CITRUS ADVANCED TECHNOLOGY PROGRAM

QUARTERLY & FINAL REPORTS: Control of Citrus Greening, Canker & Emerging Diseases of Citrus

▶ INSTRUCTIONS

(●) *Quarterly Report* ( ) *Annual Report* ( ) *Final*

Required: What is the "headline" for this report (e.g. a one-sentence "newspaper headline" describing what you accomplished)

Psyllid response to HLB and nutrient deficiency continues

Proposal Title

Does huanglongbing (HLB) or associated nutrient deficiencies change asian citrus psyllid (ACP) feeding patterns?

Today's Date	Sponsoring Organization (drop-down)	Category (drop down)
1/26/11	Citrus Research and Development Foundation	Vector Monitoring, Behavior, Cultivation

REPORT UPDATE (500 words; summarize your accomplishments)

The objective of this project is to investigate three questions: 1) whether HLB symptoms or boron/zinc deficiencies alone affect how ACP responds to citrus; 2) whether feeding patterns by adults, length and location of feeding, are altered by HLB infection or boron/zinc deficiencies; and 3) whether different strains of Ca. Liberibacter asiaticus (Las) differentially affect the response of ACP to citrus.

In other pathogen/host/vectors systems, such as that with Ca. Phytoplasma mali and Cacopsylla picta (the apple psyllid), the pathogen manipulates the plant host metabolism so that diseased plants become more attractive to the psyllid vector, thereby spreading the pathogen more rapidly than if no plant host manipulation occurred. Since nutrient deficiencies are often associated with HLB in citrus, we wished to confirm that the reported attraction of Diaphorina citri to HLB symptomatic plants over uninfected plants was due to changes in host metabolism by the pathogen rather than physiological changes due to poor nutrition.

The production of greenhouse-grown citrus trees with nutrient deficiency symptoms for both zinc and boron continues. Strong characteristic deficiency symptoms have yet to develop. Deficiency symptoms are expected to take several months to develop, which is exacerbated by the slow growth due to cold weather. This is especially the case for zinc because of the high mobility of zinc within the plant allowing redistribution of existing zinc to new flush, delaying the development of symptoms. Multiplication of our stocks of HLB infected citrus is also underway to provide a constant source of symptomatic tissue for experimentation once the nutrient deficiency symptoms have developed. As soon as strong deficiency symptoms develop, then psyllid testing for objective 1 and 2 will commence and is expected to move rapidly.

We are also interested to determine if strains of Las will have any effect on the attractiveness of trees to D. citri. It has been reported that Las strains have varying levels of virulence and symptomatology (Tsai et al. 2008). We have analyzed DNA samples from HLB positive trees from Polk and Highlands counties as well as the 'Smoak Grove' CREC greenhouse strain by PCR and sequencing. Three putative strains of Ca. Liberibacter asiaticus (Las) were found with 5 (CREC greenhouse isolate), 13, and 15 tandem repeats of DNA in the LAPGP locus described by Chen et al. 2010 and have identified sources of budwood. We are currently using the identified budwood sources to acquire and bulk up isolates of the three strains in the greenhouse. Cloning and sequencing of loci including the b-operon, OMP (outer membrane protein) gene and phage DNA polymerase to support the differentiation of the three strains is underway (Bastianel et al. 2005; Lin et al. 2008; Okuda et al. 2005; Tomimura et al. 2009). Current analysis suggests strong support for at least two strains and we are currently trying to determine if the third strain is an independent strain or a subpopulation of one of the other two. To insure that the isolates are CTV free they must be passaged through Carrizo, which will take at least 3-6 months due to the latent period.

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Project Duration (years) 2 *Year of Project* 1

Total Funds (current year) $39,689.00

SUBMIT REPORT

CITRUS RESEARCH AND DEVELOPMENT FOUNDATION, INC.