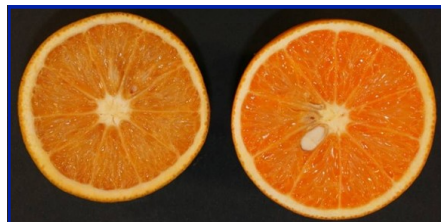


INTERNAL FRUIT APPEARANCE

- Symptomatic fruit may have aborted, dark-colored seeds, and the central core may be curved. The juice vesicle color may lighten, moving from the peel to the middle of the fruit.
- Additionally, crystals (believed to be hesperidin) have been observed on the segment membranes and the albedo may take on a bluish tinge.

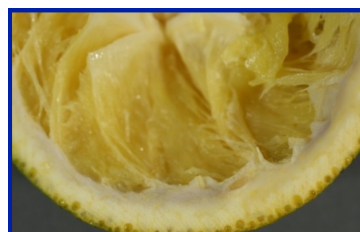


Loss of juice vesicle color

Misshapen (lopsided) fruit showing curved core (right)



Dark aborted seeds (below)



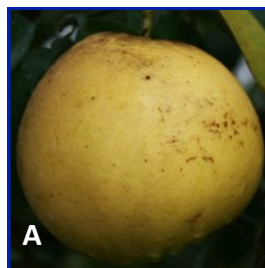
Blue albedo



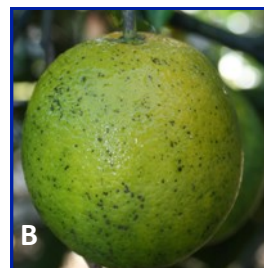
Hesperidin crystals

EXTERNAL FRUIT APPEARANCE

- Symptomatic fruit appear lopsided (A), often oblong (B), with a tendency to be smaller than normal (C), and frequently with an inverted color change (green shoulders, orange blossom end). Additionally, fruit often have a yellow stain below the calyx (point of stem attachment, D) when compared to healthy fruit (E).



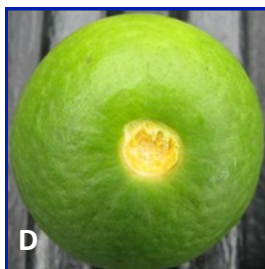
A



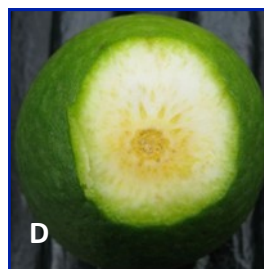
B



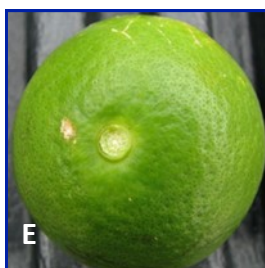
C



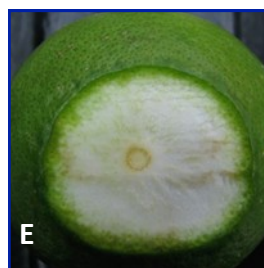
D



D



E



E

FRUIT SIZE and YIELD

- HLB-infected trees have a significantly greater portion of fruit in smaller size categories compared to healthy trees — over 95% of symptomatic fruit are < 2.25" in diameter.
- Most HLB-symptomatic fruit could be eliminated by removing fruit that is < 2.25" in diameter.
- Total juice volume produced will be less from HLB-positive trees due to smaller fruit size.
- HLB-infected trees appear to have good yields at least one year after known infection.
- Yield does not appear to be consistently reduced until > 25% of tree canopy is symptomatic.
- Treatments to improve tree health may not improve fruit size, but appear to slow within-tree disease spread and maintain total yield.

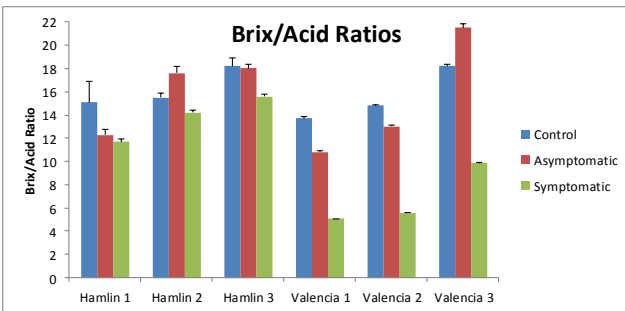


Range of fruit sizes from HLB-infected (above) and healthy trees (below). Fruit sizes are (left to right): < 2.25 in, 2.25–2.5 in, 2.5–2.75 in.



FRUIT QUALITY

- The ratio of sugars to acid (Brix/acid ratio) is used as a maturity and quality indicator. Three types of fruit were compared:
 1. Control fruit that was harvested from a non-infected tree
 2. Asymptomatic fruit that did not show physical symptoms of HLB, but came from an HLB-infected tree
 3. Symptomatic fruit that did show physical symptoms of HLB and came from an HLB-infected tree
- Brix/acid ratios were as much as 13–24% lower and acid levels were as much as 18% higher in symptomatic juices compared to control.
- Juice from symptomatic fruit was less sweet and more tart/sour than that from control fruit. Symptomatic juice appears to be from less mature fruit, even though the juices are from fruit of the same age.
- Potential immature flavors in HLB fruit make removal desirable.
- Only symptomatic fruit from HLB-infected trees show quality changes (rendering it similar to immature fruit).



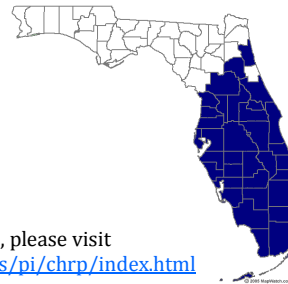
1. This document is FSHN11-08/FS169, one of a series of the Department of Food Science and Human Nutrition, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. First printing: January 2011. Digital edition issued March 2011.
 2. Michelle Danyluk, assistant professor, Department of Food Science and Human Nutrition; Timothy M. Spann, assistant professor, Horticultural Sciences Department; Russell Rouseff, professor, Department of Food Science and Human Nutrition; all of UF/IFAS Citrus REC, Lake Alfred, FL; Renée M. Goodrich-Schneider, associate professor, and Charlie Sims, professor and interim chair, both of the Department of Food Science and Human Nutrition; Institute of Food and Agricultural Sciences; University of Florida; Gainesville, FL 32611.

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HUANGLONGBING HISTORY

- Huanglongbing is a plant disease caused by *Candidatus Liberibacter asiaticus*, a phloem-limited bacterium affecting all citrus cultivars.
- In 1995, the official name for citrus greening became Huanglongbing (HLB).
- The vector, Asian citrus psyllid, was first found in Florida in 1998.
- HLB was first detected in south Florida in August 2005.
- As of October 2006, HLB-infected trees had been found in twelve counties.
- Thirty-two counties had confirmed HLB in their area by the end of 2008.
- By February 2010, thirty-four counties (dark blue on map), including all commercial citrus producing counties, were confirmed positive with at least one HLB-infected tree.
- Symptoms can be found year-round, but are more prominent September through March.



For a detailed map, please visit <http://www.doacs.state.fl.us/pi/chrp/index.html>

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HUANGLONGBING:

A serious threat to the Florida Citrus Industry



The Effects of Huanglongbing on Florida Oranges



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