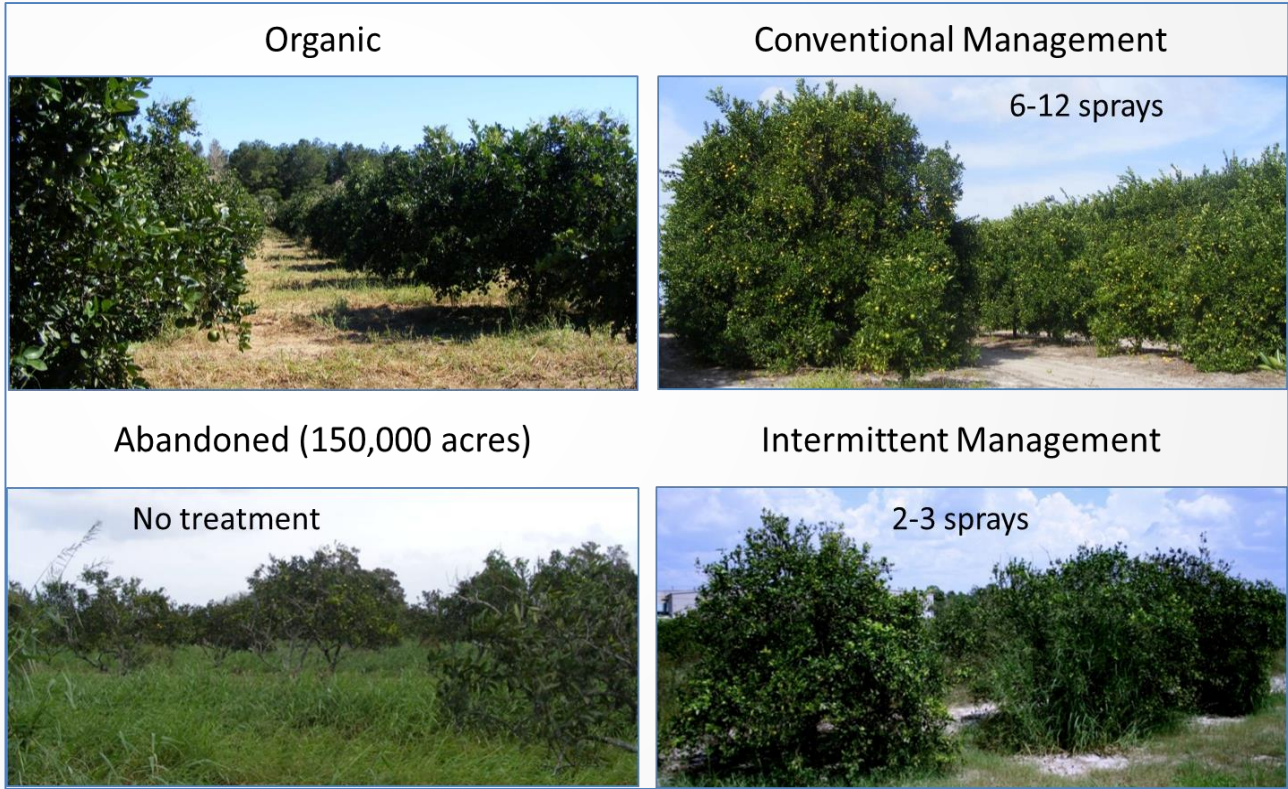


Production in enclosed nurseries is mandatory to protect trees from vector transmission (2X the cost)



HLB management has more than **doubled** production costs and varies depending on profitability of the grove

- Less trees in production
- Increased demand and cost for trees to reset
- Increased chemical costs for vector control
- Enhanced nutrition programs to sustain productivity of HLB trees



Impacts on Florida production and processing industry

- Production losses of 30-60%**
- Reduced yield, fruit quality and quantity (off-flavor, lower lb solids of juice)**
- Greater than 2X Increase in production costs**
- Smaller producers reaching tipping point in profitability even if though fruit prices remain high**
- Since 2006-07 HLB impact on FL is in excess of \$7.80 billion and cost 7,513 jobs (U. Florida , Dec 2014)**
- It is expected that further reduction in fruit supply will force closure of some orange processing plants**

HLB research programs at Univ. Florida

- **Cultural Management (7 programs)**

Graham, Johnson, Morgan (E), Dewdney (E), Ehsani, Powell, Vashisth (E)

- **Host-Pathogen Interactions (8 programs)**

Dawson, Wang, Gowda, Grosser, Gmitter, Gonzalez, Triplett, Moore

- **Pathogen-Vector Interactions (7 programs)**

Stelinski , Rogers (E), Killiny, Pelz-Stelinski, Stansly (E), Gabriel, Davis

- **Researchers from over 20 countries convene every 2 years in Orlando for the International Research Conference on HLB (IRCHLB); Research progress is reported at Grower Day**

Short term therapies for restoring health of HLB-affected trees

Thermotherapy with steam to reduce symptom expression (SCRI supported research program)




Acid treatment of bicarbonates in irrigation water and soil to lower pH in the root zone has resulted in increased production after 2 years of application (MAC supported)



Fruit crop 6/12/15

Concluding comments on research and funding

- Since 2007, with box tax on Florida fruit, CRDF has invested \$20 mil/yr in research  Citrus Research and Development Foundation, Inc.
- CRDF funding continues at a reduced level and has been prioritized for product development
- NIFI-SCRI funding (\$25 mil for 5 yrs) partially replaces this shortfall but is targeted to a small number of research priorities
- No silver bullets, to date all are short term fixes, still need funding to find long-term sustainable solutions