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	7/29/10

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

Evaluation of chemicals and their risk of resistance for control citrus canker in grapefruit and Hamlin is continues in 2010

TITLE and CONTACT INFORMATION

Proposal Title Canker management in Florida citrus groves: chemical control on highly susceptible grapefruit and early orange varieties

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Phone 863-956-1151	*Project Duration (years)* 3 *Year of Project* 2
Organization UF, Citrus Research and Education Center	*Total Direct Funds (current year)* $123,227

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

Under Objective 1 (define rates and formulations of copper sprays for more effective control) one trial with Red grapefruit has been set up in Ft. Pierce, FL and one trial with Hamlin orange in Hardee County, each with 14 treatments of formulations, rates and combinations with other chemical treatments of interest. This season, trials have low to moderate disease epidemics as a result of a periodically wet spring, moderately wet summer and, so far, an absence of tropical storm events. Under Objective 2 (establish the period of fruit susceptibility for grapefruit and oranges), 2008 and 2009 trials established that season long sprays are necessary for control on fresh grapefruit, and sprays through mid-July are required to prevent fruit drop of Hamlin. These results are being summarized for publication in 2010. Under Objective 3 (evaluate the use of streptomycin [Firewall]) two trials, one non-bearing and one bearing, in grapefruit have been initiated to evaluate streptomycin for canker control. The process of preparing the package for Firewall to obtain an EPA Section 18 Emergency Exemption has been initiated based on data from Florida trials in 2007-2009. Under Objective 4 (To define risk for development of bacterial resistance to copper [Cu] and streptomycin [Sm] in FL citrus groves) a number of factors favorable for the development of copper resistance in Xcc were identified, but further investigation is necessary to fully assess the risk for streptomycin resistance. Although no CuR strains of Xcc were detected in Florida , many strains of Xanthomonas alfalfae subsp. citrumelonis (Xac), the casual agent of citrus bacterial spot in Florida, were resistant to copper. This is the first time copper resistance has been reported in Xac and since Xac and Xcc share the same host and thrive under similar environmental conditions, the concern is that copper resistance may be horizontally transferred from Xac to Xcc. This concern is supported by experiments that showed that copper resistance genes can be conjugated among different species of Xanthomonas including Xcc and Xac. Moreover, although no CuR or SmR strain of Xcc was isolated from citrus trees repeatedly sprayed with copper or streptomycin for 3 consecutive seasons, the frequent sprays caused an increase of the population of endemic bacteria with resistance to these chemicals. The intensive use of these bactericides may consequently increase the risks for acquisition by Xcc of copper or streptomycin resistance genes from epiphytic bacteria. This possibility is confirmed by the presence of Xcc copper resistance gene homologues in bacteria from the citrus tree canopy which are able to confer resistance to copper sensitive strains of Xanthomonas. Cloning and characterization of copper resistance genes in Xcc revealed copL, copA and copB as the major determinants of resistance. Homologues of these genes with identity higher than 90% occurred in CuR strains of several other species of Xanthomonas and other bacterial species, indicating that these copper resistance determinants are widespread and may be transferable into Xcc populations under repeated use of copper for citrus canker management. Under Objective 5 (rapid transfer improved canker management technology to the Florida citrus industry), the 2010-11 canker management recommendations have been published in the Florida Citrus Pest Management Guide and Citrus Industry Magazine. Oral presentations have been delivered to the Florida Citrus Production Managers and at county extension meetings.