

Proposed strategies for decreasing the threat of laurel wilt (LW) and its vector, the redbay ambrosia beetle (RAB) to commercial avocado groves in Miami-Dade County

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Purpose

To reduce the RAB population in commercial avocado groves and suppress the spread of LW in commercial groves.

Tactics for suppressing RAB and the spread of LW

Scouting groves

Scouting to detect RAB-LW on public and private properties is a key component to (a) alerting the avocado industry that RAB-LW is present or nearby and (b) providing an opportunity to drastically reduce the spread of RAB and LW. FDACS-DPI personnel will be the lead scouting and monitoring agency on the public and private urban properties. **Grove owners and operators should scout their groves thoroughly and often.**

Grove owners and operators should mark the symptomatic tree or trees and take wood samples (enough for 2 labs) or contact FDACS-DPI or take samples to the UF-TREC Diagnostic Lab for assay. For sampling procedures see below and for questions about sampling for diagnosis contact Dr. Jonathan Crane at 786-255-5878 or Dr. Aaron Palmateer at 786-525-0717. Initially the wood samples will be provided to Dr. Randy Ploetz at TREC and Dr. Jason Smith, UF-SFRC and DPI, Gainesville.

Scouting for laurel wilt in commercial avocado groves

1. Surveying for the symptoms of laurel wilt is a key component of limiting the spread of laurel wilt. Growers and their workers should survey their groves immediately and then weekly or more often if an infestation is detected in an adjacent grove.
 - a. Symptoms to look for might include (see scouting factsheet photographs):
 - i. Leaf and young stem wilting.
 - ii. Leaf color changing from light green to dark green, bluish-green or greenish-brown. Some leaves showing leaf mottling (dark and light green areas) and yellowing.
 - iii. Dead leaves curled hanging on the tree.
 - iv. A few stems and limbs with 2 to 4 ft of dieback or whole sections or entire limbs with dieback.
 - v. Inspection of the trunk and major limbs may show dried sap (white, crystalline powdery material) that indicates insect boring. In any case, on symptomatic limbs remove the bark

down to the sapwood and look for dark streaking. Dark streaks in the sapwood may indicate fungal infection. Normally this sapwood should be white to yellowish with no dark staining or streaking. In addition, small, dark holes in the sapwood further indicate wood boring beetles are present.

2. If the tree shows *only a few stems and limbs with 2 to 4 ft of dieback*, wait for confirmation of laurel wilt before removing the tree. You can remove the dead part of the limb by cutting several feet below the dead area of the limb; burn or bury the infested limb. After removal paint with pruning paint or tar.

DPI instructions on sampling for Laurel Wilt (LW)

http://www.freshfromflorida.com/pi/enpp/pathology/laurel_wilt_disease.html

1. A. If collecting from the trunk and/or a major limb of a mature tree: Using a hatchet, hammer and chisel, or knife, remove the bark down to the surface of the sapwood (xylem) and look for discoloration in the wood. Chisel or cut out a few thick chips of the discolored wood.
B. If collecting from small stems or branches with wilted leaves: With a knife, remove bark down to the surface of the sapwood and look for discoloration in the wood. Cut and collect a few short branches or stem sections that contain this discoloration. Small twigs that have been dead a long time and are dry and crispy when broken are not good samples for pathogen confirmation.
2. Fill out a sheet of paper with information about the sample (type of plant, cultivar, and date collected, exact location of diseased plant, symptoms observed, your name, address and contact information).
3. Put the plant material in a plastic zip-lock bag and the paper containing collection information in another plastic zip-lock bag. Put all these bags into another bag to keep them together. Tightly seal all bags to prevent the possibility of live insects (including the exotic redbay ambrosia beetle) in the wood from escaping.
4. Keep samples cool until shipped to diagnostic laboratories.

If LW is confirmed then suppression and control is warranted.

LW and RAB suppression

Background (reasoning behind the recommendations)

Research has shown:

RAB

- a. The generation time of RAB inside avocado trees takes about 40-50 days depending upon temperatures (JE Peña, unpublished data).
- b. Chipping dramatically decreases RAB survival and emergence but not completely (JA Smith, unpublished data).
- c. RAB flight activity is highest in the late afternoon and early evening and trapping has shown most RAB flight is mostly from the ground to about 15 ft (G. Brar, unpublished data).
- d. The number of RAB emerging from avocado wood has been proportionally minute compared to other ambrosia beetle species (JE Peña et al., 2010). Whether this is due to competition among beetles or avocado is a less efficient brood rearing host is not known at this time.
- e. Damaged or recently pruned avocado wood is more attractive to RAB than non-damaged/pruned wood for about a 3 week period (LK Stelinski, unpublished data).

LW

- a. The molecular identification method to identify LW has been improved and perfected (JA Smith, unpublished data).

- b. The LW pathogen does not survive in the mulched wood chips (JA Smith, unpublished data). The LW pathogen does not appear to be transmitted by high-speed mechanical pruning equipment. The LW pathogen can be transmitted with hand saws (hand-powered) pruning saws.
- c. The visual external plant symptoms e.g., leaf wilting and stem dieback, of laurel wilt lag behind the degree of internal infestation and damage to the tree (RC Ploetz, unpublished data).
- d. Preliminary data utilizing small avocado trees strongly suggests the reaction to (i.e., tolerance) LW varies by genetic background (i.e., West Indian, Guatemalan, Mexican, and hybrids among these) and cultivar (RC Ploetz et al., 2010). In general West Indian and West Indian-Guatemalan hybrids are less tolerant of LW than Guatemalan and Guatemalan-Mexican hybrids.
- e. Larger avocado trees are more affected by LW than smaller avocado trees (RC Ploetz et al., 2010).
- f. The laurel wilt pathogen has not been demonstrated to move by root grafting from an infested avocado tree to adjacent avocado trees; although it is suspected this may occur.

Economics

1. A comparison of the use of Alamo® and Tilt® formulations of propiconazole using current information on the macro-infusion technique for mature trees and avocado production cost data suggest only macro-infusion of Tilt® with a 3 year efficacy would be economically feasible (Ploetz, et al., 2011). However, the optimum rates and efficacy of Tilt® for use on mature trees is unknown at this time.
2. A preliminary analysis of the effect of avocado tree removal on grove profitability suggests a maximum of 15-20 trees in a 100 tree/acre and 8-11 trees in a 88 tree/acre grove could be removed and the grove remain economically profitable (EA Evans, unpublished data). Of course the result of the analysis depends upon avocado prices, cost of tree removal/destruction, and any other treatment costs. Thus removing the 2 to 8 non-symptomatic trees adjacent to LW positive trees may not be economically sustainable.

Observations

1. The avocado trees in small avocado groves on Merritt Island surrounded by dead and declining redbay trees have not been decimated over a 3-4 year period by LW (JE Peña, JC Ploetz, and JH Crane). Over a 2-3 year period while the redbay trees are being attacked there appears to be only random, limited attack of the adjacent avocado trees. There is a potential for this to change once the redbay population is devastated.
2. Large mature trees have usually not died quickly but in sections over time (months to years) (JE Peña, JC Ploetz, and JH Crane). For example, one or two major limbs would show external symptoms and others would not. However, one large avocado tree in Gainesville died in approximately 6 weeks following initial symptom development in one main branch.

These research findings and observations suggest that RAB and LW has not quickly overwhelmed avocado groves in Merritt Island, that chipping wood and tarping or burning suppresses RAB, LW does not survive in chipped wood, RAB flight activity is highest during the late afternoon/early evening, most flight is within 15 ft of the ground and avocado may not be a “good” host for RAB reproduction all suggest RAB suppression may slow the spread of LW.

Literatures cited

Peña, J.E., J. Capinera, P. Kendra, G. Brar, S. McLean, L. Stelinski, R. Ploetz, and J.H. Crane. 2010. Abundance in *Persea americana* of the redbay ambrosia beetle, *Xyleborus glabratus* (Coleoptera:Curculionidae:Scolytinae)

vector of laurel wilt: a case of intra-guild competition? Annual Meeting, Southeastern Branch, Entomology Soc. Amer. (in press).

Ploetz, R.C., J. M. Pérez-Martínez and E.A. Edwards. 2011. Towards fungicidal management of laurel wilt of avocado. Plant Disease 96: (in press).

Ploetz, R.C., J.M. Pérez-Martínez, J.A. Smith, M. Hughes, and Y. Fu. 2010. Response of avocado to laurel wilt, caused by *Raffaelea lauricola*. Plant Disease (abstract).

Unpublished data citations

- J.E. Peña, Entomologist, University of Florida, IFAS, Tropical Research and Education Center, Homestead, FL.
- J.C. Ploetz, Plant Pathologist, University of Florida, IFAS, Tropical Research and Education Center, Homestead, FL.
- E.A. Evans, Agricultural Economics, University of Florida, IFAS, Tropical Research and Education Center, Homestead, FL.
- J.H. Crane, Tropical Fruit Crops Specialist, University of Florida, IFAS, Tropical Research and Education Center, Homestead, FL.
- L.L. Stelinski, Entomologist, University of Florida, IFAS, Citrus Research and Education Center, Lake Alfred, FL.
- C. Brar, Entomologist, graduate student, University of Florida, IFAS, Tropical Research and Education Center, Homestead, FL.

Redbay Ambrosia Beetle and Laurel Wilt control options to consider

Severely declining trees

1. Cut, chip, and tarp LW positive trees.
2. Cut, chip, and burn LW positive trees.

Adjacent avocado trees

1. Adjacent avocado trees not showing symptoms should be treated with a soil drench of imidacloprid (Admire Pro®) to kill any potential RAB inside the trees.
2. Make a late afternoon foliar application of contact insecticide (Danitol® or Malathion®) to kill flying RAB and to cover bark surfaces.

Avocado trees with “thin” bark, i.e., <7 years old

1. An emergency exemption for the use of Tilt® (propiconazole) has been granted. Research has shown that a bark directed Tilt® plus 2% Penra-bark trunk and limb spray application appears to provide some protection against LW. (See enclosed labels). However, the frequency of repeat applications is not known at this time. The applicator must have the Section 18 label and container label in their possession in order to legally apply Tilt®.

Mature avocado trees, i.e., >7 years old

1. No known effective treatment at this time.

2. An emergency exemption for the use of Tilt® (propiconazole) has been granted but research to determine potential phytotoxicity, efficacy, and rates have not been completed. At this time Tilt® is not recommended.

Potential effect on other cultural practices
(other issues: pruning and harvest)

Pruning

The research of the entomologists suggests that recently cut surfaces of avocado are more attractive to RAB than non-cut surfaces; however, RAB does bore into the bark and through the cut ends. It is assumed that cutting increases the attractive volatiles naturally produced by the trees.

Strategy for pruning:

1. Where and when possible prune during the late fall and winter when RAB activity is depressed. This may be mostly appropriate for mid- and late season avocado cultivars.
2. Prune groves in the early morning and apply a contact insecticide with residual activity to cover cut surfaces during the late afternoon/early evening (4PM on).

Harvest

No information exists on the effect of harvest wounds to the plant stems and attractive volatile rates. Data on the potential for harvest damage to plant stems and RAB attractiveness should be established so a decision can be made as to whether insecticide applications are warranted after harvest.

NOTE: These recommendations are subject to change as research results information and experience dictate.

(c://ext/handouts/2011/Proposed grove strategy RAB-LW 4-1-11.docx)