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*	Other	6/18/10

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

TITLE and CONTACT INFORMATION

Proposal Title Combating symptom development in fruit from Huanglongbing-infected citrus trees: A senory, metabolite and physiological approach

Principal Investigator Burns, JK	*PI Last Name* Burns
Email jkbu@ufl.edu	*FDACS Contract Number* 014661
Phone (863) 956-1151	*Project Duration (years)* 2 *Year of Project* 1
Organization UF/IFAS CREC	*Total Direct Funds (current year)* $179,153

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

This is the report for the last quarter of year 1. Sensory impacts and flavor and aroma changes in HLB fruit: Critical juice aroma volatiles were lower in symptomatic (SYM) compared to healthy (H) juices. Static headspace solid phase microextraction volatile concentration and GC-MS analyses of juice from H, asymptomatic (ASYM) and SYM juices were carried out in triplicate for both pasteurized and non-pasteurized Hamlin orange juices. Of the 67 volatiles measured and identified, 20 volatiles from the SYM juices were 25-400% lower than H. Some of these were known aroma impact volatiles such as: linalool, ethyl butanoate, ethyl hexanoate, and E2-hexenal. In contrast, only 15 volatiles were lower in ASYM juices compared to H. Pasteurization decreased total juice volatiles more than 80% on average for all sample types. Two fruit samples from SYM, ASYM and H were used for studies described below. After squeezing, juice was strained and half of each sample was pasteurized, resulting in six test groups for each sampling date. Juice analysis included % oil, Brix, acid, color and ratio determination. No significant differences were seen between pasteurized and fresh juice. Juice from SYM fruit had lower ratios than ASYM or H fruit due to consistently higher acid levels. Consumer sensory analysis was conducted on juice. No clear preferences for pasteurized vs non-pasteurized (juice), but significant differences in preference, sweetness orange intensity were noted among the juice samples from SYM, ASYM and H fruit. Preference was related to brix/acid ratio levels, with higher ratios associated with greater preference. Physiological changes in HLB fruit: An iodine-starch test on fruit flavedo revealed high starch content in healthy (HFF) but not in symptomatic mature green and mature flavedo (SYMFF). Flavedo starch content from zinc deficient and water stressed trees was similar to HFF. Quantification showed that starch was 70 and 90 % reduced in SYMFF compared with HFF in mature green and full mature fruit, respectively. Starch accumulation in ASYMFF was less than HFF. Microscopic observation confirmed the above. Four starch biosynthetic genes were down regulated, and three of four starch degradation genes were up regulated in ASYMFF and SYMFF compared with HFF. Mature fruit drop in SYM trees reached 18% after monitoring trees 20 days, whereas no drop was evident in ASYM or H. Fruit detachment force significantly decreased in SYM and abscission marker genes increased compared with H. Although whole SYM fruit produced less ethylene, 5- and 2-fold more ethylene was produced in the stem-end area of SYM and ASYM, respectively, compared with H. At this time of year (April-June), there was no significant difference in % leaf drop or leaf detachment force in SYM and ASYM leaves after 20 days compared with H leaves. Expression of abscission marker genes in SYM and ASYM leaf abscission zones slightly increased compared with H, indicating potential for leaf drop to occur. Yield, peel color, fruit size and seed abortion in HLB fruit: Ten SYM trees and 10 H trees were harvested from two commercial citrus groves (1 Hamlin, 1 Valencia) to characterize and quantify yield changes (pieces of fruit, fresh weight and fruit size) due to HLB infection. SYM trees had significantly smaller average fruit size and fewer fruit per tree than H trees. Further analysis ongoing. Extension and education: 1) Aroma Differences between HLB/greening Symptomatic and Control "Valencia" Orange Juice. Dagulo, Danyluk, Goodrich, Sims, Valim, Spann, Rouseff; Florida State Horticultural Society, June 8, 2010. 2) Dagulo, Danyluk, Spann, Valima, Goodrich-Schneider, Sims, Rouseff. 2010. Chemical characterization of orange juice from trees infected with citrus greening (Huanglongbing). J. Food Sci. 75: C199-C207.