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)

Infection of citrus with HLB pathogen affects psyllid behavior

Proposal Title

How does Liberibacter infection of psyllids affect the behavioral response of this vector to healthy versus HLB-infected citrus trees?

Today's Date	Sponsoring Organization (drop-down)	Category (drop down)
7/8/11	Citrus Research and Development Foundation	Vector Monitoring, Behavior, Cultivation

REPORT UPDATE (500 words; summarize your accomplishments)

The goal of this project was to determine if infection by Candidatus Liberibacter asiaticus (Las) affects the response of Asian citrus psyllid (ACP) to its citrus host plants. In a two-choice laboratory olfactometer experiment, more ACP were attracted to volatile chambers containing Las-infected citrus plants than chambers containing uninfected citrus plants. In settling experiments, Las-infected plants were more attractive to ACP adults than uninfected plants initially; however, psyllids subsequently dispersed to uninfected plants as their final settling point rather than infected plants. Settling experiments with Las-infected and uninfected plants under complete darkness produced similar results to experiments conducted under light conditions. Both Las-infected and uninfected psyllids exhibited similar behavioral responses to Las-infected and uninfected plants in olfactometer and settling assays. Volatiles were collected from citrus plants that were either uninfected (control) or infected with Las. The volatile profiles of these plants were analyzed using a machine-learning algorithm called 'Random Forests'. This is a data-mining technique which allowed for the selection of the most appropriate predictor volatiles of observed ACP behavior and provided probabilities for classification of each plant as infected or uninfected based on volatiles alone. This analysis effectively divided the sampled plants into two groups, supporting a volatile basis for discrimination between infected and uninfected plants by Asian citrus psyllid. Methyl salicylate and methyl anthranilate were selected as the major predictor variables for the classification of the plant infection treatments. There was significantly more methyl salicylate (MS) and less methyl anthranilate (MA) in Las-infected plants than uninfected plants. Methyl salicylate was found to repel psyllids in laboratory olfactometer experiments at a 100 mg dosage. There was no effect of MA on the behavior of psyllids.

In addition to investigating ACP response to plant odors and whether it changes due to Las infection, we investigated the hypothesis that infection may influence plant nutritional status and that this may affect psyllid host choice behavior. Nutritional analysis revealed that HLB-infected plants in our experiments were deficient in zinc, iron, nitrogen and phosphorus and produced more potassium and boron than uninfected plants. Experiments investigating how nutritional status of plants due to infection affects psyllid behavior are underway as part of our ongoing and future studies. Collectively, our results indicate that ACP host seeking behavior is modified by changes plant volatile release due to infection with Las, which alters headspace volatile release and nutrient profiles of infected plants and compared with uninfected controls.

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Organization University of Florida

Contract Number 334

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

Total Funds (current year) $30,867.00

SUBMIT REPORT

CITRUS RESEARCH AND DEVELOPMENT FOUNDATION, INC.