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	1/1/10

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

First field testing of DMDS reveals that it is an effective repellent for Asian citrus psyllid

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)

The purpose of this project has been 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. Interplanting citrus with guava, Psidium guajava L., was reported to reduce ACP populations and incidence of HLB. Therefore, we initiated a series of investigations on the response of ACP to citrus volatiles with and without guava leaf volatiles and to synthetic dimethyl disulfide (DMDS), in laboratory studies and in the field. DMDS was recently identified as a metabolite produced in large quantities by wounded guava leaves. Volatiles from guava leaves significantly inhibited attraction of ACP to normally attractive host-plant (citrus) volatiles. A similar level of inhibition was recorded when synthetic DMDS was co-released with volatiles from citrus leaves. In addition, the volatile mixture emanating from a combination of intact citrus and intact guava leaves induced a knock-down effect on adult ACP. Compounds similar to DMDS including dipropyl disulfide, ethyl-1-propyl disulfide, and diethyl disulfide did not affect the behavioral response of ACP to attractive citrus host plant volatiles in laboratory olfactometer assays. Our field experiments confirmed the results of our laboratory olfactometer assays. Deployment of synthetic DMDS from polyethylene vials (Alpha Scents) and SPLAT wax dispensers (ISCA technologies) reduced populations of ACP in an unsprayed citrus orchard 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. However, we cannot exclude the possibility that a proportion of the ACP populations in DMDS-treated plots may have been reduced due to direct intoxication. By the fourth week, there was no remaining DMDS in the dispensers, which likely explains why populations were once again equivalent in treated and control plots. 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. The polyethylene vials and SPLAT dispensers evaluated in these initial proof-of-concept investigations will likely not be economically practical for releasing DMDS for control of ACP in their current form. Both the number of dispensers required per acre (~200) as well as the amount of active ingredient required per three weeks (~3 kg) would likely be economically prohibitive for a hand applied dispenser. Furthermore, the dispensers evaluated in this study resulted in a ~2/3 decrease in field populations of ACP, which would be insufficient for effective control of this pest as a stand alone treatment. Another immediate logistical hurdle for developing DMDS into a practical psyllid management tool is the chemical's strong and unpleasant odor. This may render field application difficult and potentially limit the use of DMDS depending on fruit harvesting schedules or proximity to urban areas. Ideally, a slow-release dispenser needs be developed that could achieve 150-200 d of behaviorally efficacious release. ACP populations are much more prevalent on crop borders and thus targeted applications of DMDS to those areas may be immediately useful with a dispenser that is not yet optimized. Our current efforts are focussing on further optimizing these dispensers to increase the duration of efficacy. ISCA has recently developed four new formulations of SPLAT dispensers that we will be evaluating in the early spring which show promise. Most recently, we have identified new compounds that are ACP repellents. In general, trisulfides (dimethyl trisulfide) inhibited the response of ACP to citrus volatiles more than disulfides (dimethyl disulfide, allyl methyl disulfide, allyl disulfide). Monosulfides did not affect the behavior of ACP adults. A blend of dimethyl trisulfide (DMTS) and dimethyl disulfide (DMDS) in 1:1 ratio showed an additive effect on inhibition of the response of ACP to citrus volatiles and was more effective than DMDS alone in the lab.