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)

We received an APHIS permit to plant genetically modified citrus trees in the field. More than 900 transgenic citrus trees, containing 15 different constructs with potential to provide resistance to HLB and/or canker, have been propagated for field planting at 3 locations where HLB/canker pressure is severe. Planting will begin in a few weeks. Several new genetic constructs have been prepared for new transformation experiments, including lima b, a more "consumer-friendly" sister to the lima a that has shown some promise already against HLB. With tests completed proving function two new phloem limited promoters, there are 4 currently available that could be combined with AMPs to target HLB in phloem tissue. Propagation and testing of previously produced transgenic plants continues, with several showing either delayed, reduced or no symptoms of HLB following inoculation. Transgenic plants have also been produced containing insecticidal genes and these are being prepared for tests against aphids and psyllids. Transgenic and citrus hybrid plants have been tested by canker inoculations, and those showing few or no symptoms are being retested. 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. Studies into the metabolism of sugars and starch in HLB-infected plants have been initiated. Previous research 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. New DNA samples from a genetic population have been received for genotyping to contribute to the International Citrus Genome Consortium sequencing project in collaboration with colleagues in Spain and France. Hybrid plants have been produced for rootstock improvement from the previous season, and new crosses made this spring 2009 have been harvested and planted. 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, propagated, and 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. A new greenhouse screen for tolerance to Phytophthora/soil adaptation using tetraploid rootstock candidates has been established. Seeds have been harvested and planted from several dozen newly available rootstock candidates with tree size control and productivity potential, for future rootstock trials particularly aimed at new production technologies and orchard design. 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. New grapefruit-type candidates have been found this season and preliminary selections have been made based on fruit quality and attributes, and several hundred more such hybrids have been produced through crosses made in the spring and subsequent seed collection or embryo rescue, using newly available breeding parents. We are well on our way to meeting project objectives and goals.