Current control strategies, recommendations and issues on the management of avocado laurel wilt in Florida

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July 29-Aug. 2, 2019: Laurel wilt-ambrosia beetle seminar series, California

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- *Florida Avocado Administrative Committee*
- *California Avocado Commission*
- *University of California Extension*

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- *Dr. Trevor Smith, Director*
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- *Dr. Tyson Emery, Section Chief*

Florida Avocado Administrative Committee

- *Ms. Medora Krome, Chairwomen*
- *Mr. Alan Flinn, Administrator*

Laurel Wilt Panel

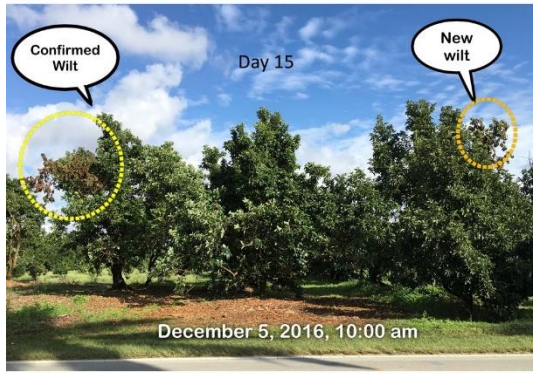
- *Avocado producers and UF-IFAS*

Avocado Industry Advisory Panel members

(USDA-NIFA grant (2015·51181-24257)

- *Armando Monterroso, Brooks Tropicals*
- *Louis Dessaint, Brooks Tropicals*
- *Medora Krome, Grower and Chair of Avocado Administrative Committee*
- *Michael Hunt, Grower*
- *Victoria Barnes, Grower*
- *Mark Philcox, Grove Services*
- *Diego Rodriguez, Diego Rodriguez Farms*
- *Bienvenido Suero, New Limeco*
- *Margie Pikarsky, Bee Heaven Farm*
- *Carlos de la Torre, Grower*
- *Alan Flinn, Administrator, Florida Avocado Committee*
- *Charles LaPradd, Agricultural Manager, Miami-Dade County*

How to lose three trees in 26 days



Credits: Carlos de la Torre


09 .18 .2012

Current recommendations and strategies for control of the laurel wilt pathogen and ambrosia beetle vectors

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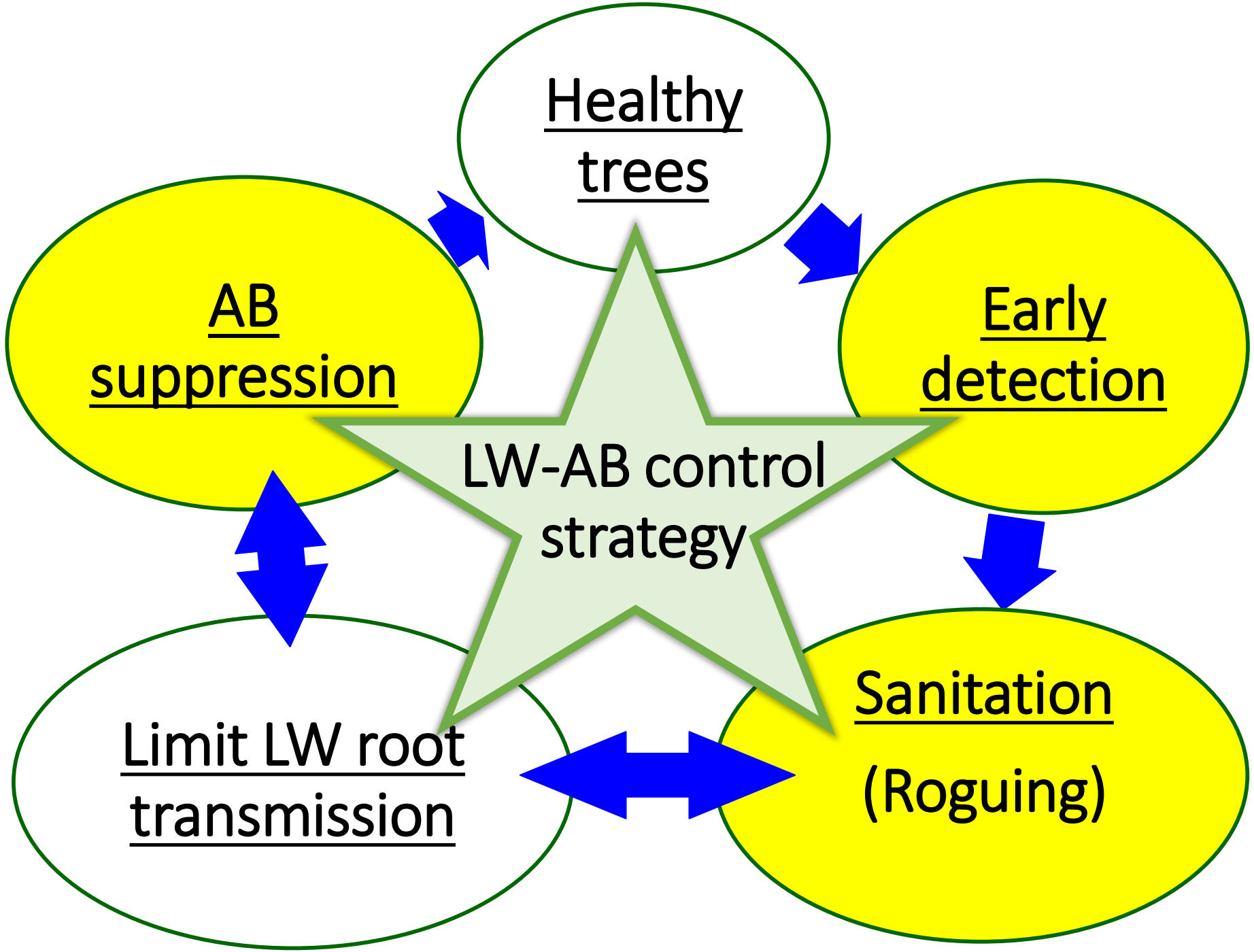
Healthy trees
AB suppression
Early detection
LW-AB control strategy
Limit LW root transmission
Sanitation
(Roguing)

Bottom lines

- **The most efficacious and cost-effective control for the LW pathogen is to detect symptomatic trees as soon as possible through frequent scouting and immediately remove (uprooting) and destroy the tree (sanitation) - roguing**
- **Reduce the potential for beetle transmission of LW**
  - **Sanitation (tree destruct)**
  - **Timed-limited and directed insecticide applications**
  - **Pruning programs to enhance light penetration and duration into tree canopies**

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Limit laurel wilt pathogen transmission

To prevent this, immediate sanitation is required

Root graft transmission

Ambrosia beetle transmission

Scouting - key

Early symptoms to look for

- Commonly sections of the tree show symptoms and other sections do not
- Part of the canopy is wilting

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Early detection of laurel wilt

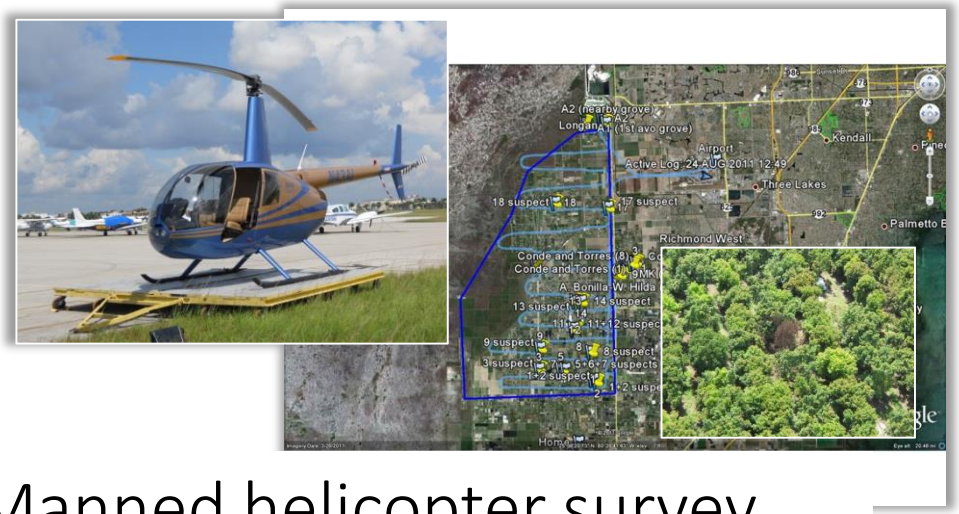
Best – no visible symptoms

Partial canopy wilting – still green

Obvious symptoms – desiccation

Ideal stage to detect | Okay to good stage to detect | May be too late for adjacent trees

Methods - early detection of laurel wilt



Manned helicopter survey

- Currently
- Most common

Scouting from the ground

Drones – visible light, infra-red, specific spectral ranges

- Works
- Limited

Canine – olfactory detection

Drones opportunities/uses

- ID early -symptomatic LW affected (infected) trees
- Allows quick implementation for LW control
- Have the potential to frequently and quickly scout orchards
- Barrier – FAA rules and regulations

Photo credit: C. de la Torre

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Immediate roguing (sanitation) – the most important step

¿Prophylactic fungicide applications?

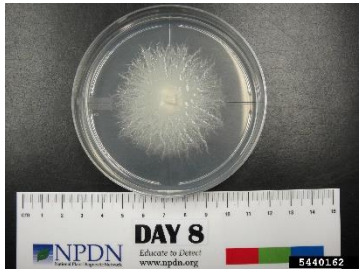


Photo Credit: S. Glucksman

Considerations

- Infusion (IV-like procedure)
- Injection
- Labor intensive
- Material costs
  - Equipment and fungicide (Tilt®)
- Must be repeated periodically
- Expensive to moderately expensive

Sustainability issues - new information

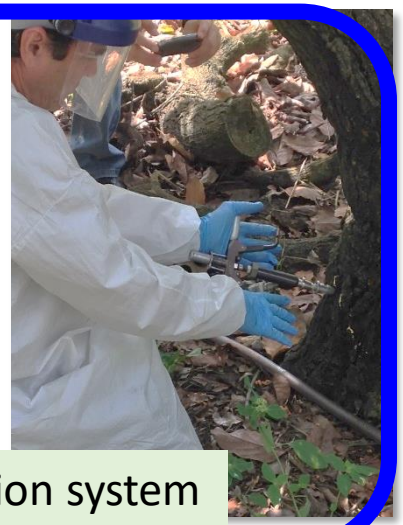
- Infusion – tree damage, too costly
- Injection – slow to protect, potentially incomplete coverage/protection
- Recent data has found that very few LW spores (CFUs) can induce disease
  - AB populations have increased
    - Some contaminated with LW pathogen
- Our lack of knowledge on injection
  - Time from injection to protection?
  - Incomplete protection?
  - Tree damage over time
  - Root-graft grove-wide biology

Methods of systemic fungicide application

Conventional infusion – low pressure

Passive infusion – transpiration

Hybrid infusion-injection



Wedge hydraulic injection system

QuikJet

Hybrid infusion-injection

Prophylactic fungicide treatments?

Current status

- 1,200 acres are under an injection program (claim ~2% loss due to LW)
- 400 acres under a spot treatment regime with infusion
- 96 acres under an infusion program

Recommendation - considerations

- Conduct a cost-benefit analysis
- Current situation, LW now endemic and AB populations high
- Sustainability – tree damage assessments with time
- Cost of control options
  - LW disease outbreaks w/out fungicide
  - Cost of control with fungicide applications

Ambrosia beetle suppression and control

Photo credit: D. Carrillo

- AB habitat destruction
- Limited area trunk and major limb directed insecticides

Current strategy for suppression of AB

Ambrosia beetle (AB) control

- Chip or shred infested wood
- Spray chips with insecticide (Hero®, Malathion, or Danitol®) + adjuvant
- Tree directed spray application of trees in a 1-acre grove area with Malathion, Agri-Mek®SC, Talstar®S, Danitol® or Hero®* + adjuvant or BotaniGard® (1-2 times)
- Implement pruning program to increase amount and hours of sunlight

*, non-bearing trees only

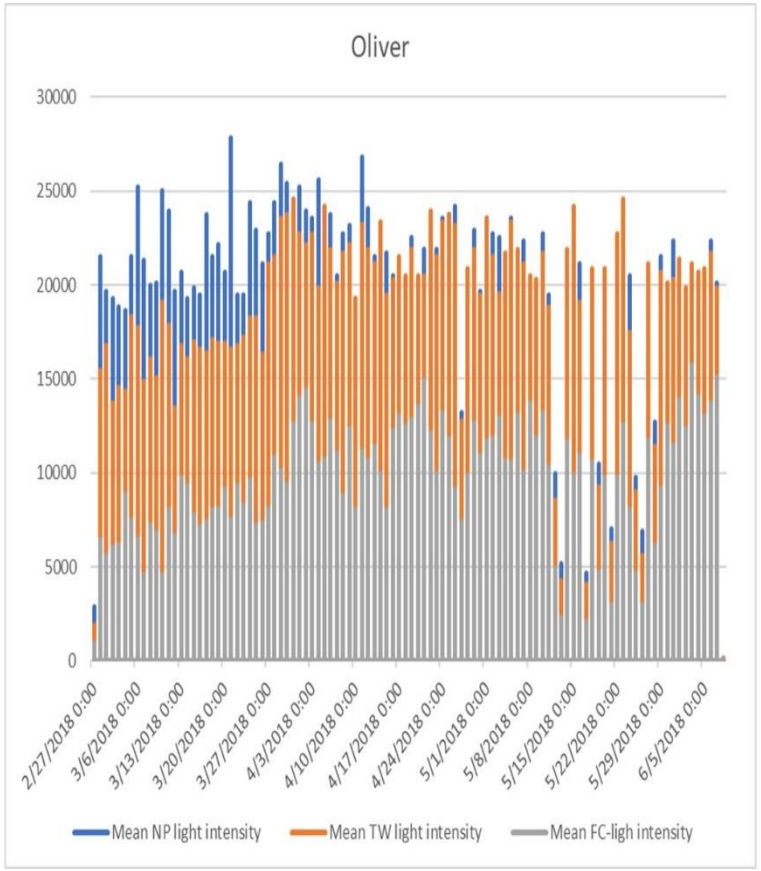
Light management: the effect of light duration and levels on AB activity

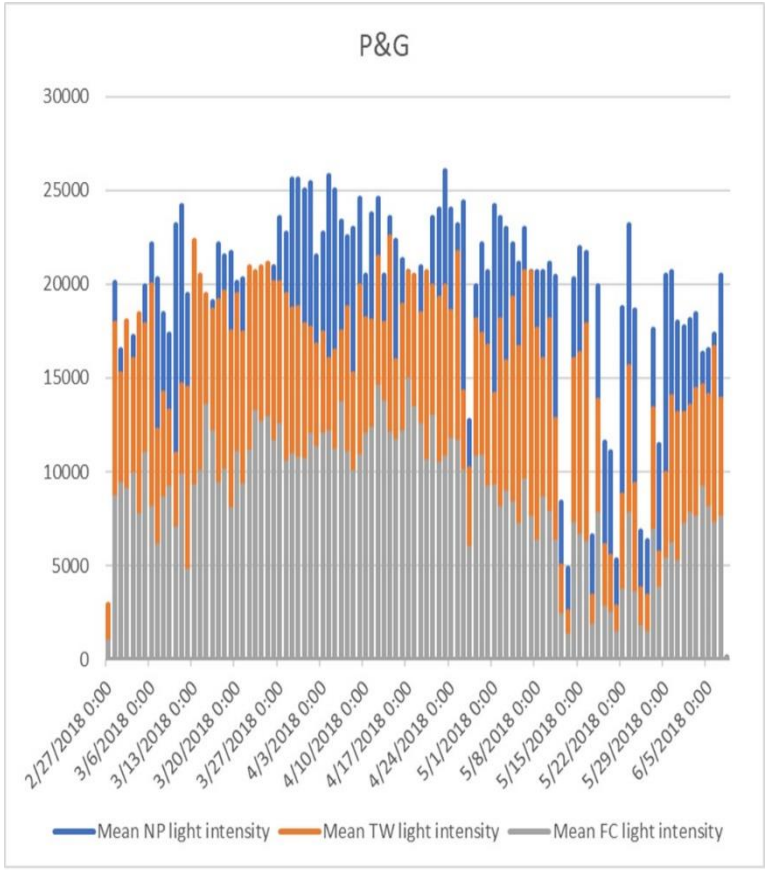
Photo credit: D. Carrillo

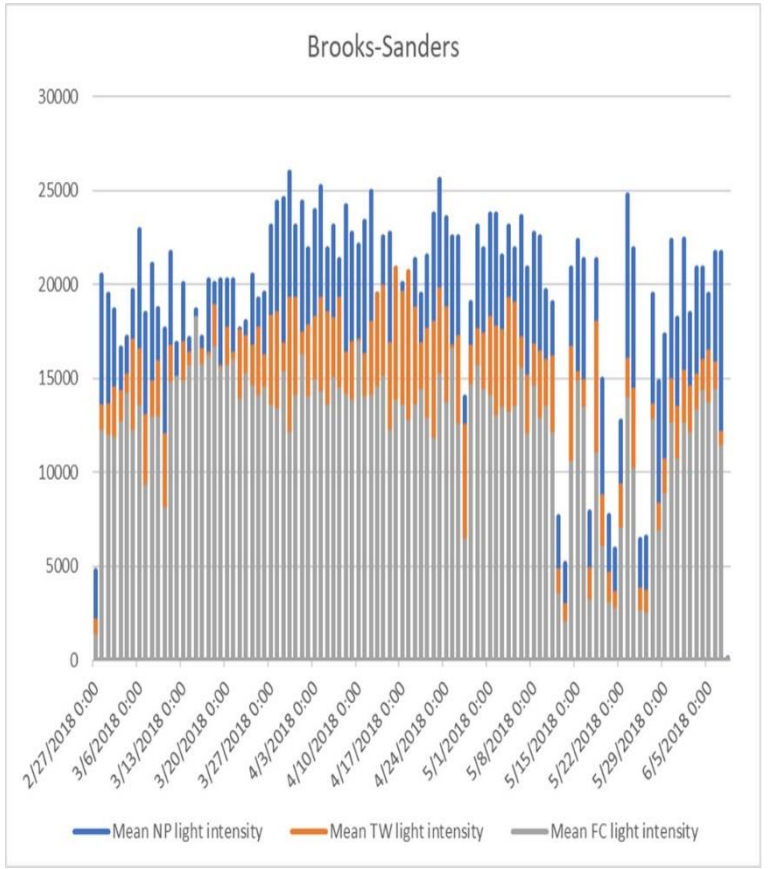
Three light environments

- Full-canopy, minimal to rarely pruned
- Top-worked within last 3-4 years
- Newly planted areas of existent groves

Light levels







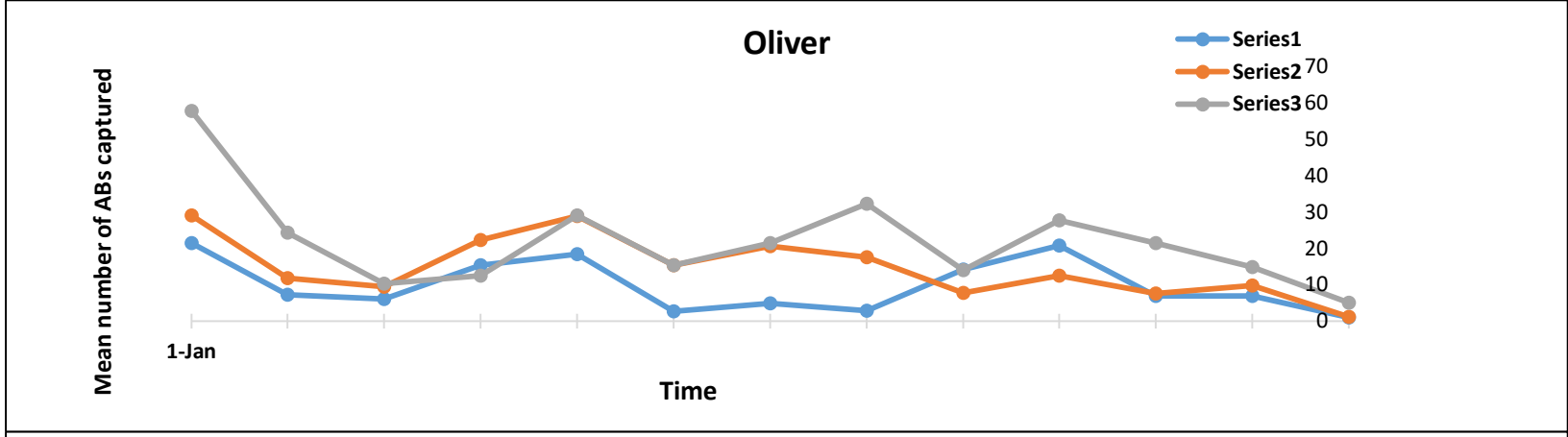
3 grove light levels

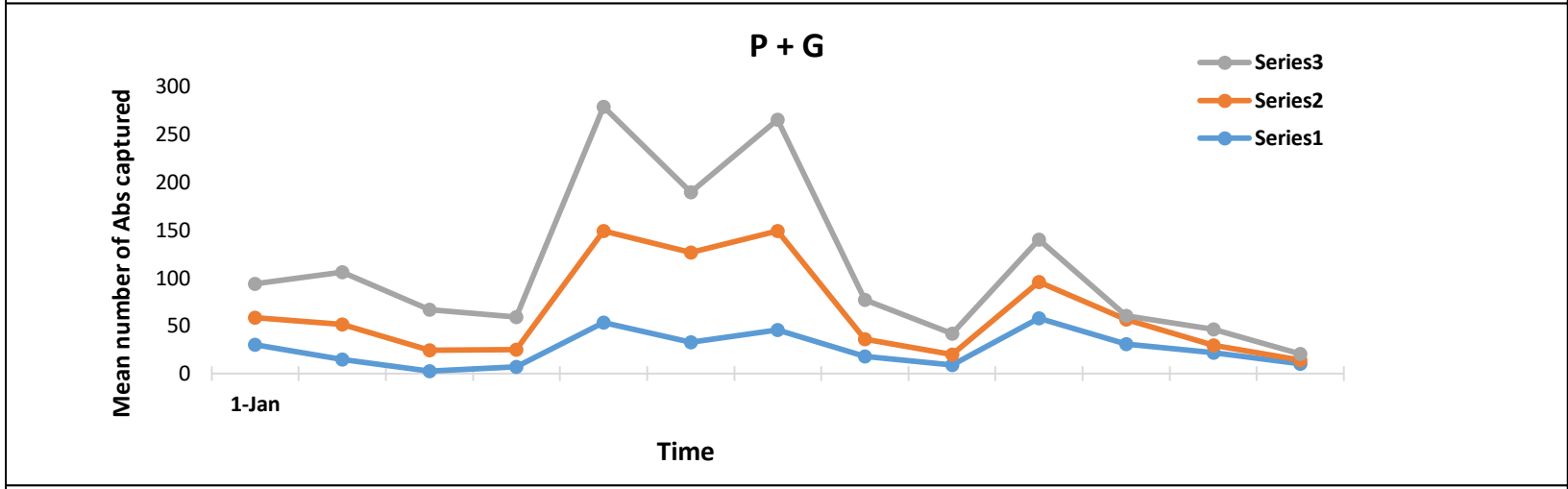
Full canopy
Top-worked
New planting

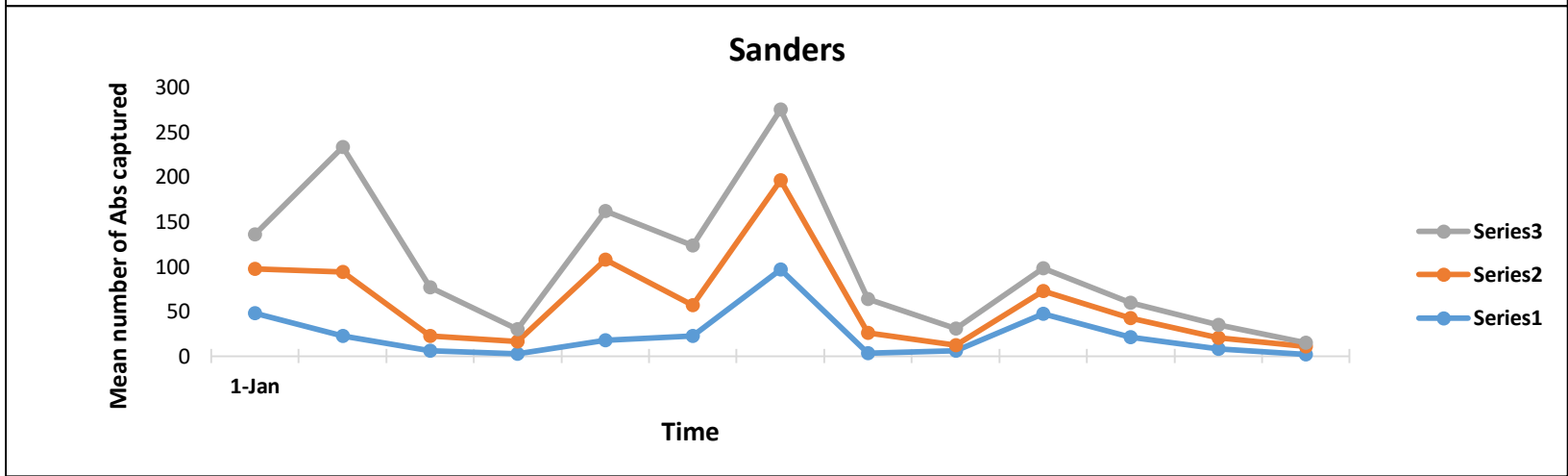
Ambrosia beetles captured over time

Full canopy - most
Topworked – sign. lower
New planting – sign. lower

Consistently more AB activity in full-canopy areas of a grove compared to top-worked and newly planted areas







Recommendations

- Re-institute pruning programs
  - Top-hedge
  - Selective pruning
- Rejuvenation program
  - Hatrack
  - Stump
- Top-work to new cultivars
  - #1 stump
  - #2 regrow selected shoots
  - #3 graft to new cultivar

Hatrack

Stump – topwork, 100's acres

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Mitigation strategies
Recent and potential changes

- Replanting avocado trees
  - 79% of avocado acreage surveyed
  - Of that, 77% of trees lost, were replanted
  - Intent on 1-for-1 replacement

Why?

- Not root grafted to adjacent neighbors
- Less attractive to AB
  - Light regime is high
  - Wood diameters smaller

Additional mitigation strategies

Replant alternative fruit crop

Longan

Exit fruit industry

- Nursery crops
- Vegetable crops
- Development
  - Housing
  - Energy
  - Alternative ag – bread/breakfast, destination

Issues to investigate

Stump tree system (barrier method)

- Attempt to limit the number of trees destroyed adjacent to LW affected trees and limit spread of LW
  - Remove initial symptomatic tree
  - Hatrack or stump adjacent trees
    - Stop transpiration of trees adjacent to a LW affected tree

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Bagging treatments

- Symptomatic trees are sampled for LW and stumped
- Trees covered with pallet bags and sealed at soil level
- Insecticide may or may not be applied to the stump
- Monitored 3”-4” inside stumps with Onset Tidbit temperature probes

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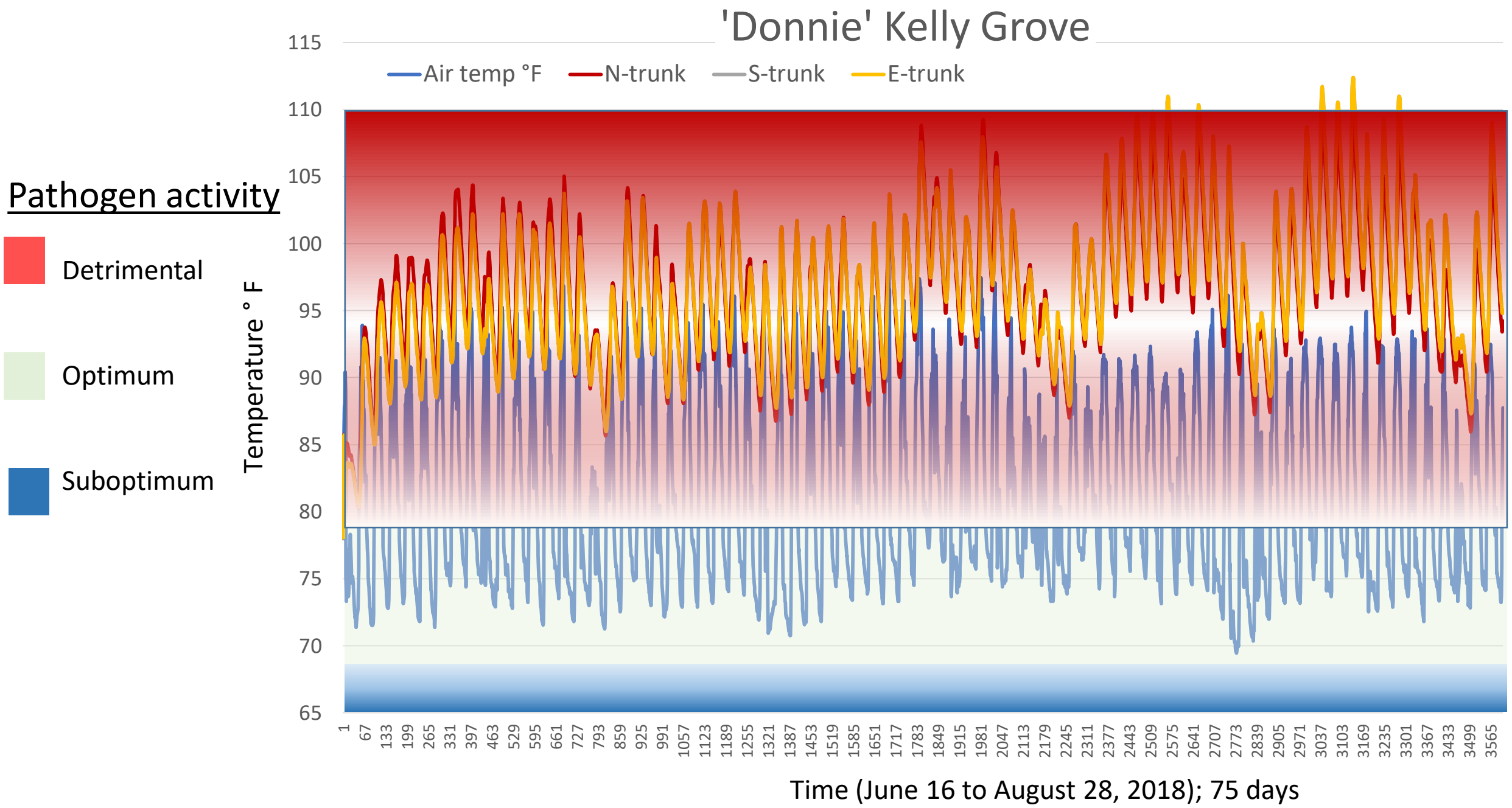
'Donnie' Kelly Grove
Air temp °F
N-trunk
S-trunk
E-trunk
Pathogen activity
Detrimental
Optimum
Suboptimum
Temperature ° F
115
110
105
100
95
90
85
80
75
70
65
1
67
133
199
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3301
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3433
3499
3565
Time (June 16 to August 28, 2018); 75 days

Future applied research

Pathogen

- Improve diagnostics
- Continue the search for fungicide materials and formulations
  - Old materials, new formulations
  - Combination of materials
  - Movement synergists
- Biocontrol agents
  - Antagonists

AB vectors

- Continued evaluation of contact and systemic insecticides
- Continued evaluation of attractants and repellents
- Continued evaluation of biocontrols
  - *Beauveria* strains
  - Other organisms

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Future applied research

Plant Physiology

- Understand rootstock and scion susceptibility to LW pathogen
- Screen germplasm for tolerance

Horticulture

- Continued exploration of grove environmental conditions that reduce the incidence of LW
  - Light management
  - Nutrient management

Economics

- Continued economic analysis
  - Control measures
  - Mitigation strategies
  - Industry viability

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Future extension

- Continue to facilitate the research effort
- Continue
  - Seminar series
  - Field days
  - Internet – email, website, video, publications
  - Meetings as needed/requested
- Liaison with industry
  - Industry-research-extension panel
  - Research funding
  - Regulatory agencies
  - Outreach methodology
- Facilitate pest control registrations
- Continue to develop economic and feasible recommendations

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Recommendation to California industry

- *Determine native and exotic plant LW and AB hosts*
- *Identify potential pathways of LW introduction*
- *Identify AB species capable of contamination with and transmission of the LW pathogen*
- *Work with, support and plan with UC scientists and regulatory agencies to develop a plan for detection, eradication or management if LW is introduced*

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Thanks for your attention

¿Questions?

Laurel Wilt website - http://trec.ifas.ufl.edu/RAB-LW-2/index.shtml

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