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Laurel Wilt—An Update on the Disease's Impact on South Florida's Avocado Industry

Jeff Wasielewski*[1], Jonathan H. Crane[2], and Daniel Carrillo[2]

University of Florida/IFAS, Miami-Dade County Extension, 18700 SW 288 Street, Homestead, FL 33030

[2]University of Florida/IFAS, Tropical Research and Education Center, 18905 SW 280 Street, Homestead, FL 33031

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Laurel wilt is disease that affects plants in the *Lauraceae* causing a tree's xylem to shut down followed by rapid wilt and sudden death. It is caused by the fungus, *Raffaelea lauricola*, that was introduced, along with its original vector, the redbay ambrosia beetle, *Xyleborus glabratus,* to the United States in May 2002, in Port Wentworth, GA. *Raffaelea lauricola* has now moved south from Georgia through Florida and as far west as Texas decimating over a half a billion native Lauraceae plants. *Xyleborus glabratus* was first detected in South Florida in 2010, and the first tree infected with *Raffaelea lauricola* found in an avocado grove in 2012. While *Xyleborus glabratus* is the primary vector for native Lauraceae, other ambrosia beetle species have picked up *Raffaelea lauricola* and are thought to be the main vectors of *Raffaelea lauricola* within avocado groves. Roughly 2% of the 7000 acres of avocado groves in South Florida have been destroyed due to this disease, and there is no known cure. Current recommendations at minimum include excellent horticulture, vigilant grove scouting, and immediate removal and destruction of infected trees. Other techniques being used to combat this disease are, detector dogs, fungicide injection and infusion, root trenching, and ambrosia beetle suppression.

Laurel wilt is a fatal disease, caused by the fungus *Raffaelea lauricola*, that attacks members of the Lauraceae family causing failure of the xylem system and rapid wilt. Key members of this family found in Florida are swampbay (*Persea palustris*), redbay (*P. borbonia*), and avocado (*P. americana*). The disease first entered the United States in May 2002, through Port Wentworth, GA, (Fraedrich et al., 2006). It is thought that the beetle carrying laurel wilt, the redbay ambrosia beetle (*Xyleborus glabratus*) hitchhiked to the United States inside a shipping pallet.

The disease has since moved south from Georgia into Florida and west as far as Texas. Over 500,000,000 native swampbay and redbay trees have been killed to date (Fig. 1).

Xyleborus glabratus was first detected in South Florida in 2010, with *Raffaelea lauricola* showing up in an avocado grove in 2012 (Green, 2012). While *X. glabratus* is the primary vector for native Lauraceae species, other ambrosia beetle species, already present in South Florida, have begun transferring *R. lauricola* and are thought to be the main vectors of this disease within avocado groves as large scale trapping has yielded insignificant amounts of *X. glabratus* within avocado groves. *X. bispinatus* and *X. volvulus* have been shown to carry enough of the fungus to infect avocado trees (Carrillo et al. 2014) and are thought to be the main laurel wilt vectors within avocado groves. Roughly 2% of South Florida's 7000 acres of avocado groves have been destroyed due to this disease (Fig. 2).

The disease is spread in two ways through ambrosia beetle vectors or through root grafts among adjacent avocado trees. Female ambrosia beetles carry the fungus in mycangia and bore into host trees creating galleries to grow the fungus to feed their young. The females begin to grow the fungus and produce both male and female offspring. Male ambrosia beetles never leave the galleries and their only function is to mate with their female siblings. The female ambrosia beetles leave the host tree carrying the deadly fungus and fertilized eggs ready to infest another tree.

Fig. 1. A swampbay tree killed by laurel wilt in South Florida. Photo: Jeff Wasielewski.

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*Corresponding author: jwasielewski@ufl.edu

Fig. 2. Avocado trees lost due to laurel wilt (**top right**) and trees cut down to top work (**bottom left**). Photo: Jeff Wasielewski.

Females may emerge and then reenter the same tree or bore into a new host tree. A large percentage of avocado groves in South Florida are old enough that the roots of adjacent trees within the grove intermingle and have grafted together. Grafted roots allow the fungus to move quickly from one tree to the next and are the primary source of infected trees within a grove.

Current recommendations for combating laurel wilt are varied. Excellent horticulture, including timely pruning and fertilization, combined with integrated pest management and proper irrigation is essential to maintaining healthy trees which will be less likely to be attacked by ambrosia beetles. Scouting is also important as rapid removal and destruction of infected trees greatly reduces the likelihood of transmission of the disease throughout the grove by beetles or root grafts. When a tree is diagnosed with laurel wilt, the tree should be completely removed, severing the entire root system. Severing the root system will stop transmission of the disease to adjacent trees through root grafting (Fig. 3). The tree should then be chipped or burned to kill any beetles remaining in the tree (Fig. 4).

Other techniques recommended to help control the spread of laurel wilt are insecticidal sprays, including biopesticides following sanitation practices, and injection or infusion of the fungicide Tilt® (propiconazole) into healthy trees adjacent to the affected trees. At the time of this writing, Tilt® is the only fungicide labeled for use on commercial avocado trees. Tilt® is used as a prophylactic measure and will not kill the fungus once it has infected a tree. It is recommended that two rows of trees in a ring around an infected tree be injected or infused with Tilt®. Methods such as spectral photography and canines are being investigated as means of detecting trees with laurel wilt before visible symptoms appear (e.g., wilting, desiccation of leaves). Studies are also underway to look for genetic resistance through different cultivars and rootstocks. Finally, drones and spectral imaging are also being tested as ways of identifying trees infected with the disease.

Laurel wilt has impacted the South Florida avocado industry greatly. Avocados have an economic impact of $100 million to the regional economy (Evans et al., 2012; Evans and Crane, 2013; Crane, 2012). Avocado profits are already marginal and fighting the disease is an expensive venture. With avocado being the largest fruit crop in South Florida both in acreage and economics by a large margin, this disease has affected a high percentage of tropical fruit growers in the region. The future of the avocado in South Florida is unknown. It appears that trees will continue to be lost due to laurel wilt, but that growers will adapt and still find ways to produce avocados under the stress of this deadly pathogen.

Fig. 3. Severed avocado roots to stop lateral transmission of the disease. Photo: Jeff Wasielewski.

Fig. 4. Preparing to burn infected avocado trees. Photo: Jeff Wasielewski.

Literature Cited

Carrillo, D., R.E. Duncan, J.N. Ploetz, A.F. Campbell, R.C. Ploetz, and J.E. Peña. 2014. Lateral transfer of a phytopathogenic symbiont among native and exotic ambrosia beetles. Plant Pathol. 63:54–62.

Crane, J. 2012. Current status and recommendations for control of laurel

wilt and the redbay ambrosia beetle. <http://trec.ifas.ufl.edu/RAB-LW-2/pdfs/Current%20status%20and%20recommendations%20for%20control%20of%20LW%20and%20RAB%204-10-13%20pdf%20version.pdf >.

Evans, E.A. and J.H. Crane. 2013. Estimates of the replacement costs of commercial and backyard avocado trees in south Florida. Food and Resource Econ. Dept., Fla. Coop. Ext. Serv., IFAS, Univ. of Florida, Gainesville. 3 p.

Evans, E.A., J. Crane, A. Hodges, and J.L. Osborne. 2010. Potential economic impact of laurel wilt disease on the Florida avocado industry. HortTechnology 20:234–238.

Fraedrich, S.W., T.C. Harrington, and R.J. Rabaglia. 2006. An Ophiostoma species and *Xyleborus glabratus* threaten red bay (*Persea borbonia*) and other members of the Lauraceae in the southeastern USA. Poster presented at the conference: Advances in Threat Assessment and Their Application to Forest and Rangeland Management, 18–20 July, Boulder, CO. Poster accessed 13 Apr. 2016. <http://www.urbanforestrysouth.org/resources/library/citations/an-ophiostoma-species-and-xyleborus-glabratus-threaten-red-bay-persea-borbonia-and-other-members-of-the-lauraceae-in-the-southeastern-usa/?searchterm=S.W. Fraedrich>.

Green, N. 2012. Redbay ambrosia beetle threatening south Florida avocado crop. Miami Herald, 2 May 2012. Accessed 4-13-16. <http://www.miamiherald.com/site-services/archives/>.