CITRUS ADVANCED TECHNOLOGY PROGRAM

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

SELECT PERIOD December 2016

(●) *Quarterly Report* ( ) *Final*

Proposal Title

Insecticide resistance monitoring and managment in Florida citrus to maintain sustainable control of Asian citrus psyllid within Citrus Health Managment Areas

Today's Date	Sponsoring Organization (drop-down)	Category (drop down)
12/12/2016	Citrus Research and Development Foundation	Vector Management

REPORT UPDATE (500 words-It is not necessary in this public report to disclose your institution's proprietary information or intellectual property.)

The overall goal of this project is to improve insecticide resistance management for Florida populations of Asian citrus psyllid (ACP). We are achieving this through investigations of the mechanisms of resistance, monitoring resistance in the field, development of optimized rotation skills, and evaluations of new tools for implementation into these rotation schedules. One of the major obstacles facing Florida citrus growers is a lack of a sufficient number of modes of action for management of to achieve efficacious and cost-effective rotations season-long. Currently, and unfortunately, this sometimes requires application of the same mode of action more than one time per year. We therefore continue to investigate the physiological consequences and effectiveness of alternative modes of action against ACP.

We continue to investigate three different rotation modules using dimethoate, adamectin, fenpropathrin, diflubenzuron and imidacloprid. We have there were three rotation models that are producing the best results to minimize development of insecticide resistance and one positive control and one negative control. Each treatment is replicated four times. Before application we use a leaf dip bioassay to determine susceptible levels of ACP populations. We monitor ACP adults, eggs and nymphs weekly and determined when insecticide applications should be made based on a threshold of adults ≤ 2, eggs ≤5 and nymphs ≤5 per per average sampling per sample date. This experiment remains currently in progress, but all three rotation models that we have developed appear to be quite promising to maintain the effectiveness of our currently available modes of action for ACP viable.

A wide variety of insecticides are used to manage ACP populations within citrus groves in Florida. However, in areas shared by citrus growers and beekeepers the use of insecticides may increase the risks of honeybee (A. mellifera) loss. In addition to developing the most effective insecticide rotation schedules, we have investigated the potential non-target effects of our rotation modules on beneficial insects. The objective of this research was to determine the environmental toxicity of insecticides, spanning five different modes of action used to control ACP, to A. mellifera. The insecticides investigated were imidacloprid, fenpropathrin, dimethoate, spinetoram and diflubenzuron. In laboratory experiments, LD50 values were determined and ranged from 0.10 to 0.53 ng/µl for imidacloprid, fenpropathrin, dimethoate and spinetoram. LD50 values for diflubenzuron were > 1000 ng/µl. Also, a hazard quotient was determined and ranged from 1130.43 to 10893.3 for imidacloprid, fenpropathrin, dimethoate, spinetorama. This quotient was < 0.465 for diflubenzuron. In field experiments, residual activity of fenpropathrin and dimethoate applied to citrus caused significant mortality of A. mellifera 3 and 7 d after application. Spinetoram and imidacloprid were moderately toxic to A. mellifera at the recommended rates for ACP. Diflubenzuron was not toxic to A. mellifera in the field as compared with untreated control plots. Phenoloxidase (PO) activity of A. mellifera was higher than in untreated controls when A. mellifera were exposed to 14 d old residues. The results indicate that diflubenzuron may be safe to apply in citrus when A. meliifera are foraging, while most insecticides used for management of ACP in citrus are likely hazardous under various exposure scenarios.

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Form PR-12 Quarterly Reports **SUBMIT REPORT**

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