

Phloem production in Huanglongbing-affected citrus trees

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Citrus Huanglongbing (citrus greening disease) is highly destructive and fast-spreading, contributing to a reduction in crop yields in Florida and threatening the future of the citrus industry worldwide. Once infected, trees never fully recover and there currently is no cure, although proper nutrient and water management appear to slow tree decline in some situations.

A bacterium called *Candidatus Liberibacter asiaticus* (CLas), vectored by the Asian [citrus psyllid](#), is the presumed causal agent of the disease. Citrus trees affected by HLB exhibit a progressive degeneration of the phloem tissue that results in partial or total phloem collapse. However, in trees known to have been infected with HLB for several years, vegetative and fruit production continues for several years, although succeeding crops are progressively smaller and of lower quality, and new leaves do not grow to their typical size. According to the authors of a new study, observations of infected citrus suggest that photoassimilate transport takes place in newly developed phloem tissue of young flush and of the older supporting branches and trunk. At some point after leaf development, the phloem eventually collapses and becomes dysfunctional.

Craig Brodersen, Cody Narciso, Mary Reed, and Ed Etxeberria from the University of Florida's Citrus Research and Education Center published the results of a study in *HortScience* in which they monitored the progression of phloem production over time in field-grown trees to determine how the trees are capable of sustaining new growth, and then documented the subsequent phloem collapse.

The scientists collected fully expanded and developed tissue from HLB-affected trees from 5-year-old 'Valencia' orange trees that had been previously determined to be infected with CLas. They tested trees 3 months before sampling using the diagnostic facilities at the University of Florida's Southwest Florida Research and Education Center

using real-time polymerase chain reaction (PCR) analysis. Symptomatic tissue was characterized by blotchy leaf mottle, smaller and misshapen yellow leaves, and was confirmed with a starch test commonly used for HLB identification in the field.

The data suggested that, in HLB-affected [trees](#), production of vegetative and reproductive tissues is supported for a limited time by new phloem production during periodic flushes of new growth. "Our study indicates that a systemic wave of cambial activity can take place in stems, petioles, and midveins of fully expanded leaves and mature stems affected by HLB," said Brodersen. "In newly produced vegetative tissue, even after leaves had already fully expanded, phloem elements contain no signs of deterioration."

The scientists concluded that because of the short window during which the phloem appears healthy, the weeks immediately before and after the spring and summer flush are the most critical from a citrus management perspective.

More information: The complete study and abstract are available on the ASHS HortScience electronic journal web site:

hortsci.ashspublications.org/content/49/1/59.abstract

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