



## Coordination of Research and Field Trials between Florida and Brazilian Citrus Industries

A few months ago, we highlighted the importance of coordination of research efforts against Huanglongbing (HLB) with other U.S. states which are facing the onset of challenges similar to those that we are experiencing in Florida. California, Texas, and Arizona have citrus industries which are facing the spread of Asian citrus psyllid (ACP), the vector of HLB, and have in some cases, found initial infection of citrus trees by the pathogen *Candidatus Liberibacter asiaticus* (CLAs) in their state.

At its April 2013 Board meeting, the Citrus Research and Development Foundation (CRDF) discussed the need to become more connected with Brazil's efforts in managing HLB or citrus greening, and make sure that everything is being done to coordinate between Florida and Brazil with regard to solutions to manage HLB. This is in synch with efforts to coordinate with other U.S. citrus producing states. One example of the opportunity for coordination is field trials in Brazil that are evaluating the effects of 2,4-D and other plant growth regulators on HLB infection and fruit retention. Florida growers also are applying 2,4-D, as well as various nutrient treatments, and want to learn more. CRDF is currently supporting experiments on how best to use these and other materials. Following the discussion of HLB research in Brazil, the Board recommended that plans be made for a visit to Brazil to get an update on research, field trials, and HLB management tools being implemented by growers and how we can coordinate more closely with Fundecitrus (Fundo de Defesa da Citricultura), with Brazilian researchers, and with growers.

Much has changed in both Brazil and Florida in recent years with HLB, and with regard to measures being developed and evaluated to stem disease advance. In Florida, more growers are realizing that HLB is impacting their crop in a significant way, and are more aware than ever of the need for replanting. The degree of confidence in the availability of tools to manage young trees in the presence of HLB determines growers' willingness to replant.

CRDF therefore approved support for a small group trip to Brazil to meet with relevant entities and to observe experiments under way in the field that are addressing these and other issues:

- Asian citrus psyllid control
- Scouting and removal of HLB infected trees
- Strategies to manage infection pressure from neighboring citrus groves

### UPCOMING MEETINGS

#### January 2014

28	Board of Directors	CREC, Lake Alfred	9:30 am
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- Evaluation of treatments applied to promote tree health in the presence of HLB
- Effects of plant growth regulator treatments in limiting fruit drop
- Status of other citrus diseases in relation to HLB

The HLB study trip was conducted by Harold Browning, CRDF's Chief Operations Officer, Bobby Barben, Citrus Grower and Chair of the CRDF Research Management Committee, and Ben McLean, Citrus Grower and Chair of the CRDF Commercial Product Delivery Committee. Two University of Florida, IFAS Researchers were invited to participate in this activity. However, schedules did not allow their participation in this itinerary, so they will be making plans for a follow-up visit to Brazil.

A one-week itinerary which allowed the team to visit several production areas in the State of São Paulo, the largest citrus producer in the world and an area where the first infection with HLB was reported in 2004, one year before the detection in Florida in 2005. The team was provided open access to a range of opportunities to observe and discuss how growers are attempting to manage HLB across the state. This included farm visits, formal presentations by growers, and informal discussions. In addition, the team met several times with administration and staff of Fundecitrus, who graciously hosted this event and provided tremendous logistics support. On these occasions, specific presentations, tours and discussions were held on ongoing research projects, and how Fundecitrus and CRDF can coordinate better in the ongoing research related to ACP and HLB. A day was spent with the Entomology and Acarology Department of the University of São Paulo, Piracicaba, where a number of projects focus on the biology, behavior, and control of ACP. While in Brazil, the CRDF team also was able to visit a citrus nursery, and during this and other visits, the team was able to discuss other citrus diseases of importance to both Brazil and Florida, and how they are being addressed in each location.

A comprehensive report is being drafted and will be made public when it is completed. However, some preliminary findings from the trip are outlined here.

- Citrus HLB is non-discriminating, affecting small and large farms in Brazil, and across scions and rootstocks as it is in Florida. The disease varies in intensity, with higher infection having occurred in the central-northern sector of São

Paulo State, around Araraquara, the initial area of detection of HLB. Incidence is lower in the southern part of the state, and growers have been able to implement aggressive HLB management tools before HLB disease incidence rose in this area.

- Overall, many citrus growers in Brazil have remained focused on ACP suppression, HLB scouting, and removal and replanting of infected trees. While many trees have been removed using this strategy, the overall incidence of HLB in the field remains quite low compared to Florida, where HLB is now widespread and the incidence of infected trees is growing. Through tree removal, the overall percentage of trees showing chronic infection is limited to those growers who are not removing trees, so we did not see extensive fruit drop affecting a large population of trees.
- Citrus farms in São Paulo are positioned to take advantage of alternate land uses when citrus groves reach a point of economic uncertainty. Among the options that we saw for alternative agricultural use included sugarcane, a strong crop currently in Brazil due to increased reliance on ethanol as a component in automobile fuel. Also being considered as alternatives for citrus are short-term crops like maize and soybeans, and longer term crops like coffee and rubber plantations. These latter two crops have economic viability of 20 years or more, and thus share some of the risks with citrus of early cash flow and uncertain long-term economics. This ability to remove citrus and convert to other agricultural crops was viewed as a clear advantage for small

and large growers, and is allowing citrus growers to remove unproductive groves and replanting to something else.

- The issue of borders around citrus farms as a first defense against movement of ACP and HLB from neighboring properties or adjacent on-farm groves into new citrus plantings was a major topic for extensive discussion. We observed many methods implemented to manage borders, including: planting at higher tree densities to provide a stronger barrier to the interior; higher intensity of ACP monitoring and more frequent ACP control applications; diligent scouting for and removal of HLB-infected trees; and locating new plantings where border scenarios are at lesser risk from neighboring groves with higher HLB risk.
- We ended the trip with many observations and a sense that, like Florida, there is no single management system which will guarantee sustained economical citrus production in the presence of HLB. However, between growers who are choosing temporarily to remove citrus and plant alternatives, and growers who are aggressively investing in all available tools to fight the disease, there is a wide range of experiences which we hope to better understand and on which to capitalize.

Further discussion and reaction to the observations and information made available during this trip will occur, and CRDF intends to follow up on areas of common interest with researchers and growers in Brazil.

LINK	TITLE	RESEARCHER
	Control HLB by developing antimicrobial compounds against <i>Candidatus Liberibacter asiaticus</i>	Wang
	Characterization of critical genes involved in spread of citrus canker pathogen <i>Xanthomonas axonopodis</i> pv. <i>citri</i>	Wang
	Impact of insecticidal control of Asian citrus psyllid (ACP) on leafminers, mites, scales, thrips and their natural enemies in Florida	Qureshi
	Culturing <i>Liberibacter asiaticus</i>	Davis
	Copper loaded silica nanogel technology for long term prevention of citrus canker disease	Santra
	Insecticidal and antimicrobial peptides for management of Asian citrus psyllid	Pelz-Stelinski
	Functional study of the putative effectors of ' <i>Candidatus Liberibacter asiaticus</i> ' using <i>Citrus tristeza virus</i> vector	Gowda
	Efficacy of citrus canker control strategies, leafminer interactions, and bacterial survival.	Gottwald
	Epidemiology and disease control of huanglongbing	Gottwald
	Characterization of Imidacloprid Fate and Transport During Management of Citrus Greening	Morgan