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*	Canker Pathology	9/30/09

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

Hypersensitve-like response of kumquat (Fortunella spp.) to Xanthomonas citri sbsp. citri

TITLE and CONTACT INFORMATION

Proposal Title Characterization of canker resistance in citrus plants created by 'Somatic Cybridization' without citrus transformation

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Organization UF, Citrus Research and Education Center	*Total Direct Funds (current year)* $122,717

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

Under Objective 1 (Characterization of hypersensitive resistance in kumquat and the cybrid of rough lemon 8166 with maternal 'Meiwa' kumquat.), a comparative study of grapefruit (C. paradisi) cv. Duncan, a very susceptible host, and two resistant cultivars of kumquat (Fortunella spp.), 'Meiwa' and 'Nagami', evaluated the mechanisms involved in the resistance of kumquat to the citrus canker. Xcc inoculum densities of 104 to 108 cfu/ml were infiltrated into immature leaves in the greenhouse (in planta) and into detached leaves incubated on water agar plates (in vitro). At higher bacterial inoculum density, kumquat cultivars developed a hypersensitive (HR)-like reaction in the infiltrated area, within a period of 72 h in vitro, and 96-168 h in planta. No symptoms or a few small necrotic spots developed in kumquats at the lower inoculum density. Susceptible grapefruit infiltrated with the same inoculum densities produced no visible tissue alterations at 72 h after inoculation and required 120 h or longer to develop water-soaking, hypertrophy and hyperplasia typical of canker lesions in compatible hosts. Phenotype of the lesions, bacterial population growth, anatomical changes in the infiltrated tissue and early expression of genes related to programmed cell death are indicative of HR that reduces growth of Xcc in the inoculation site and the further development of disease. Microarray produced differential expression of genes in grapefruit and Nagami kumquat inoculated with Xcc. In comparison kumquat expression changes were more marked than those of grapefruit. 172 kumquat and 140 grapefruit ESTs were sequenced and 52.5% of the sequences in the EST library were up regulated at 4 hrs in KN that shared significant sequence similarity with putative senescent related protein, DNA damage related kinases (CHKI), chloroplast binding proteins, chlorophyll carrying proteins, lipoxygenases, multiple complex forming proteins (SKP1), membrane associated peptidases, detoxification related enzymes (such as glutathione S-transferase, ribonucleases, and metallothionein-like protein), transposase, ethylene synthesis and chlorophyll related genes. In DG, sequence identities included major facilitator superfamily (MFS-1) phosphorylases and transferase, lectin related protein precursors, aspartyl tRNA synthethase, phosphatase 2A inhibitor, NADH dehydrogenase, catalase, chloroplast heat shock proteins. Genes associated with hypersensitive responses found in the citrus EST database, like lipoxygenase, superoxide dismutase (SPD), and glutatione peroxidase (GLP), were expressed early in kumquats, but not in grapefruit. A study is underway to characterize the responses in the somatic cybrid of rough lemon 8166 with maternal 'Meiwa' kumquat.