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*	Management	10/17/09

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

Consumer juice ratings, flavor and aroma changes, physiological impacts in HLB-affected fruit

TITLE and CONTACT INFORMATION

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

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Organization UF/IFAS Citrus REC	*Total Direct Funds (current year)* $179,153

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

Sensory impacts in unpasteurized and pasteurized juice from HLB-affected fruit: Valencia fruit samples from April and May 2009 were evaluated in a consumer sensory panel. Objectives were to assess consumer acceptability of symptomatic, asymptomatic, and healthy fruit. Three treatment groups for each harvest sample date were hand-extracted to yield 6 total juice treatments, which were further split into thermal treatment types. Consumer sensory testing indicated that symptomatic samples produced juice that was less accepted, less sweet and less flavorful that either control or asymptomatic products. Pasteurization does not appear to affect acceptance in any sample except for the symptomatic product from the April Valencia harvest date, where pasteurization impacted the overall acceptance, sweetness and flavor. Flavor and aroma changes in HLB fruit: Analysis of juice samples from the previous season continued. Esters responsible for the fruity, sweet aroma in OJ were significantly lower in symptomatic juice. Esters such as ethyl butyrate and ethyl-2-methyl butyrate were 20-50% lower in symptomatic compared to control juice. Important aldehydes such as hexanal were 50% lower in symptomatic fruit. Alcohols were generally higher in symptomatic fruit. Linalool, responsible for the fruity, citrus aroma in OJ, was 45% higher in symptomatic fruit. Although there was little difference in flavor volatiles between juice from healthy or asymptomatic fruit, aroma volatiles in juice from symptomatic fruit were out of balance compared to that of healthy juice. Phytohormone changes in HLB fruit: Ethylene production, ACC content and expression of ethylene biosynthesis genes were analyzed in isolated juice vesicle tissue from early season Valencia fruit. In contrast lower biosynthesis-related gene expression and lower production in symptomatic whole fruit, ethylene production increased in juice vesicles when compared with asymptomatic or healthy ones. To examine the spatial role of phytohormones in HLB disease symptom development, IAA and ABA contents were evaluated in flavedo removed from the stem-end, mid-section, and stylar-end of healthy, asymptomatic, and symptomatic fruit. IAA content was highest in the mid-section, lower in the stylar end, and lowest in the stem-end in all fruit. However, IAA was 2-fold higher in mid-section but 2-fold lower in the stylar-end of symptomatic fruit. Although little difference in ABA content was measured in whole fruit, spatial analysis indicated that flavedo from symptomatic fruit had 3-fold higher ABA content in the mid-section and 3-fold lower content in the stylar-end. Results indicate increased stress in HLB-affected fruit and suggest a role for temporal and spatial redistribution of ethylene production, IAA and ABA contents in premature fruit abscission, fruit shape and seed abortion. Yield, peel color, fruit size and seed abortion in HLB fruit: Accumulation of chlorophyll a and b and total chlorophyll were 3-fold higher, while b-carotenoid content was 2-fold lower in flavedo of symptomatic fruit compared with healthy tissue. Pigment accumulation in asymptomatic flavedo was less compared with symptomatic flavedo but higher when compared with healthy fruit. Starch content was reduced in symptomatic and asymptomatic flavedo compared with healthy tissue. In symptomatic and asymptomatic flavedo, iodine-stained starch grains were sparse or absent when viewed with light microscopy, however, starch grains were abundant throughout the flavedo of healthy fruit. Iodine staining confirmed light microscopy observations. The use of iodine staining as a tool for early detection of HLB-affected in asymptomatic fruit in the field will be explored this coming season. Extension and education: Four members of our group made oral presentations at the International Citrus and Beverage Conference. A tabletop extension display was also prepared and presented, and written materials distributed. Similar displays are planned at upcoming industry meetings.