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*	Management	10/25/09

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

The new commercially viable modern VRT controller performs significantly better than existing systems on the market

TITLE and CONTACT INFORMATION

Proposal Title Advanced control system for variable rate application of fertilizer and pesticide to trees in the presence of greening and canker

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Phone (863) 956-1151	*Project Duration (years)* 1 *Year of Project* 1
Organization University of Florida - CREC	*Total Direct Funds (current year)* $29,846

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

The new variable rate controller is a major enhancement and upgrade of existing commercial controllers using real-time "sensor eye" actuation in the Florida citrus industry. The addition of a liquid crystal display was successfully tested in a prototype, and will eliminate the need for a separate wireless hand-held computer for changing task configurations. All 50+ prototype units are performing well in a fully deployed commercial environment and no failures have been reported in 14 months. Exceptional reliability was an important criterion when we designed and fabricated the controller's computer motherboard.

Prototype controller testing at the CREC and in commercial groves initially included both split-chain granular fertilizer spreaders and air blast sprayers, but this year we also successfully tested controller performance on a hoop sprayer. The controller performance can be seen on a short video (allow time to load): http://128.227.177.113/pa/Video.html
Hoop sprayers are ideal for profitable caretaking of young solid-set citrus plantings such as in new ACPS / OHS blocks because the agrochemical savings could be greater than 75% compared to a conventional air blast sprayer. Additionally because the application is not low- or ultralow-volume, nutrient supplements can be included in the spray as part of a comprehensive nutrition IPM against HLB or in an ACPS.

We are adapting and testing the controller for variable rate or spot spraying of weeds, which will be the fourth application in citrus production. Efficient weed sensing is crucial to the success of this application, and initial results from using a small color digital camera look promising when green color pixels are extracted to identify weed positions on the ground. Comprehensive testing is continuing this fall. The camera sensor system was successfully tested to recognize trees with special colored flags in the grove, such as for identifying trees marked as diseased. Fertilizer and spray applications to those trees could then be omitted or modified according to the management plan of the particular grove, thus increasing agrochemical use efficiency and profitability.

Two simple software programs have been developed and posted on-line to assist growers when setting up their variable rate fertilizer spreaders: http://128.227.177.113/pa/Software.html
The sensor angle program will calculate the best angle to use when adjusting the sensor eyes so that they detect the required canopy size of the trees. The gate height calculator program is useful for obtaining the best gate height of a variable rate fertilizer spreader when used at a given ground speed, fertilizer rate and density, and row spacing. Inappropriate gate heights will decrease performance by causing controller errors during operation which wastes time or causes inaccurate application.