Laurel wilt working group

Meeting Notes

Date: Thursday, May 23, 2013
Time: 10:00 AM – 2:30 PM
Location: TREC Classroom (teaching building),
18905 SW 280 St., Homestead, FL 33031-3314

Opening remarks/welcome……Jonathan Crane/Richard Gaskalla

Trapping results/trees positive for LW…..Richard Gaskalla/Wayne Dixon

Dr. Dixon presented an updated map which showed RAB-LW continued to spread in Florida, North and South Carolina, Georgia, Alabama and Mississippi. He also showed a map of the FDACS LW survey sites; 48 RAB trap sites, 28 sticky trap sites, and 19 centennial tree sites. To date 267 RAB have been trapped in urban, natural area, and urban/natural area boundaries. FDACS has confirmed the presence of LW (through molecular testing) in 7 commercial avocado groves.

Current industry LW survey updates and control strategy ...Don Pybas/Jonathan Crane

Dr. Crane and Mr. Pybas presented an update of the LW aerial surveys that took place from late Feb. through late April. A total of 90 suspect trees were identified and ground inspections for all the Feb.-March survey were completed and the April ground truthing was in progress. The number of LW samples taken and avocado trees positive for LW increased from Jan. (1 LW pos.) through April (14 LW pos.). From Sept., 2011 to May 2013, 222 LW wood samples were submitted and 88 were LW positive (~40%). However, about 1,035 avocado trees have been destroyed; attributed to LW infection. Numerous avocado cultivars have been documented to have succumbed to LW; genetic backgrounds include West Indian, Guatemalan, Guatemalan-West Indian hybrids, 1 complex hybrid ('Brogdon') and 1 Guatemalan-Mexican hybrid ('Winter Mexican'). The current early detection and suppression program and the infusion or injection spot treatment with Tilt of non-symptomatic avocado trees adjacent to LW positive trees was discussed.

Research updates and plans

Dr. Peña and Dr. Carrillo: Research update toward management of the redbay ambrosia beetle

Dr. Peña presented data that showed contact sprays of Malathion and Danitol were effective against RAB and that using an adjuvant (i.e., NuFilm 17, Vaporgard) improved the duration of efficacy. He also presented information on the effect of these pesticides on other avocado insects and so far has not detected an increase in the incidence of looper, mealybug, and whitefly insect populations. Jorge then described a systemic insecticide RAB efficacy trial underway to compare injected emamectin benzoate, imidacloprid, cyazypyr and sulfoxaflor. He then described the labs field work with several RAB repellents, CK, CK1 and CK2. Preliminary data suggested CK was superior to CK1 and CK2 in repelling RAB. Dr. Peña then described the

entomopathogenic research underway in collaboration with Drs. Dunlap, P. Avery, J. Navarrete, M. Jackson, R. Behle, and A. Rooney, USDA-ARS researchers in Peoria, ILL. They have determined that several commercial strains of *Beauveria* spp. and *Isaria* spp. will kill RAB within about 4 days and developing methods to inoculate ambrosia beetles under field conditions is planned.

Dr. Carrillo presented information demonstrating avocado wood is not a good host for RAB reproduction and then discussed the need for research into how plant host nutrition may affect host attractiveness and susceptibility to RAB attack and LW disease development. Future plans include developing a trapping system for RAB at low densities, more entomopathogenic trials, and trials on beetle repellents.

Drs. Kendra, Niogret, Montgomery, Schnell and Epsky: Cubeb oil is better than manuka oil for detection of redbay ambrosia beetle

Dr. Niogret presented data that showed cubeb oil's longevity as an RAB attractant is superior to manuka oil. Their lab has also tested other natural compounds and found cubeb=manuka= phoebe>> ginger=angilica>tea>orange=control. Adding ethanol to the natural compounds had no effect. In a field test comparison of a cubeb bubble lure (Semiochemicals Corp.) and a manuka oil lure, the cubeb oil lure was far superior to manuka oil and its usefulness lasted about 8 weeks. They are now perfecting the cubeb lure and recommended it be employed when available.

Dr. Stelinski: Update on behavior modifying chemicals for redbay ambrosia beetle monitoring and management

Dr. Stelinski's lab has found RAB is attracted to the laurel wilt pathogen (*Raffaelea lauricola*) and *Ambrosiozyma* spp. They have identified one blend of five main fungal chemical constituents was highly attractive to RAB and are working with a company to develop a lure. Comparing the efficacy of several of their blends with and without manuka oil they reported the lure of manuka oil + blend D was superior to lure blends A, B, and C with or without manuka oil. He reported manuka oil + blend D lure had the highest and longest release rate and the effect of the blend was synergistic with the manuka oil. Lukas also reported that they have found that odors from *Raffaelea lauricola* may drive RAB boring. He also report that RAB is attracted to eucalyptol and since avocado has little of this compound it may partially explain why RAB is less attracted to avocado trees than redbay trees..

Mr. Monterroso: Tilt rates and application method

Mr. Monterroso presented information on field trials where soil applications of Tilt was applied at 6 week intervals to 35-year-old 'Donnie' avocado trees and that to date the wood residue concentrations were very low (0.1-0.5 ppm). The trial is on-going. He also reported on a bark spray directed Tilt + Pentrabark (2.5% conc.) trial with 8 applications per year at 3 rates every 6 weeks to 35-year-old 'Donnie' and 8-year-old 'Donnie' trees; to date all wood residues are less than 0.7 ppm. Slightly higher residues were detected in the wood of the young 'Donnie' trees. This trial is also on-going. Mr. Monterroso also reported on a Tilt fungicide injection trial using 8-year-old 'Donnie' avocado trees and Quikjet injectors. Trees are injected at 4 to 5 points at the base of the tree and subsequently wood samples are taken at a 3 and 6 ft height to determine Tilt residue concentrations. So far, 1-

3 ppm of Tilt was detected 40 days after injection at 6 ft and 2-7 ppm at 3 ft. After 125 days 36 ppm of Tilt was detected at a 3 ft height. He also sampled wood for Tilt residues at 6 inches, 3 ft, and 6 ft from an injection point and found 1542 ppm, 1.25 ppm, and 0.25 ppm residue concentrations 31 days after injection. He summarized: (1) soil drenching does not appear to be efficacious; (2) bark directed applications with Pentrabark are not very effective and; (c) micro-injection appeared to be the best application method tested. They noted no phytotoxicity at the point of injection or tree canopy.

Mr. Martinez: Tilt injection methods: results and cost comparison

Mr. Martinez showed and spoke about the types of infusion and injection equipment they have been working with (e.g., Quikjet, Arborjet, and Passive-IV). He then presented information on several field tests: (1) compared 3 Tilt application methods using 8-year-old 'Wheeling' avocado trees and found a range (2.0-6.5 ppm) in wood residue concentrations 217 days post-application; (b) same test but using 35-year-old 'Wheeling' avocado trees and after 224 days, 1.2-1.9 ppm residues and (3) passive infused trees with Tilt alone, Tilt+30 ml water or Tilt+230 ml water and higher wood residues in the Tilt alone compared to Tilt+water treatment. Jose went on to estimate the cost to tree young trees was about $3.50/tree and mature trees about $4.09/tree.

Research updates and plans

Dr. Ploetz: Fungicide application methodology and efficacy

- Dr. Ploetz provided an overview of what has been determined with respect to the efficacy of triazole fungicides and propiconazole specifically to control the LW pathogen.
- Macroinfusion appears to protect trees for up to about 11 months.
- Little to no propiconazole residue is found in the fruit.
- Macroinfusion with the current application methodology is expensive.
- Soil drenches and topical bark applications move insufficient amounts of fungicide into the tree.
- Strategies for spot treatments around LW focal points may be able to manage LW.

He then described the plans for multiple efficacy trials (dubbed the Riley Trials) to take place at the Riley Grove. The trials would address 5 main objectives:

- Test propiconazole formulations (injectable and non-injectable).
- Compare pressurized macroinfusion, passive macroinfusion, and injection methodologies.
- Efficacy impact of co-treatments with phosphonates and nutritional additives.
- Efficacy of tebuconazole.
- Compare macroinfusion and injections' efficacy for lateral distribution of fungicide.

Randy then discussed:

- The effect of tree anatomy on potential fungicide movement.
- The concentration of propiconazole inside avocado trees needed to protect them (unknown).

Dr. Tomas Ayala-Silva (USDA-ARS, Miami) then briefly described improvements on macroinfusion equipment they have used: 2-gallon stainless steel tanks, zip-tied hose connections, stabling infusion T's to the flare roots when infusing, inserted a quick release stem valve on the steel tanks to quickly pressurize them from a gas nurse tank, and inserted

an air-release valve to remove air in the system. Tom White then showed slides of dye injected or infused into trees and the superior lateral diffusion of the macroinfused dye compared to injected dye.

Dr. Mills and Dr. Furton: Canine detection of laurel wilt and the redbay ambrosia beetle

Dr. Furton discussed the olfactory abilities and attributes of canines:

- For many detection uses (e.g., biotic and abiotic chemicals) canines are far superior to most current instrumentation.
- Canines have over 300 million olfactory receptors in their nose and can detect in excess of 10,000 individual odors. In contrast humans only have 5 million olfactory receptors.
- Among the many substances canines have been trained to they can detect and differentiate among mold species.
- They are flexible, trainable and re-trainable and can work in numerous indoor and outdoor settings.

Training canines to a substance consists of breaking down the chemical components of the substance/organism of interest and determining which one or ones are best detected. Then this substance is placed into the environment of interest (e.g., airport, grove) and the canine is tested to determine if they detect it. If detectable the canine and substance are calibrated to reduce false positive and negative detections. Currently, Drs. Mills and Furton are in the process of obtaining or re-training a dog to begin testing. In addition, they have submitted a grant to investigate the potential to use canines for early detection of RAB and LW. Drs. Peña and Ploetz will provide RAB and Raffaelea lauricola to Drs. Mills and Furton for training the canine.

Dr. Kuhn or Dr. Gutierrez: Progress report: LW resistance

Dr. Gutierrez reviewed the USDA-ARS long-term avocado and breeding selection program and the technology being utilized to screen 251 accessions for LW resistance, the development of genetic linkage maps which will assist in selecting superior parents to cross, and their plans for testing the crosses in-the-field. They will screen over 1,000 plants from 39 material parents.

Outreach……Denise Feiber/Jonathan Crane

Denise Feiber, FDACS/DPI, distributed the new Laurel Wilt Disease and the Redbay Ambrosia Beetle (Save the Guac) brochure that can be used to inform citizens, regulatory and legislative clientele about RAB-LW. She also spoke about news articles and updates on the FDACS-DPI Laurel Wilt website. Jonathan Crane, spoke briefly about the current status of the recommendations for control of LW.

(c://ext/programs/2012/RAB-LW/LW working group/Minutes from LW Working Group 5-23-13.doc)