

Progress
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on
Forest Pest Management
Issues

Forest Pest Management Cooperative



Nantucket Pine Tip Moth, *Rhyacionia frustrana* (Comstock)

Texas A&M Forest Service
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PEST was a quarterly newsletter initiated in 1996 to provide up-to-date information on existing forest pest problems, exotic pests, new pest management technology, and current pesticide registrations related to seed orchards, forest plantations and urban trees. The newsletter focused on, but was not limited to, issues occurring in the South (Texas to Florida to Virginia.). This is the final issue.

FPMC Discontinued

Forest Pest Management Cooperative (FPMC), initially called the Western Gulf Forest Pest Management Cooperative when it began in March, 1996, is administered by the Texas A&M Forest Service (TFS). The FPMC, with a small staff in College Station and Lufkin, conducts applied research on forest, seed orchard and urban tree pests. After nearly 21 years, TFS decided to terminate the FPMC at the end of 2016. Reasons for this decision were multifold. The FPMC has addressed most of the major insect problems confronting forest industry in the mid-1990s. Accomplishments included development and the field testing of new insecticides or management practices for seed orchard pests, regeneration weevils, Texas leafcutting ants, pine tip moth, and conifer bark beetles, among others. For various reasons, the destructive southern pine beetle essentially disappeared from the Western Gulf Coast in 1997 and has remained at low levels in most other regions in recent years. The change in land ownership from large forest industries to Timber Investment Management Organizations

(TIMOs) and Real Estate Investment Trusts (REITs) effectively reduced the number of current and potential dues-paying members. The financial resources required by TFS to operate the cooperative became unsustainable, particularly given the reduction in outside grant funding opportunities and the declining number of members. The ultimate factor no doubt was the recent decision of FPMC Staff Forest William Upton and Coordinator Dr. Ronald Billings to retire.

The Texas A&M Forest Service wishes to thank all the past and present members of the FPMC for their support and contributions over the years (see the following list). Special appreciation is extended to past FPMC coordinators Dr. Donald Grosman (1996-2013), Dr. Melissa Fisher (2013-2014), and Dr. Ronald Billings (2015-2017) for their leadership and dedicated service. Existence of the Coop would not have been possible without the support of past and present TFS Directors Bruce Miles, James Hull, and Tom Boggus. And success of field operations was due to many other TFS administrators and employees, including Ed Barron, Bill Oates, Allen Smith, William Upton, Larry Spivey, Billi Kavanagh, Jason Helvey, Martha Johnson, Harold Read, Patricia Faries, Joe Pase, Mike Murphrey, and numerous seasonal workers.

Membership in the FPMC grew from five charter members in 1996 to eleven members in 2016. A list of past and recent members of the FPMC follows:

Boise Cascade Corporation (1996 – 1997)
The Bosch Nursery (1996 –1997)
Champion International Corporation (1996 – 2000)
Temple Inland Forest Products Corporation (1996 – 2007)
Texas A&M Forest Service (1996 – 2016)
International Paper Company (1997 – 2005)
Louisiana Pacific Corporation (1998 – 2001)
USDA Forest Service – Forest Health Protection (1998 – 2016)
The Timber Company – (2000)
Willamette Industries (2000 – 2001)
Rhom and Haas, Inc. (2000)
Dow AgroSciences (2001)
North Carolina Division of Forest Resources (2010 - 2012)
CellFor, Inc. (2010 - 2012)
Plum Creek Timber Company (2001 – 2016)
Weyerhaeuser Company (2002 – 2016)
Potlatch Forest Holdings, Inc. (2002 – 2012)
Anthony Forest Products Company (2002 – 2016)
Forest Investment Associates (2003 – 2015)
Hancock Forest Management, Inc. (2006 – 2016)
ArborGen LLC (2008 – 2016)
Campbell Global (2008 – 2015)
Rayonier (2008 – 2015)
International Forest Company (2010-2016)
Arborjet, Inc. (2014-2016)
USDA Forest Service/ International Programs (2016)
International Society of Arboriculture – Texas Chapter (2016)

Major Accomplishments

The FPMC, initiated in March, 1996, and disbanded at the end of December, 2016, provided major contributions in relation to the following forest pests:



Regeneration Weevils

- Pales and pitch-eating weevils were found to be causing significant losses of pine seedlings on certain sites.
- A hazard rating table was developed to predict where losses to regeneration weevils are most likely to occur, based on date of harvest and other factors.
- Based on FPMC field trials, the insecticide Pounce® was registered by the Environmental Protection Agency (EPA) for preventing weevil damage to newly-planted seedlings on high hazard sites.
- In 2005, the insecticide Waylay™ was registered in TX, LA, AR, MS, AL, GA, and VA for weevil control, based largely on FPMC efforts.
- The efficacy of fipronil for weevil control was evaluated.
- Arctic® 3.2EC (permethrin) was confirmed to protect pine seedlings for 6+ months.



Texas Leaf-cutting Ants (TLCA)

- The Texas leafcutting ant (*Atta texana*) is a major pest of newly planted pine seedlings wherever colonies occur in East Texas and western Louisiana, particularly on deep sandy soils.
- Methyl bromide, an insecticide used for leafcutting ant control since the 1970s, was banned for this use in the 1980s.
- The FPMC has evaluated various toxic baits for control of TLCA.
- Sulfluramid bait proved to be very effective for control. A sulfluramid bait having the trade name Volcano® was registered in TX and LA for controlling TLCA, based on FPMC studies. Although very effective, production and sale of Volcano® was discontinued in 2003.
- FPMC studies demonstrated that a second bait containing fipronil, known as BES-100®, was attractive to the ants and effective for eliminating TLCA colonies. Unfortunately, the producer of BES-100 did not seek EPA registration for this product in the U.S.
- Other baits, including Grant's Total Ant Killer bait, Amdro® Ant Block and a modified (larger) Amdro® (hydramethylnon), were tested for attractiveness and control efficacy.
- Based on positive results from FPMC field trials, leaf-cutting ant and red imported fire ants were added to the PTM™ Insecticide (fipronil) label in 2009 and 2013, respectively.
- New toxic baits from Syngenta and BASF (Siesta™) were evaluated in preference and efficacy tests in 2015 and 2016 but these baits were largely ineffective against leafcutting ants.



Seed Orchard Insects (Coneworms and Seed Bugs)

- Coneworms (*Dioryctria* spp.) and seed bugs (*Leptoglossus corculus* and *Tetyra bipunctata*) are major pests of cones and seeds in commercial pine seed orchards, capable of destroying up to 90% of a potential cone crop.
- The FPMC evaluated various approaches for injecting systemic insecticides into seed orchard trees. Two chemicals, emamectin benzoate and fipronil, proved effective for significantly reducing coneworm damage.
- Emamectin benzoate, in particular, provided extended protection from coneworms - up to six years with a single injection.
- The FPMC assisted the Seed Orchard Pest Management Committee in the evaluation of Asana®, Imidan®, Capture® and Coragen® for control of seed orchard pests.
- Injections of emamectin benzoate, imidacloprid, thiamethoxam and dinotefuran reduced damage by seed bugs in loblolly pine seed orchards, but the effects did not persist for more than one year.
- Based on positive results from FPMC field trials, coneworm and seed bugs were included on the TREE-age® label registered in 2010.
- In 2016, the FPMC evaluated the effectiveness of Sivanto™ and XXpireWG™ insecticides for control of seed orchard pests.



Nantucket Pine Tip Moth

- The Nantucket pine tip moth (*Rhyacionia frustrana*) is a common pest of young pine seedlings and infestations reduce height and volume growth and often cause seedlings to fork.
- More than 100 plots on 76 sites were established in TX, LA, and AR to assess the impact of tip moths on the growth of pine seedlings. Seedlings protected from tip moth damage with insecticide sprays for 2 years showed significant increases in height, diameter, and volume growth, compared to unprotected seedlings. In most cases, growth differences disappeared after 5 years.
- A hazard rating model for tip moths was developed, based on site factors from 76 sites.

- Multiple trials were conducted to evaluate fipronil, imidacloprid, and other chemicals, applied in the nursery and the field, for protecting pine seedlings from tip moths. Different application rates and techniques for applying insecticides for tip moth control were compared.
- Seedlings treated with a single application of fipronil grew at an accelerated rate through three growing seasons compared to seedlings unprotected from tip moth damage.
- Based on positive results from FPMC field trials, both SilvaShield™ Forestry Tablets (imidacloprid) and PTM™ Insecticide (fipronil) were registered with EPA in 2006 and 2007, respectively, for protecting pine seedlings from tip moths.
- A novel plug injection system for injecting containerized pine seedlings with insecticides for protection against pine tip moth was developed and evaluated. Its use was added to the PTM™ Insecticide label in 2013.
- Field studies to determine the optimal timing for a single spray application of insecticides for pine tip moth control were conducted in 2014. Results suggested that spraying a single tip moth generation was not consistently effective for reducing losses to pine tip moth throughout the year.



Bark Beetles

- Several systemic chemicals were tested as a means to prevent attack and/or brood production of southern pine engraver beetles (*Ips* spp.).
- Emamectin benzoate, fipronil, abamectin and nemadectin proved especially effective in preventing *Ips* attacks on standing, weakened pines as well as on pine logs.
- In conjunction with cooperators, the FPMC implemented studies to evaluate the efficacy of emamectin benzoate, fipronil and abamectin for protection of trees from *Dendroctonus* bark beetles, including the southern pine beetle in Mississippi and Alabama, the western pine beetle in California, the mountain pine beetle in Idaho, Utah, Colorado, and British Columbia, the spruce beetle in Utah, and the black turpentine beetle in Texas.
- Based on FPMC studies, emamectin benzoate was registered by EPA as a restricted use systemic insecticide for a variety of forest and urban tree pests, including pine bark beetles and wood borers. Sold under the tradename of TREE-äge™, emamectin benzoate has enjoyed wide use for protecting ash trees from the invasive emerald ash borer.
- Field studies carried out in Virginia, Alabama and Mississippi have shown that injection of selected trees with emamectin benzoate, followed by baiting with SPB pheromones, shows promise as a means to control low levels of southern pine beetle in a trap-tree tactic. Attacked trees failed to be successfully colonized and no SPB broods were produced, although most injected trees eventually died from blue stain fungal infection.
- Winter injections of TREE-äge™ proved effective for preventing SPB brood production with dosage levels as low as 1.25 ml/inch diameter.
- Trees injected with TREE-äge™ in November 2014 were still effective as trap trees when mass attacks by SPB were induced 18 months post-injection.
- Research findings revealed that pines may be simultaneously injected with emamectin benzoate and baited to induce SPB attacks with similar results. Particularly in situations of moderate and low SPB population pressure, there is sufficient time between baiting and complete mass attack for the target trees to take up and distribute the insecticide.
- Field trials in Louisiana, Mississippi, and Alabama in the spring and fall (2016) showed that a lure consisting of frontalin, *endo*-brevicommin (displaced by 4 m) and Caribbean pine turpentine or frontalin, Sirex sleeve and *endo*-brevicommin were consistently the most attractive lures for southern pine beetle while the standard lure (frontalin + Sirex sleeve) used in Southwide prediction surveys since 2005 was the least attractive lure. The protocol for the SPB Prediction System will be modified accordingly to improve the prediction of pending outbreaks.



Invasive Pests

- Based in part on positive results from FPMC field trials, TREE-äge™ (emamectin benzoate) was registered with EPA in 2009 for protecting ash from emerald ash borer in the Great Lakes Region.
- Emamectin benzoate proved especially effective in preventing additional colonization of chalcid wasps on Afghan pines near El Paso and Midland, TX.
- Emamectin benzoate has shown activity in preventing additional attacks of the Mexican soapberry borer on western soapberry near Anderson, Dallas and Houston, TX.

Other Accomplishments

- Systemic insecticides were evaluated for prevention of acorn weevils and other oak pests in live oak, cherrybark oak and bur oak and for termites in pine.
- Emamectin benzoate injections into loblolly pine trees were evaluated but found ineffective for preventing colonization of the pinewood nematode in logs destined for export.
- Trunk injections of plant growth regulators were evaluated for phytotoxicity and reduction of fruit production in sweetgum.
- Various commercially-available micro-injection systems were evaluated for treating live oak trees with the fungicide propaconazole (Alamo®) for prevention of oak wilt in Central Texas. Overall, all systems were effective in preventing oak wilt infection.
- Additional tests are underway to compare macro- versus micro-injection systems for prevention of oak wilt in Central Texas as part of a 3-year U. S. Forest Service-funded study.
- Additional studies have been carried out to address pest problems with conifer mites and hypoxylon canker.
- Studies were conducted in Tennessee to evaluate the effectiveness of emamectin benzoate and propiconazole for prevention of walnut twig beetle, the vector of thousand cankers disease in black walnut. Although beetle survival in infested trees was reduced, the treatment was ineffective for preventing thousand cankers disease.
- Sporax™ (Borax fungicide) was reregistered in Texas for prevention of annosus root disease.
- BotaniGard™, containing the fungus *Baeuveria bassiana*, did not persist for long periods under summer conditions in East Texas and provided no control of SPB on treated trees in Alabama.
- Annual reports of accomplishments were prepared and presented to members of the FPMC Executive Committee.
- A FPMC webpage was developed for use by the general public, with a Members Only section to allow access to annual accomplishment reports and *PEST* newsletters.
- Numerous publications were prepared to document FPMC accomplishments.
- Technical assistance and information on forest pests, as well as on-site visits both nationally and internationally, were provided to members upon request.
- Since it began in 1996, the FPMC generated more than \$1.2 million in federal research grants and donations from chemical companies to supplement its research projects.
- The newsletter *PEST (Progress, Education, Science and Technology)* was prepared and distributed quarterly to FPMC members since 1996. This is the final issue.

ADIOS

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U.S.D.A. Forest Service,
Forest Health Protection (R8) and
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Weyerhaeuser NR Co.

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