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*	Genetics	8/4/09

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

New sweet oranges released by UF, and disease resistance vigorously pursued

TITLE and CONTACT INFORMATION

Proposal Title Surviving HLB and canker: genetic strategies for improved scion and rootstock varieties

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Phone 8639561151	*Project Duration (years)* 3 *Year of Project* 1
Organization UF-CREC	*Total Direct Funds (current year)* 840,045.60

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

Several new sweet oranges have been approved for release by UF-IFAS; these include several from Brazil believed to have canker tolerance, as well as new Valencia types with earlier and later maturity. The former will be generally available, but the latter will be patented and available through license agreements; together, they give industry new options to produce distinctive, high-quality juice. Canker tolerance of the Brazilian selections is currently being assessed under controlled greenhouse conditions, and preliminary results indicate that some of them are, in fact, significantly more canker-tolerant than ordinary sweet oranges. Additional data was collected from other advanced sweet orange selections in replicated field trials, and the best performing of these are being cleaned of pathogens and indexed, to provide certified budwood sources following approval for their release. These include a range of Valencia-types with improved color, yield, and juice quality attributes, as well as some very productive, seedless Midsweet clones; fruit and juice of these selections have been included in several commercial taste panels and assessments, and have been shown to be superior in their quality attributes. Hybrid plants have been produced for rootstock improvement from the previous season, and new crosses were made this spring 2009, that utilized germplasm with potential canker and HLB resistance or tolerance. Previous work to develop rootstocks tolerant of or resistant to other maladies (such as CTV, blight, Phytophthora/Diaprepes, calcareous soils, etc.) continues, as we collected data from replicated trials and other plantings. New rootstock trials were planned, with plants being propagated or already planted, to test the suitability of experimental rootstocks for advanced production technologies; tree size control and broad-spectrum disease resistance and tolerance of adverse environmental conditions are critical to these efforts. Some trials include the recently released UF cultivar Sugar Belle (Tm), but most are with sweet orange. New transgenes have been developed or acquired, and experiments have been established to introduce them into HLB and canker susceptible citrus. Previously developed transgenic plants have been inoculated with HLB, and those thus far showing no symptoms and negative qPCR tests (after more than 18 months) are being propagated for further testing. Several newly developed transgenic lines are being propagated for canker inoculations and evaluation, as well. New pummelo-grapefruit hybrids, some of which were previously found to be significantly more tolerant of canker than grapefruit, are being propagated for canker challenges. Several of these hybrids also have been found to contain little or no furanocoumarin compounds, suggesting that they might not result in harmful grapefruit-drug interactions; further, some of them produce seedless fruit. A series of experiments have been established to provide materials needed for research aimed at further characterization of gene expression differences resulting when susceptible citrus are challenged with HLB. RNA and DNA samples have been prepared at regular intervals to follow gene expression changes over time. These experiments may provide genetic targets to induce resistance to HLB, or at least to develop markers for early detection of disease. Previous research revealed several target genes in kumquat associated with its canker resistance (hypersensitivity). Microarray experiments were analyzed and have revealed more information on the defense machinery within kumquat cells. Several of the target genes have been fully cloned for further experiments including genetic transformation, following a more careful study of their gene expression patterns. Publicly available citrus genome resources are being mined for genes that may be used to hasten development of citrus plants resistant to HLB, canker, and other production-limiting diseases. Additional molecular markers have been developed and mapped in collaboration with colleagues in Spain and France, in support of the International Citrus Genome Consortium sequencing project. We are well on our way to meeting project objectives and goals.