Florida Citrus Advanced Technology Program

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

Instructions Complete the fields based on your project specs. When finished, save the form to your local disk using a unique name. Then, go to **http://research.fcprac.com**, and log in with your user name and password using Researcher Login in the lower left. Find this project title and click on **Submit a Report**. Update your profile information if needed, then upload this report as directed.

2009-2010 REPORT	CATEGORY (drop-down)	TODAY'S DATE (m/d/yr)
(●) *Quarterly Report* ( ) *Annual Report* ( ) *Final*	Psyllid	6/25/09

WHAT IS THE "HEADLINE" FOR THIS REPORT (e.g. a one-sentence "newspaper headline" describing what you accomplished)

New repellent chemicals identified in addition to DMDS and new technology evaluated in the field

TITLE and CONTACT INFORMATION

Proposal Title Development of Effective Guava-based Repellent to Control Asian Citrus Psyllid and Mitigate Huanglongbing Disease Incidence

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Organization University of Florida/IFAS	*Total Direct Funds (current year)* 159869

REPORT UPDATE (650 words; provide details about your headline)

Over the past year, we have been working to develop an effective repellent for the Asian citrus psyllid (ACP). Our work was initiated by investigating the volatiles released by guava plants and their effects on ACP behavior. Initially, we found that dimethyl disulfide (DMDS) was produced in large quantities by wounded guava leaves. This prompted an investigation of the effects of this chemical on ACP behavior. DMDS is a known plant defense chemical against insects and we have shown that it acts as both a repellent and a neurotoxin against psyllids. We quantified the airborne concentration of DMDS that induced the behavioral effect in the laboratory behavioral tests and found it to be 107pg/cc. Compounds similar to DMDS including dipropyl disulfide, ethyl-1-propyl disulfide, and ethyl disulfide did not affect the behavioral response of ACP to attractive citrus host plant volatiles in laboratory behavioral tests. These data suggested that the activity of DMDS on the behavior of ACP is somewhat unique and not shared by all disulfide compounds. However, more recently we have found that certain other sulfur compounds, including dimethyl trisulfide and allyl methyl disulside, are either slightly more or equally active against the psyllid than the originally identified DMDS. Determining whether a blend of these chemicals will increase the repellent effect further is currently under investigation.

Field trials were conducted this past spring and summer to test the effect of synthetic DMDS released from polyethylene vials and other devices on population densities of ACP. The treatments compared were plots treated with DMDS versus untreated control plots. In one trial, fifteen ml of synthetic DMDS was formulated per polyethylene vial and approximately 200 vials were deployed per acre. This release device was developed with one of our industry partners (Alpha Scents). In this initial field experiment, populations of ACP were significantly reduced by deployment of synthetic DMDS from the polyethylene vials compared with untreated control plots. This small plot field experiment confirmed the results of our laboratory olfactometer assays. Deployment of synthetic DMDS from polyethylene vials reduced populations of ACP in an unsprayed citrus grove for up to 3 weeks following deployment. Given that population densities were equivalent among plots prior to the deployment of DMDS treatments, we hypothesize that DMDS repelled adult ACP from treated plots. By the fourth week, there was no remaining DMDS in the polyethylene vials, which likely explains why populations were once again equivalent in treated and control plots by the fourth week of the trial. Given the volatility of DMDS, one of the main obstacles to the development of a practical DMDS formulation for ACP management will be development of a slow-release device that maintains the chemical above a behaviorally active threshold for long periods. Ideally, a slow-release device should be developed that could achieve 150-200 days of behaviorally efficacious release. We are working with ISCA Technologies (Riverside, CA) to develop a flowable formulation of the psyllid repellent that also shows considerable promise. Our initial work with this formulation shows that it works, but also for only 3-4 weeks. Also, this formulation does not reduce psyllid populations as effectilly as currently available pesticides. Although DMDS appears to be a potential candidate repellent for ACP, other repellent compounds similar to DMDS have been recently discovered and they are being investigated further to detemine if a more potent blend can be developed. Our current on-going efforts include formulating these repellent chemicals into controlled release devices for extended release of the chemical in the field. We have also begun a corroborative project with engineers from Auburn University to develop an effective release device for DMDS and related sulfur chemicals. Our goal is to develop a product that would be effective for several months.