Proposed strategies for RAB and LW

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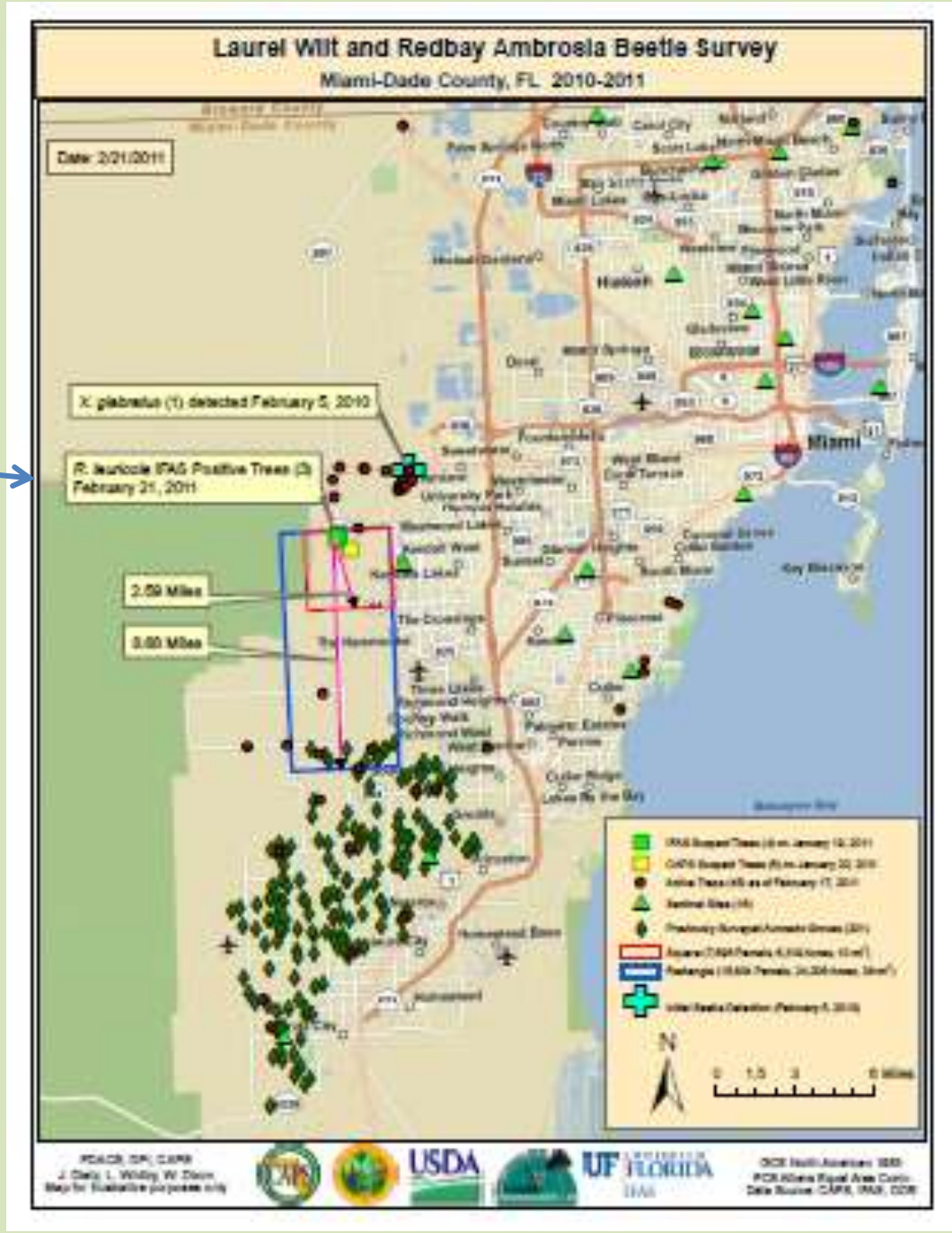
Location of the LW positive trees

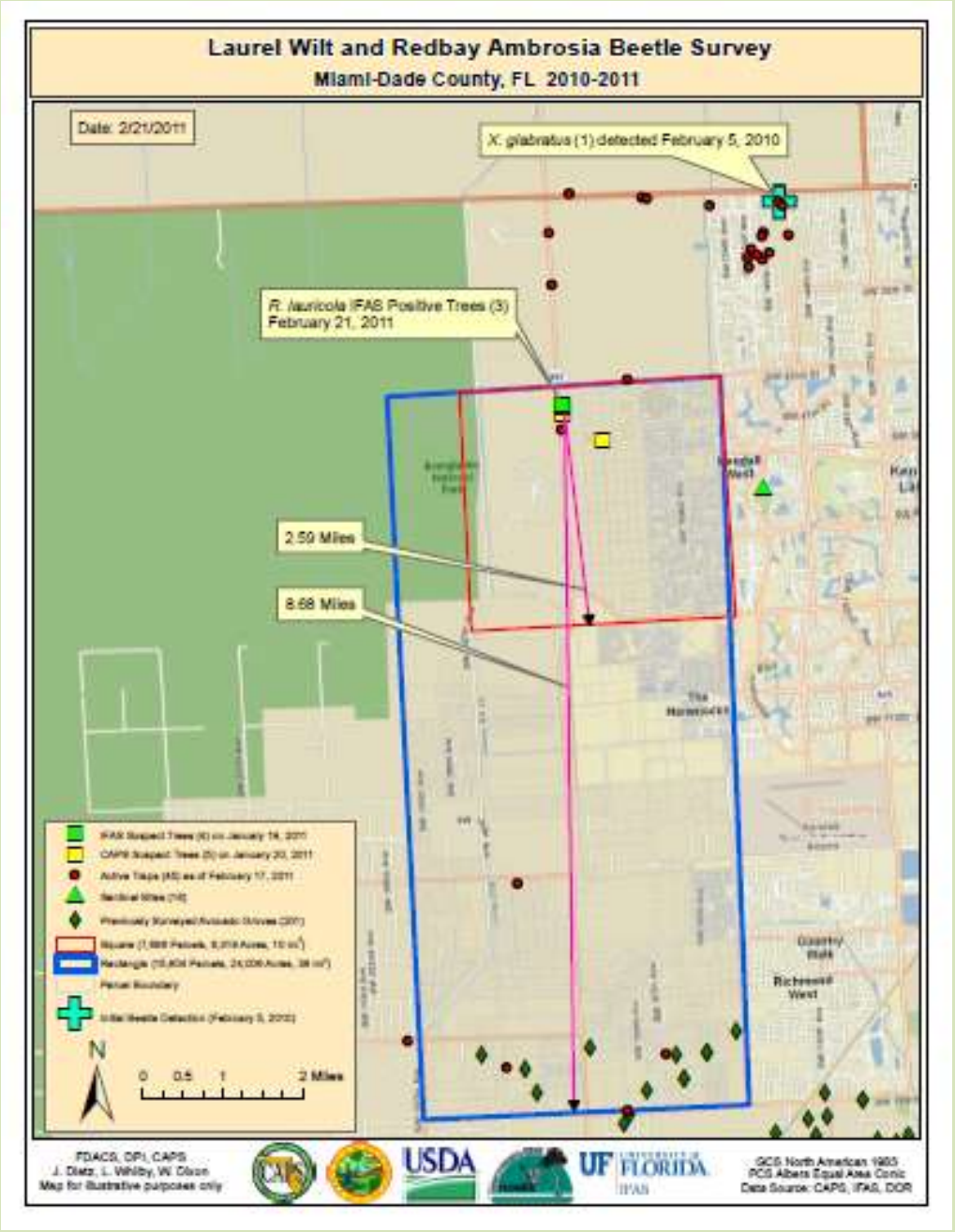
- Three swampbay (*Persea palustris*) trees were sampled February 1, 2011.
- Between mile marker ~20 and 21 on east side of Krome Avenue.
- Samples were sent to 3 laboratories
  - DPI, Gainesville
  - J. Smith, UF-SFRC
  - R. Ploetz, UF-TREC
- Visual – CSMA selective augur - symptoms
- Molecular testing
  - PCR amplification of diagnostic small subunit (rDNA)
  - PCR amplification of diagnostic microsatellite DNA loci
- Koch's postulates
  - Inoculate container-grown 'Simmonds' avocado trees with isolates from suspect trees

Location of the LW positive swampbay trees

Tamiami Trail/
Rt. 41/SW 8th St.



Location of the LW positive swampbay trees



General location of LW positive swamp bay trees

LW positive swampbay trees

Area of suspect swampbay trees

FDACS-DPI response plan

- Working with SFWMD
  - Helicopter survey of area
- DPI ground truth suspects
- DPI to change to sticky traps
  - Appear more effective
  - Verify vector presence
  - Access RAB population density
- Commercial avocado producers
  - Initially provide suspect samples to R. Ploetz and J. Smith
- Urban residents
  - Contact DPI
  - Samples go to DPI
- Outreach
  - Commercial producers
  - Urban residents

Redbay ambrosia beetle (RAB) (*Xyleborus glabratus)*

- Very small (~2 mm in length), brown-black colored, cylinder shaped

- Female beetles - most common and can fly; males – not common and cannot fly

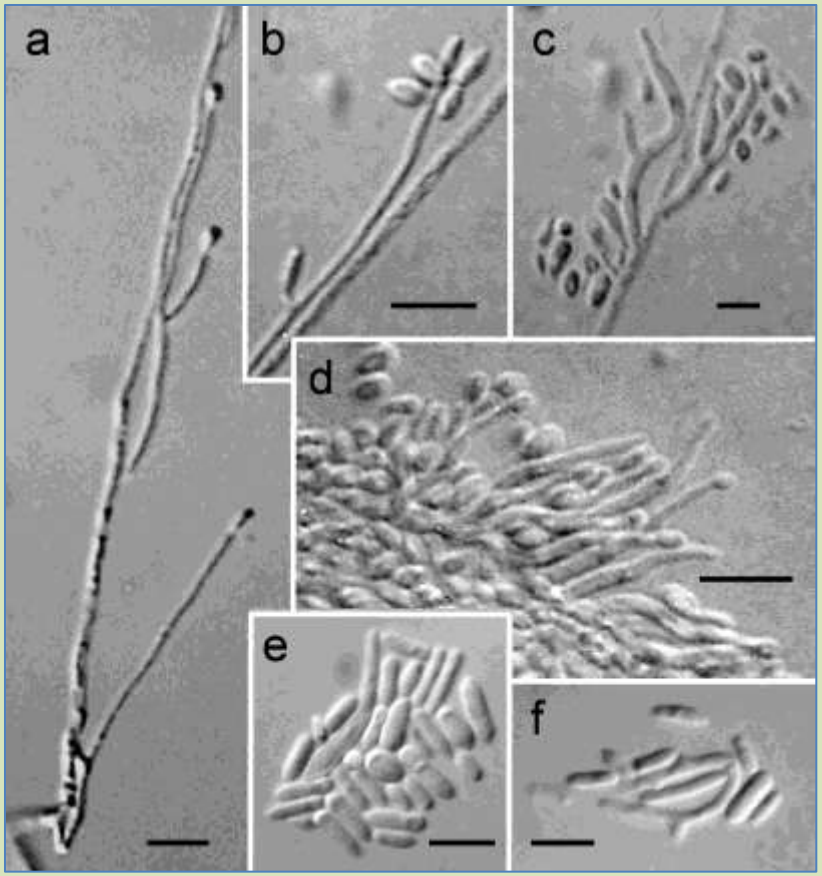
- The RAB carries spores of the laurel wilt pathogen (LW: fungus) in special mouth pouches called mycangia

- Beetles bore into the wood just below the bark and form galleries in the sapwood

Laurel Wilt Pathogen (LW) *(Raffaelea lauricola)*

An exotic fungus

Mouth pouches on the beetle (mycangia) with LW spores



The laurel wilt pathogen

- The adult beetles and their larvae feed on the fungus

Proposed control strategies

Commercial avocado groves

Purpose

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

Key components

- Scouting
- Identification
- Suppression
- Other issues

Scouting and identification

- Frequent scouting
  - Early detection
  - Opportunity for suppression of RAB-LW
- Identification of LW
  - Proper sampling
  - Submission of samples
  - Decision on action

Scouting

Symptoms to look for

- Leaf and young stem wilting
- Leaf color change from green to dark green, bluish-green to greenish-brown.

Scouting

- Dead leaves hanging on the tree
- Stem and limb dieback
- Commonly sections of the tree show symptoms and other sections do not.

Scouting and inspection

- Inspection of the trunk and limbs
  - Dried sap
  - Sawdust (toothpicks)
  - Beetle entrance holes

Inspection and sampling

- 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.
- Small, dark holes in the sapwood indicate wood boring beetles are present.

Sampling for LW

Procedures

- Tag tree/note location
- Equipment
  - Disinfectant (alcohol, 2% chlorine solution)
  - Hand saw or hatchet
  - Zip-lock bag
- Information
  - Your name and contact information
  - Cultivar of avocado
  - Date collected
  - Exact location
  - Plant symptoms
- Digital photographs (optional)

Label bag

- Label the bag with
  - Your name
  - Avocado cultivar
  - Contact information
- Box the sample and send overnight to:

FDAVS/DPI

Attn. Laurel Wilt Sample

1911 SW 34 St.

Gainesville, FL 32608-1201

Tel: 305-372-3505

Sampling for LW

Sampling kit

Tree trunk and limbs

Sampling for LW

- Cut through the bark
- Past the phloem and cambium
- Note pinkish color of wood immediately under bark
- Yellowish-white heartwood (xylem)

- Chip xylem wood for sample

- Limb pieces wood sample

Research background

Redbay Ambrosia Beetle

- RAB generation time 40-50 days
- Chipping dramatically decreases RAB survival and emergence but not completely.
- RAB flight activity is greatest late afternoon-early evening.
- Most RAB flight at or below 15 ft.
- Number of RAB:other ambrosia beetles is extremely small.
- Damaged or pruned avocado wood is more attractive to RAB than non-damage/pruned wood for about a 3 week period.

Research background

Redbay Ambrosia Beetle

Redbay ambrosia beetle host preference

- silkbay>redbay=swampbay>avocado>lancewood

RAB odor preference

- Redbay>>avocado

> = greater than

Research background

Laurel Wilt Pathogen

- The molecular identification method to identify LW has been improved and perfected.
- The LW pathogen does not survive in the mulched wood chips.
- 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.
- 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.
- The laurel wilt pathogen has <u>not</u> been demonstrated to move by root grafting from an infested avocado tree to adjacent avocado trees; although it is suspected this may occur.

Research background

Laurel Wilt Pathogen

- Preliminary data utilizing small avocado trees strongly suggests the reaction to (i.e., tolerance) to LW varies by genetic background (i.e., West Indian, Guatemalan, Mexican, and hybrids among these) and cultivar.
- In general West Indian and West Indian-Guatemalan hybrids appear to be less tolerant of LW than Guatemalan and Guatemalan-Mexican hybrids.
- Larger avocado trees are more affected by LW than smaller avocado trees.

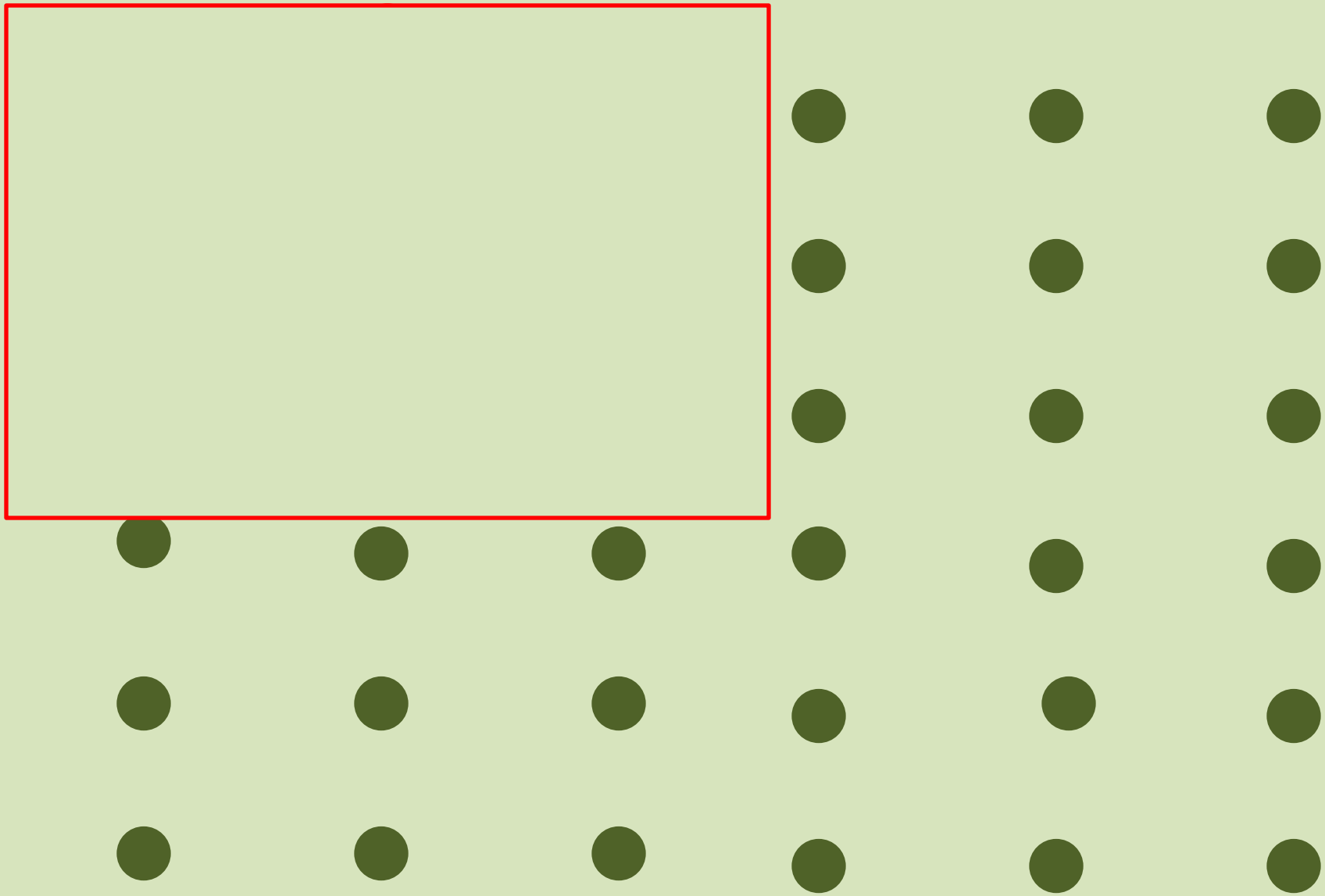
Economics

- 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.
- However, the optimum rates and efficacy of Tilt® for use on mature trees is unknown at this time.

Economics

- A preliminary analysis of the effect of avocado tree removal on grove profitability suggest –
  - 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.
  - 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.

Tree removal



Observations

Groves on Merritt Island

- Surrounded by dead and declining redbay trees
- Have not been decimated over a 3-4 year period by LW.
- 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.
- Large mature trees have usually not died quickly but in sections over time (months to years).
- For example, one or two major limbs would show external symptoms and others would not.

Summary

These research findings and observations suggest that

- RAB and LW has not quickly overwhelmed avocado groves in Merritt Island
- that RAB is more attracted to redbay and swampbay than avocado trees
- that chipping wood suppresses RAB
- LW does not survive in chipped wood
- RAB flight activity is highest during the late afternoon/early evening and most flight is within 15 ft of the ground
- Avocado may not be a “good” host for RAB reproduction
- All this suggest RAB suppression may slow the spread of LW.

Laurel wilt key points

- This is an insect vectored disease – not wind or soil borne.
- Only the redbay ambrosia beetle has been shown to transmit laurel wilt
- There is no proof that it moves through root grafts – although this may happen
- Early detection – scouting is key to reducing the beetle population and limiting the spread of the disease

RAB-LW control
options to consider

- Detecting infestations as quickly as possible
  - Provide opportunity for RAB-LW suppression
- Scouting groves as frequently as possible
- Sampling suspicious trees for LW
- Waiting for verification of cause of decline –
  - Lightning
  - Flooding/root disease
  - Severe drought
  - Mechanical damage
  - Other ambrosia beetles

RAB-LW control *options to consider*

<u>Severely declining trees</u>

- Cut, chip, and tarp LW positive trees.
- Cut, chip, and burn LW positive trees.
  - Burn permits ahead of time
- Sever the root system from adjacent trees with a ditch-witch or other device.

RAB-LW control *options to consider*

Adjacent avocado trees

- Adjacent avocado trees not showing symptoms may be treated with a soil drench of imidacloprid (Admire Pro®) to kill any potential RAB inside the trees.
- Make a late afternoon foliar application of contact insecticide (Danitol® or Malathion®) to kill flying RAB and to cover bark surfaces.
- We are not advocating spraying groves until a positive find is found in the grove.

RAB-LW control *options to consider*

Avocado trees with "thin" bark, i.e., **<7 years old**

- An emergency exemption for the use of Tilt® (propiconazole) has been granted. Research has shown that a bark directed Tilt® plus 2% Pentra-Bark trunk and limb spray application appears to provide some protection against LW. However, the frequency of repeat applications is not known at this time.

RAB-LW control *options to consider*

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

- No known effective treatment at this time.
- 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.
  - **Not recommended at this time**

Other cultural practices

Pruning

- The research of the entomologists suggests that recently cut surfaces of avocado are more attractive to RAB than non-cut surfaces (~ 3 weeks).
- 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

- 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.
- 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).
  - Malathion®
  - Danitol®

Discussion

Another option to consider RAB-LW control

Early symptomatic trees (early detection is critical)

- Trees not showing dramatic symptoms may be treated with a soil drench of imidacloprid (Admire Pro®) to kill any potential RAB inside the trees.
- Remove affected limbs down to non-symptomatic wood. Cover cut surface with a pruning tar or paint.
- Destroy affected limbs.
- Sever the root system from adjacent trees with a ditch-witch.

On-going research

- Plant pathology group
  - Chemical products and rates
  - Methods of application (e.g., flare root infusion, linkage with other products)
- Entomology group
  - Chemical products and rates (Section 18 Endigo®)
  - Repellents
  - Trap and kill

Q&A
Discussion

FDACS/DPI Helpline

888-397-1517

DPI links:

www.fl-dpi.com

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

s a v e t h e g u a c . c o m

UF/IFAS Extension offices:

http://solutionsforyourlife.ufl.edu/map/index.html

UF/IFAS publications: http://edis.ifas.ufl.edu

UF/IFAS Tropical Research and Education Center:

http://trec.ifas.ufl.edu