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	5/21/10

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

Developing New Rootstocks and Scions Resistant to HLB

TITLE and CONTACT INFORMATION

Proposal Title Development of Promising New Rootstocks and Scions for Florida Citrus

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Phone 772-462-5920	*Project Duration (years)* 12 *Year of Project* 6
Organization USDA, ARS	*Total Direct Funds (current year)* 200,953.00

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

Seed from new crosses to develop rootstocks and scions were planted in the greenhouse. New crosses were completed with more than forty different genetic combinations. Fruit quality, yield, and tree size data were collected from 16 rootstock field trials. Propagations from supersour rootstock hybrids were prepared for budding to produce trees for disease testing and field trials. Rootstock liners were budded with scions to prepare trees for trials. Budded greenhouse trees for field trials were grown to planting size. Two new rootstock field trials were planted into the field. Three new field trials were planted at the Whitmore Farm in Lake County to study inheritance of fruit quality factors in sweet orange-type material from populations of hybrids between high quality pummelo and mandarin parents. One of these was planted on trellis to also examine the effect of tree manipulations on the length of time for transition from juvenility to maturity. Studies continue to assess citrus germplasm tolerance to Huanglongbing (HLB) and Phytophthora/Diaprepes in the greenhouse and under field conditions. Greenhouse trees inoculated with Citrus tristeza virus (CTV) were tested for virus titer in preparation for CTV-induced decline evaluation of supersour rootstocks. More than fifty citrus genotypes and citrus relatives, as well as thousands of progeny from crosses, have been challenged by natural inoculation with Liberibacter in the field, and data are being collected on HLB symptoms and Liberibacter titer by PCR. Detailed information is being collected on HLB tolerance and tree performance in four rootstock field trials. All citrus germplasm and cultivars become infected with Liberibacter when inoculated, but different germplasm responds to HLB infection at different rates and with different symptom severity. Some trifoliate hybrid rootstocks, including US-897, exhibit tolerance to HLB as seedling trees. Some hybrid selections resembling mandarin, grapefruit, and sweet orange also appear to exhibit some tolerance to HLB. Greenhouse and field studies are continuing to determine the most efficient methods to evaluate new citrus germplasm from crosses and transformation for resistance or tolerance to HLB. In coordinated research between this grant and the FCATP transgenic citrus grant to USDA, selected anti-microbial, insect resistance, and other genes were inserted into outstanding rootstock and scion cultivars to develop new cultivars with resistance to HLB and Citrus Bacterial Canker. Transformed trees containing seven different promoters and three new anti-bacterial genes were prepared for greenhouse testing with HLB. Genetic transformation was used to introduce the citrus FT gene for induction of early flowering into citrus scion and rootstock germplasm. Manipulation of this gene with inducible promoters will drastically accelerate the pace of cultivar development (shortening the generation time from 6-15 years to 1 year) and can also be used to increase early cropping of commercial trees. To date, the early flowering gene has been introduced into Hamlin, Ray Ruby, US-812, and US-942. Four new hybrid rootstocks, US-1235, US-1239, US-1225, and US-1241, were identified as especially promising for expanded field trials in the coming year. Promising new scion cultivars were released, including the seedless mandarin cultivar 'Early Pride'. The new hybrid rootstock US-942 is being released for commercial use because of outstanding performance in many trials. Research is continuing to use HLB responsive genes and promoters identified in the gene expression study published last year for inducing or engineering resistance in citrus. New studies were initiated to examine gene expression and metabolic changes associated with HLB disease development and apparent resistance to Liberibacter in particular selections. This will provide additional insights about how to engineer HLB resistant cultivars. A study demonstrating no evidence for seed transmission of HLB was published in HortScience. A field day was held at the Ft. Pierce USDA farm to highlight progress in development of new cultivars, and performance information from several rootstock trials was presented.