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	1/15/10

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

Auburn University Developing Airflow Computer Simulation for Psyllid Repellent

TITLE and CONTACT INFORMATION

Proposal Title Engineering Evaluation of Deployment Strategies for Dimethyl Disulfide to Repel the Asian Citrus Psyllid

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Phone 334-864-6809	*Project Duration (years)* 0.75 *Year of Project* 2009
Organization Auburn University College of Engineering	*Total Direct Funds (current year)* $49,549

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

Researchers from the Auburn University College of Engineering are constructing a combined empirical and simulation based toolset to ultimately optimize the "how much" (rate of release) and "where" (physical locations within a orange grove) deployment of a citrus psyllid repellent. The current focus is on recording physical measurements of repellent diffusion into air under prescribed ambient conditions and constructing a computational fluid dynamics (CFD) model of the airborne mixing of the repellent within the flowfield generated by a citrus grove. These studies serve as an engineering requirements flow-down, providing the necessary scientific data to shape specific deployment hardware options that balance effects longevity with application cost.

Given the recent Citrus Research and Education Center (CREC) laboratory and field studies using the "Splat" (emulsified paraffin wax) approach for dimethyl disulfide (DMDS) application, DMDS is selected as the initial agent for repellent release rate studies. The PIs have traveled to CREC for first-hand discussion and observation of those studies and interfaced with ISCA Technologies, the manufacturer and supplier of "Splat". Auburn is currently setting up a laboratory facility to measure and study the release rate of DMDS as input for airflow computer simulations. Initial experimental focus is on DMDS in liquid form, coupled with an artificial membrane to provide control over the rate of diffusion into air. It should be noted that the Auburn strategy maintains a broad top-level approach, favoring no one particular deployment method and leaving options open to consider other potential repellant chemical formulations as well.

Implementation and evaluation of an initial CFD model is underway. The vegetation canopy is approximated by a porous medium that acts as a volumetric sink on airflow momentum, while insertion of repellent is accomplished by discrete point sources within the hedge row geometry of a typical mature grove. A literature survey supporting the use of CFD modeling applied to vegetation canopy airflow and mixing has provided valuable data and best practices. Of particular interest is the related problem of the effects of tree plantings in urban street canyons for the dispersion of automotive exhaust pollution. The literature reports good correlation between experimental and numerical airflow and dispersion findings and provides parametric information such as average canopy porosity for various tree species.