CITRUS ADVANCED TECHNOLOGY PROGRAM

QUARTERLY & FINAL REPORTS: Control of Citrus Greening, Canker & Emerging Diseases of Citrus

▶ INSTRUCTIONS

○ *Quarterly Report* ◉ *Annual Report* ○ *Final*

Required: What is the "headline" for this report (e.g. a one-sentence "newspaper headline" describing what you accomplished)

Speeding up the delivery of transgenic solutions to HLB

Proposal Title

Accelerating the Commercialization of Transformed Juvenile Citrus

Today's Date	Sponsoring Organization (drop-down)	Category (drop down)
3/31/11	Citrus Research and Development Foundation	Transgenic/Metagenomic Mediation of Resistance

REPORT UPDATE (500 words; summarize your accomplishments)

Continued efforts to improve transformation efficiency:
• Experiments to test or validate the enhancing effects of various chemicals for improvement of transformation efficiency in juvenile tissues continued. Results showed that the use of the antioxidant lipoic acid significantly improves transformation efficiency in Mexican lime, and a manuscript reporting this was accepted with revision for publication in PCTOC. Recovered transgenic Mexican lime trees 1.5 years after removal from tissue culture were girdled, which induced flowering about 4 months later; with complete flowering and fruit set in less than two years. Experiments to test this with commercial sweet oranges are underway. We continued with experiments to test the effects of various antibiotics / metabolites / herbicide on the transformation efficiency, including: kanamycin, hygromycin, mannose and phosphinothricin.

Horticultural manipulations to reduce juvenility in commercial citrus:
• Working with Mr. Orie Lee and Faryna Harvesting, yield and fruit quality data was collected from the St. Helena project. Approximately 10 acres of trees planted 3.0 years ago include a juvenile Valencia budline (Valquarius) and precocious Vernia on more than 70 rootstocks. The best rootstocks identified to show positive affects on rapid tree growth with precocious bearing and good early fruit quality (higher lb. solids) were somatic hybrids Changsha mandarin+trifoliate orange 50-7, white grapefruit+trifoliate orange 50-7, and sour orange+Carrizo, and tetrazygs White#4 (Nova+HBPummelo x Succari sweet orange+Argentine trifoliate orange), Orange#13, Orange#14,Orange#18 and Orange#19 (Orange series all Nova+HBPummelo x Cleo+Argentine trifoliate orange). Trees on these rootstocks averaged more than a half-box of fruit per tree with juice brix values great than 11. These rootstocks will now be tested to determine if they can shorten juvenility in transgenic plants produced from juvenile explant.

Transformation of precocious but commercially important sweet orange clones:
• Transgenic plants of precocious OLL and Vernia sweet oranges were successfully micrografted to Carrizo citrange or experimental Tetrazyg rootstocks and are growing well in the greenhouse. These will now be clonally propagated onto the rootstocks mentioned above for further study of early flowering and transgene expression. Horticultural manipulations on these plants will include the RES (Rapid Evaluation System) growth method plus girdling.

Transformation with early-flowering genes:
•Citrus has at least 3 FT genes. Cloning and characterization of all 3 (genomic clones) has been completed. We have put them into transformation vectors with a constitutive promoter and performed transformation experiments with Carrizo and Duncan. Although only a few transgenic plants were recovered, we know the constructs work because we had previously tested them in tobacco, where we recovered early flowering phenotypes, as well as some other phenotypic alterations. Our current theory is that expression with the 35S promoter is too strong in citrus (in some cases we got flowering directly on the initial explant!). We are currently testing a poplar FT with a weaker inducible promoter (a heat shock promoter shown to be inducible in Oregon); which will hopefully solve the promoter problem.

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Organization Citrus REC

Contract Number 00077976

Project Duration (years) 3 *Year of Project* 2

Total Funds (current year) $178,000.00

SUBMIT REPORT

CITRUS RESEARCH AND DEVELOPMENT FOUNDATION, INC.