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	1/15/10

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

TITLE and CONTACT INFORMATION

Proposal Title Effects of Huanglongbing (HLB) disease on quality of orange juice and identification of HLB-induced chemical signatures in fruit juice.

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Organization USDA-ARS Citrus & Subtrop. Prod. Lab	*Total Direct Funds (current year)* $147,567

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

For the first year of research on healthy and HLB samples from one Hamlin and two Valencia harvests (15+ trees/sample), reports were given on sugar, acid, brix, titratable acidity, ratio and oil content, as well as sensory perception of flavor. The results showed that there were minimal differences between juice from healthy and HLB trees for asymptomatic fruit, but that there were differences for symptomatic fruit, both chemically and in terms of sensory perception. One exception, chemically, that was not presented in previous reports, is that limonin and nomilin were higher in asymptmatic and especially symptomatic fruit compared to controls for January Hamlin and April Valencia, but not June Valencia, reflecting sensory results. Levels were below published taste thresholds for these compounds, however.

Now we present Russ Rouseff's data for aroma, which includes both gas-chromatography-olfactometry (GCO) and GC-mass spectroscopy (GC-MS) analyses. For GCO analysis, each sample evaluated was analyzed twice using two trained olfactory assessors. Only those compounds which were described similarly at a similar retention time and observed by half the panel considered as aroma active components. Both pasteurized and unpasteurized samples for healthy and symptomatic HLB juice were analyzed.

Forty-six aroma components were observed in the set of juices. Total aroma intensity from the juices were summed and averaged. Early season HLB symptomatic fruit had less overall aroma intensity than control (healthy). However, in more mature fruit there is little difference in overall intensity. On average, pasteurization increased total GCO aroma intensity.

The samples were analyzed by GC-MS, primarily to identify and confirm the GCO data. Forty-two MS analyses on three sets of juice from the 2008-2009 season were analyzed. One set was Hamlin and two sets were Valencia. Within each set there were two reps of control (healthy), symptomatic and asymptomatic juices. Each set also contained paired pasteurized and unpasteurized juices of each juice type.

In examining the GCO data set, it was observed that the vast majority of aroma active volatiles were very similar between HLB symptomatic and control juices. However, a few volatiles were found either exclusively or at higher aroma intensity in certain sample types. In the case of Valencia juices, 2-methylbutanol (minty, green) and decanal (citrus, fatty) were found primarily in HLB pasteurized juices. ß-myrcene (geranium, earthy, grass) and octen-3-one, 1 (mushroom, metallic) were identified in both HLB and control unpasteurized juices, but with a higher intensities in HLB juice. An unknown minty, ocimene (tropical); 1-decanol (spicy, cilantro), farnesyl acetate (perfume); p-cymene (citrus, green) were observed only in unpasteurized control juice. Volatiles such as methional (cooked grain); dodecanal (citrus, soapy, green) and cadinene (minty, burned) were found almost exclusively in pasteurized control juice.

Early season HLB symptomatic fruit had less overall aroma intensity than control (healthy). However, in more mature fruit there is little difference in overall intensity. On average, pasteurization increased total GCO aroma intensity.

Since the late season Hamlin harvest was missed in 2009, samples for Hamlin were harvested last week. Analyses on these samples will be added to the final quarter first year report, but the limonin and nomilin analyses are done and show higher levels in HLB juice, similar to the 2009 Hamlins. The second year of research (already underway) will include the establishment of thresholds for off-flavored symptomatic HLB juice in normal juice and of identified off flavored compounds in normal juice. Also studies are underway to compare HLB juice from trees under normal cultivation and spray regimes to those undergoing nutritional and salicylic acid sprays as well as healthy trees for chemical and sensory analyses.