CITRUS ADVANCED TECHNOLOGY PROGRAM

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

SELECT PERIOD June 2015

Quarterly Report Final

Proposal Title

Development of Promising Supersour and Other Rootstocks Resistant to HLB

Today's Date	Sponsoring Organization (drop-down)	Category (drop down)
7/15/15	Citrus Research and Development Foundation	Conventional Citrus Breeding

REPORT UPDATE (500 words-It is not necessary in this public report to disclose your institution's proprietary information or intellectual property.)

The HLB-tolerant rootstocks US-1279, US-1281, US-1282, US-1283, and US-1284 were released by USDA in 2014, and are available from FDACS-DPI as clean sources for vegetative propagation and establishment of seed trees. Plant material was also provided to commercial nurseries for micropropagation. Fruit yield of Hamlin trees infected by HLB on these rootstocks was 2-4 times the yield of trees on Swingle, and the trees on these rootstocks also had fruit that is larger in size and higher in sugar content. The previously released USDA rootstocks, US-942, US-802, and US-897 were demonstrated in greenhouse testing and field trials to exhibit better tolerance to HLB than many of rootstocks commonly used in Florida. The promising new USDA rootstocks, along with other new HLB-tolerant rootstocks from USDA and Univ. of Florida will be used in a series of grower-cooperator field trials with funding provided by the HLB-MAC program in 2016-17. An updated rootstock selection guide including information about these and other new rootstocks was developed cooperatively with University of Florida and released in 2015 as an extension publication, "Florida Citrus Rootstock Selection Guide, 3rd Edition".

Yield, fruit quality, tree health, and other performance information was collected from 10-20 established rootstock field trials each year, and used to assess new rootstock performance at different sites. Thousands of budded nursery trees were prepared with Supersour and other new rootstocks, and numerous new field trials were planted in 2013-2015. About fifteen thousand new propagations of Supersour and other rootstocks were prepared for greenhouse testing for disease tolerance and budding for additional field trials in 2016. Greenhouse and field studies were used to evaluate the phytophthora tolerance of 70 new Supersour and other rootstocks. Greenhouse tests were used to assess Supersour tolerance of CTV. Trees were planted into the field to establish seed sources for the most promising Supersour selections.

Studies of defense gene and metabolomic profiles of hybrid rootstocks that are highly tolerant to HLB were studied, so as to improve our ability to create and select conventional hybrid and transgenic rootstocks that possess a high level of tolerance. Additional studies were conducted on defense-related gene expression and small RNAs associated with HLB infection, in collaboration with University of Maryland and University of California research groups. Several research studies were published to document the new important information. New grant proposals were submitted to NIFA-SCRI and other funding agencies to follow up on new research opportunities in these areas.

Thousands of new transgenic rootstocks were produced, including the novel genes for antimicrobial peptides and constructs that would optimize expression of natural citrus defense genes. Optimizing of citrus defense genes was directed in significant part by results from other research under this grant to identify defense gene expression and metabolic profiles associated with tolerance to HLB. Fifteen transgenic rootstock selections showing increased resistance to HLB have been identified from preliminary test groups with transgenes, and trees are being propagated for additional testing. Several hundred additional transgenic citrus have been produced and are awaiting screening with HLB, including transgenics with optimized expression of the citrus defense genes CtSID2, CtSFD1, CtPAD3, CtCDR1, CtMPK4, CtTGA7, CtDIR1, CtERF1, CtFAD7, CtFMO1, CtAZL1, CtRDR1, CtRAP4, CtCSD1, CtNHL3, CtNHO1, and CtNHL25. Work is continuing under the new CRDF-funded screening project to test these transgenic citrus for tolerance to HLB.

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